



Unlocking untapped value

EPO SME case studies on IP strategy and IP management



Dear readers,

A thriving SME sector is widely accepted as one of the building blocks of a competitive and sustainable economy. With ambitious ideas and innovative solutions, small and medium-sized enterprises are often attributed with injecting great energy and productivity into both traditional and new sectors.

The EPO's mission is to support such innovators, as well as the European economy as a whole, by providing robust patents and access to published patent information. But if the power of such IP is to be fully exploited, a better understanding needs to be created about how patent protection and information can be used effectively by innovative companies, regardless of their size, sector or location.

The EPO has therefore produced this series of case studies to highlight how some SMEs are effectively leveraging the power of patents to help achieve business success. These 12 case studies have been put together to include a cross section of SMEs from across Europe, encompassing 11 of our member states, and ranging in size and sector. They provide comprehensive accounts of the different ways in which IP is playing an integral role in the development of some enterprises. The examples show how SMEs are using patents as a powerful tool to support their corporate strategy and even, in some cases, as the very foundation on which to build their business.

For some, patents defend an SME's technologies in a highly competitive sector, or help it to truly stand apart from other technologies in the field. Others in this volume attest to the way in which patents can help enhance perceptions that they are investing in a unique technology, or boost confidence in the innovative nature of the company. These are just a few of the advantages that are presented in the case studies.

Each case study features a number of "takeaway" points highlighting factors that have contributed to successful IP management. These include, for example, the potential for the use of customer feedback in developing new innovations, the benefits of regular consultations between in-house IP practitioners and management, the use of patent information to analyse prior art, freedom to operate and the competitive landscape, and the advantages of spreading IP awareness throughout the company.

These case studies will therefore help to create a wider awareness of the different ways in which patent protection can be employed. With the prospect of the coming Unitary Patent and the Unified Patent Court, they also underline how SMEs are set to benefit from reduced costs of up to 70%, a simplified application procedure and greater legal certainty. Whether it is the Unitary Patent or the classical European patent, or a combination of the two, both can help to support the success of SMEs in Europe.



Benoît Battistelli
President, European Patent Office



Executive summary

Each year, around one third of the total number of applications that are received by the EPO come from small and medium-sized enterprises (SMEs). By raising awareness of the benefits of intellectual property, the EPO aims to ensure that the share of applications from SMEs remains high and can even increase further. The EPO has therefore carried out twelve case studies looking at how European SMEs use patents, to encourage a greater understanding of the positive impacts of effective IP.

The companies selected for the study reflect the diversity of European SMEs, ranging from energy and the environment to biotechnology and communication technologies. They include start-ups and university spin-offs at various stages of development, as well as more traditional family-type enterprises whose business models are based on patented inventions and who have followed different commercialisation paths.

Analysis of the case studies enables two conclusions to be drawn. Firstly, SMEs have leveraged the power of patents to deliver a range of benefits which goes beyond a reliance on patents for protecting their products and services. Secondly, good IP strategy and IP management in the featured SMEs can be attributed to several key principles.

1. Leveraging of patents

Besides relying on patents to protect their products and services in the market, the selected SMEs have developed additional ways of further benefiting from their IP:

- Licensing – SMEs can license out patented inventions to external partners (Aerogen, Fractus, Marinomed).
- Enabling collaboration – Enterprises can use patents as a bargaining chip to obtain freedom to operate (Webdyn), make use of third parties' patents (Lithoz, Orcan Energy, Voltea), or set up collaborations (Aerogen, Ekspla, Fractus).
- Attracting investment and customers – Patents help SMEs to attract investors (Orcan Energy, Fractus, Marinomed, Voltea) and support their image towards consumers as companies offering high-quality products (Cosmed).
- New markets – In several cases (Ekspla, Picote, Fractus), patents have been pivotal in enabling companies to renew their business models and enter into new markets.













2. Good practices in IP strategy and IP management

Good practices in IP strategy and management prove instrumental in the ability of these SMEs to successfully derive value from patents. As shown in the case studies, they are based on common principles:

- Aligning IP strategy – All the SMEs recognise the importance of defining a clear and proactive IP strategy that is aligned with corporate goals, involves planning with other corporate departments as well as external experts, and is promoted by the top management.
- IP in the decision-making process – The studies likewise demonstrate the importance of effective IP management to feed the strategic decision-making process with relevant and timely information. Both time and money can be saved by keeping up to date with changes and developments, for example in the patent system (Skeleton, Marinomed, Ekspla, Micrel Medical Devices).
- Holistic IP management – Most of the SMEs use a holistic approach to IP management and strategy, involving in-house as well as external experts and covering the business, legal and R&D views (Aerogen).
- Future IP possibilities – SMEs are examining the benefits that can be brought by forthcoming developments in IP. There is an awareness that the Unitary Patent and Unified Patent Court will simplify administration, reduce costs and provide greater legal certainty. Such benefits are seen as a potential tool for helping SMEs to enter previously unconsidered markets.

All the featured SMEs face the same challenges of building and administering an international patent portfolio with limited resources. This comprehensive set of case studies reveals how European SMEs can cope with these challenges by unlocking the untapped value of patents. It shows how SMEs from different regions and sectors can better exploit their IP by developing a creative, proactive and value-oriented approach to patents and other IP rights.

The presented SME case studies

		Company	Country	Technical field	Main product
	5	Aerogen	Ireland	Medical technology	Nebulizer
	11	Cosmed	Italy	Medical technology	Biomedical measuring device
	17	Micrel Medical Devices	Greece	Medical technology	Infusion system
	23	Marinomed	Austria	Biotechnology	Anti-viral technology
	29	Webdyn	France	Digital communication	IP gateway
	33	Fractus	Spain	Telecommunications	Fractal antenna
	39	Ekspla	Lithuania	Optics	Laser
	45	Orcan Energy	Germany	Electrical machinery, apparatus, energy	Waste heat power generator
	51	Skeleton	Estonia	Electrical machinery, apparatus, energy	Ultracapacitor
	57	Voltea	The Netherlands	Electrical machinery, apparatus, energy	Water deionisation module
	63	Lithoz	Austria	Other special machines	Machine for manufacturing of ceramics
	69	Picote	Finland	Other special machines	Tool for cleaning and repairing pipes

Click on the icon to navigate to the case study.



Europäisches
Patentamt

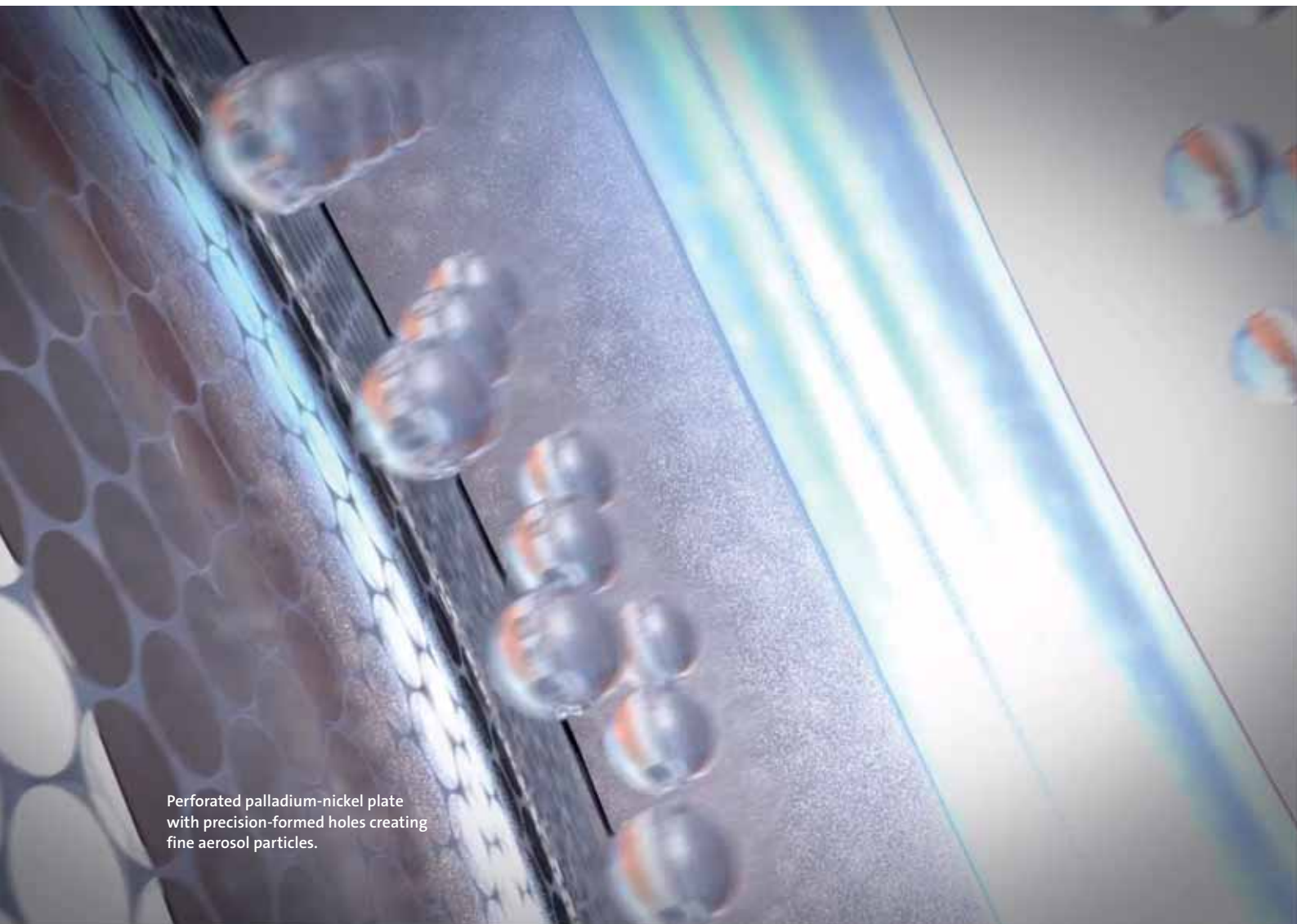
European
Patent Office

Office européen
des brevets

EPO SME CASE STUDIES | AEROGEN

Breathing new life into aerosol drug delivery

Aerogen began as a small start-up in Ireland based on an aerosol technology and has established itself as a global leader in the hospital sector for high-performance aerosol drug delivery for ventilated patients. At the heart of the aerosol technology is a nebuliser that differentiates Aerogen's products from competitors and is central to an extensive patent portfolio, which has proved to be a valuable asset in creating strategic partnerships with global leaders in the critical care respiratory sector and accelerating the acceptance of Aerogen's technology in the market. The company has found it beneficial to conduct an annual meeting with its IP management team to review and refine its IP strategy. Collaborations with outside research groups also support Aerogen's R&D and IP activities.



Perforated palladium-nickel plate
with precision-formed holes creating
fine aerosol particles.

“Aerogen is the first company in the world to develop technologies for high-performance aerosol drug delivery in acute care,” says founder and CEO John Power. The company has established itself as the global market leader in acute care drug delivery for ventilated patients. Strategic partnerships with leading companies in the sector played an important role in the acceptance of Aerogen’s innovative nebuliser technology for application in aerosol drug delivery.

Aerogen established its credentials in the sector by integrating its technology into the global leaders’ products and demonstrating that it brought superior performance. This acknowledgement and acceptance of the technology gave rise to strategic licensing and distribution partnerships that brought Aerogen’s technology into hospitals.

The company was originally created in 1997 by John Power as a small start-up in Galway, Ireland. It grew steadily through a US merger, followed by an initial public offering on the NASDAQ, a subsequent acquisition by a leading biopharmaceutical drug discovery company and, finally, by a management buyout in 2007, which Power saw as “an opportunity to grow our business and expand our product offerings.” Today, the company employs 160 people specialising in the development, design, manufacture and commercialisation of aerosol drug delivery systems, with headquarters in Galway and offices in the US, UK and China. The products are sold both directly by Aerogen and also under licence by its partnered companies.



The Aerogen Solo Nebulizer is suitable for solutions, suspensions, proteins and peptides.

A vibrating mesh technology lies at the heart of Aerogen’s nebuliser products. From its early inception, the company’s goal has been to apply its patented technology to the development of nebulisers for application in the field of medical care. The nebuliser technology enables liquid medication to be transformed into a fine particle mist, gently and effectively delivering a broad range of drugs deep into the lungs of critically ill patients, which results in drug deposition rates far greater than can be achieved by conventional aerosol technologies.

“Undoubtedly, our greatest success as a company has been that, to date, over five million patients throughout the world have benefited from our aerosol technology and products and we are extremely proud of being the first people in the world to introduce aerosol delivery to premature babies.”



John Power
Founder and CEO, Aerogen

In recognition of these achievements, Power was named RSM European Entrepreneur of the Year 2016.

A portfolio with substance

Aerogen is an innovation-driven company earning its success from a suit of patents that enables it to stand apart from other technologies and products. The patent portfolio currently consists of 14 patent families, which bring clear benefits to the company from both a tangible (monetary) and intangible (business support) perspective. At a fundamental level, these patents are important, because they enable Aerogen to defend its technology in a competitive environment. They also support the customer’s perception that they are investing in a unique and technically superior product. In discussions with clients and investors, Aerogen emphasises the formidable presence of patent protection for its products. Its patent portfolio has been a valuable marketing tool for promoting integrity, confidence and the uniqueness of its technology and products.

TAKEAWAY

PORTFOLIO AND GROWTH

Customers and investors consider it very important for a young company to have strong IP. Company scale-up must then focus on building the IP portfolio. The larger the company, the greater the customers' expectations for strong IP that will be properly defended.

Establishing a presence

"Aerogen, as a small company, had to find a way to address the large global international markets," says Power. As a newly-formed SME with a technology that is suitable for delivering better patient care throughout hospital units, the initial strategy was to approach leading companies in the acute care respiratory sector and to convince them that Aerogen's drug delivery technology would add value to their own life support ventilator products. Key to overcoming this challenge and gaining recognition from global leaders was a patent portfolio with broad geographical coverage and a wide scope of patent claims protecting the core technology and a diverse range of product applications. Partnered companies could gain access to the technology under licence and integrate it into their own products. Aerogen has thus established partnerships with some of the world's leading mechanical ventilation companies, such as Philips Healthcare, GE Healthcare, Maquet, Hamilton Medical, Medtronic, Covidien and Dräger.

"Our partners expect strong IP and that the company is prepared to defend it. They performed a thorough due diligence investigation of our IP during negotiations."



Brendan Hogan
Senior VP Engineering, Aerogen

The vibrating mesh technology was placed inside the ventilators of some partner companies and also distributed by others, which accelerated the acceptance of Aerogen's technology as the most advanced aerosol drug delivery technology available in the critical care market. The patent portfolio proved to be a valuable asset at each phase of the company's growth and today it underpins company valuation. It also attracts investment capital for its speciality pharmaceutical division Aerogen Pharma, which is engaged in product development and clinical trials for new drug-device combinations.

IP and R&D that draw profits

There are also clear monetary benefits that Aerogen can point to in assessing the value of its patent portfolio. "We work from a 60% gross margin platform and our strong IP position affords us this, which is at a considerable premium to our competitors," says Hogan. "The cheaper products on offer are quite different to ours and generally not patent-protected. Compared with the basic jet nebuliser products on the market, our products are priced forty- to fiftyfold, or tenfold compared with the more sophisticated forms." From its partnership agreements, Aerogen receives a one-off licence fee for customisation of its nebuliser products, e.g. the Aerogen Solo®, or a royalty on sales for the more sophisticated products that combine a drug and nebuliser in one device.

TECHNOLOGY PROFILE



The technology that differentiates Aerogen's products from other nebulisers lies in the aerosol generator Aerogen Vibronic®, which is a vibrating mesh constructed from a palladium-nickel plate (5 mm diameter) perforated with 1000 precision-formed holes, which pulses at 128 000 times per second, drawing the liquid through the mesh and creating a fine aerosol containing particles less than 5 µm in diameter. This is the optimal size to achieve lung penetration of a drug and is particularly important in acute care intervention.

Since 2008 the company has achieved an annual growth rate of 30% through product sales in over 75 countries worldwide, and recorded revenues of EUR 40 million for 2015. Aerogen owes this impressive growth rate to its investment in R&D: “We see innovation and IP as the very core of our business,” says John Power. This has allowed the company to exploit market opportunities as they have arisen, and it continues to reinvest a large portion of its turnover back into research, which for 2016 amounted to EUR 5.2 million.

Defending intellectual property

A core objective of the company’s IP strategy is to constantly build on the patent portfolio with a wide scope of patent claims, which can be called on to challenge reverse-engineered products entering the market and to set down a marker that the company is prepared to defend its market position. Aerogen has already drawn on this “defensive role” of its patents by initiating an infringement action, which is currently ongoing. New patent filings focus on strengthening protection for current products and identifying strategies for new products, such as those based on drug-device combinations, for the future direction of the business. Technologies and product applications that are not specifically in the company’s current plans for commercialisation are also closely considered, with the aim of widening the scope of protection for potential future technology applications.

The Unified Patent Court (UPC) could influence Aerogen’s strategy with respect to “opting in” to the Unitary Patent, as the company is currently defending a European patent validated in an EU country and has issued infringement proceedings against a competitor. This is a lengthy and unpredictable process. In future it might be beneficial to obtain a Unitary Patent instead of a classical European patent, as a decision in infringement proceedings will be issued much more quickly by the UPC than by a national court and be based on harmonised laws. Moreover, the court decision will be binding in up to 26 countries at once.

Trusted counsel

Aerogen has a long-established relationship with three patent attorneys – one in Ireland, one in the US and one in Germany – and relies on their counsel for IP strategy. They not only provide the routine services of filing and prosecuting patents, but also engage closely with the company to understand its business model and technology strategy, so that they can advise appropriately on how to achieve the company’s business goals. The Irish attorney’s firm has advised the company since its very first patent application

and has grown to know the business intimately. For this reason the firm remains a key adviser on IP strategy, patent portfolio building and competitor intelligence. The US is a major market for the business, and having a patent attorney present in the territory to advise on specific aspects of US patent practice and to contribute knowledge of competitor patents and businesses in the US adds considerable value to IP strategy discussions. Likewise, Germany is Aerogen’s largest market in Europe, and local knowledge, particularly in supporting its action to defend its patents, is essential.

TAKEAWAY

EXTERNAL COUNSEL

For an SME, it is critical to build trusted relationships with dedicated patent attorneys who have the technology-relevant expertise required for claim drafting. Clear communication about the technology, product goals and business needs establishes expectations and sets the focus moving forward.

The IP team is managed by Brendan Hogan, Senior VP Engineering, with support from R&D manager Conor Duffy and a number of his staff. They have implemented management processes that support the creation and capture of IP and assist in developing the portfolio. Tools related to these processes include confidentiality agreements, laboratory notebooks, invention disclosure forms and an evaluation and selection process.

Regular strategy meetings

Patents play a critical role in supporting Aerogen’s business objectives, so in addition to regular consultation, a one-day meeting with the patent attorneys is convened once a year. This annual meeting, which focuses on technology strategy, products and technical advancements, is instrumental in formulating the company’s IP strategy. Innovations in areas the company would like to exploit and intends to expand into are examined with the goal of identifying developments that could be included in new patent applications and patent claims. The IP management team is presented with a clear understanding of Aerogen’s intended direction and goals for creating value through IP.

The strategic objectives from the annual meeting translate into practical endeavours to achieve agreed IP objectives and provide advice on what to patent and what not to patent, where to patent, assessing potential infringers and monitoring the status of competitors’ patents and relevant third-party patents and their prosecution.



Aerogen's technology applied in patient care.

TAKEAWAY
IP STRATEGY

Successful commercialisation of an innovative technology must be guided by a clear IP strategy that is aligned with other key functions of the business.

Tracking and managing competitors

Maintaining up-to-date patent database searches for new patent applications, freedom to operate (FTO) searches, competitor watches and patent trend analyses are primary aspects of IP management that influence the company's IP filing strategies. The team regularly creates and updates a list of company names on which it performs a competitor sweep every quarter using RSS feeds from the EPO search products and its patent lawyers. These searches track the prosecution of relevant patent applications to see what claims are being granted. Patent specifications are reviewed to obtain an FTO clearance and also to assess whether products derived from a competitor's patent might give rise to an infringement of Aerogen's patent claims. Aerogen relies on this intelligence to remain agile and responsive to market conditions, and fine-tunes its IP strategy and policies accordingly.

In addition to monitoring the list of patents and competitors, Aerogen's sales team and distributors constantly highlight anything in the market that might compromise the company's product sales. When Aerogen is alerted to such instances, it gathers product information for analysis, such as the "directory for use," photographs, samples where possible and any other relevant information. The samples are dissected and examined against the Aerogen patent claims. A consultation with the Irish patent attorney fol-

lows and the matter is subsequently referred to the patent attorney in the relevant region to advise on the most appropriate course of action.

TAKEAWAY
SEARCH MATTERS

Competitor watches and patent searches are essential components of IP management.

Portfolio-building

Proposals for inventions are shared via the company's invention disclosure form. These are reviewed by the IP team and sent to the patent attorney for discussion. They also provide the essential information for drafting a patent application in the event a decision to file is agreed.

Aerogen organises in-house IP training twice a year, as an introduction for new employees and a refresher for existing staff. This pays dividends in the reporting and capture of new IP. Although there is no formal system for documenting specific methods, processes, formulations and other industry know-how, the relevant information is included in process designs and specifications, which are recorded electronically, as well as in the laboratory notebooks. Proposed inventions are analysed to see if the method for manufacture, the design or the function could be reverse-engineered from the final product. If not, then a decision to retain the information as a trade secret is often preferred to patenting.

Traditionally, Aerogen's core IP has been developed in-house, and although the company does not have a formal "open innovation" strategy, its IP portfolio is supplemented by outside collaborations with universities that perform explora-

tory work on the technology. “We go outside to access expertise that is not available internally and to determine if there is a particular skill-set we have a need for, or wish to bring in-house. It also allows us to do exploratory research work at a reasonable cost compared with doing it in-house, where the immediate demands of product delivery can delay these kinds of early-stage activities” says Conor Duffy, R&D manager. It is Aerogen’s policy to acquire the IP developed in these collaborative projects and negotiate a grant-back licence for applications outside its field of use.

TAKEAWAY

OPEN INNOVATION

Collaborating with universities and research organisations provides an opportunity to perform early-stage research and acquire new skill-sets at a reasonable cost without having to compete for overstretched internal resources.

Filing considerations

Aerogen’s patent filing strategy is only driven by the necessity to protect innovations central to the company’s technology and products as this is paramount for creating value through IP.” Priority patent applications are filed at the EPO, and thereafter, international applications cover territories worldwide on a case-by-case basis and reflecting market importance. The patent applications are evaluated and reconsidered at each important stage: priority filing, end of the priority year, publication, and national filing. Initially, the EPO filing is used to obtain a quick search report, which on review may cause the company to modify the patent claims or file divisional applications. If claims granted by the USPTO are considered too narrow, Aerogen will often file continuation applications prior to grant to try and protect other aspects of the invention separately.

When selecting countries for IP protection in Europe, Aerogen conducts a cost-benefit analysis to ensure its market choices are strategic and prudent. “We don’t see the current system as a problem, because we generally validate in Ireland, the UK, Germany, the Netherlands and France, and in some cases some of the Nordic countries, which are relatively cheap,” says Hogan. “This covers most of our major markets.” However, upon request by licensed partners who are active in countries outside this selection, a patent will be validated in additional territories as agreed and the corresponding patent costs covered by the licensee.

On the other hand, Hogan sees clear advantages to a Unitary Patent. It would be considered a very significant improvement for the business compared with the classical European patent, as it would lead to a higher value and lower cost outcome

by providing protection for up to 26 countries without fragmentation in the EU market. This in turn would give Aerogen enhanced flexibility to enter countries that are less important to the business currently, but which may become relevant in the future. “We are always exploring options to expand, either directly or through licensing, and the extended geographical coverage of the Unitary Patent may assist us in this regard, as countries not important to Aerogen for direct sales, but important for our licensees, would be covered by the wider scope of the Unitary Patent,” says Hogan. Patent filing decisions will still be subject to a strategic analysis, and many decisions will be made on a case-by-case basis.

“Initially, I would anticipate that for some inventions we may opt for the basket of countries provided by the Unitary Patent, but for others (possibly those which are the most important commercially) we will likely continue with the classical European patent and individual country selection. We are closely monitoring progress on the Unitary Patent and regularly discuss it with our patent attorney, who keeps us updated,” says Hogan.

COMPANY PROFILE

AEROGEN LTD

- > Headquarters: Galway, Ireland
- > Year of establishment: 1997
- > Staff: 160
- > Turnover: EUR 40 million (2015)
- > www.aerogen.com

PRODUCTS/SERVICES

High-performance aerosol drug delivery technology. The aerosol generator Aerogen Vibronic® is a vibrating mesh creating a fine aerosol containing particles less than 5 µm in diameter. This is the optimal size to achieve lung penetration of a drug.

MARKET AND TECHNICAL AREA

Medical devices, hospital care health systems and health providers, ventilation in critical care, life-support ventilators

CUSTOMERS

Medical device and healthcare companies, hospitals, health systems and health providers, ventilation companies, including: Medtronic, Philips and GE

SELECTED AWARDS

- 2013 Medical Technology Company of the Year
- 2016 RSM European Entrepreneur of the Year

PATENT PORTFOLIO

14 patent families, including EP1278569, EP1896662

Further SME case studies at epo.org/sme

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Disclaimer: Any opinions expressed in this case study are those of the author or the company and not necessarily those of the European Patent Office.



EPO SME CASE STUDIES | COSMED

At the cutting edge of cardiopulmonary diagnostics

Italian company Cosmed has a reputation for laboratory-based medical device products which is founded on sound IP. The market is competitive, with a limited number of players, so reputation is critical to securing a leading role. Patents assure customers that products are innovative. They increase visibility and recognition, and justify premium prices. When co-operating with external partners, IP also makes everyone's boundaries clear from the start and prevents any confusion moving forward. Medical technology must comply with regulatory requirements in order to enter the market. This takes time, so Cosmed chooses to establish IP early to safeguard its investments.



Performance diagnostics with spiroergometry using Cosmed's wearable metabolic technology.

Founded in 1980, Cosmed has become a leader in the fields of industrial design, the development and manufacture of diagnostic equipment, and scientific research in the med-tech industry. With a business model based on direct and network sales, it has established subsidiaries in Germany, France, Switzerland, the US, China, and Australia, and has distributors in Russia, Brazil and Korea.

The company's wide range of products includes spirometers, portable systems for the analysis of respiratory function and nutrition, and systems for the execution of cardiopulmonary exercise testing for metabolism and body composition. They can be used in a variety of fields, including pulmonary sports medicine, cardiology, clinical nutrition, rehabilitation and occupational medicine and pedagogic physiology.

One of the innovations that Cosmed has launched on the world market since 2005 is the FitMate series, a set of products for measuring resting metabolic rate, maximum oxygen consumption and spirometric parameters. Competitive pricing, ease of use and low maintenance requirements have allowed Cosmed to penetrate market sectors that were previously inaccessible, such as fitness and private dietetics.

In 2006, Cosmed updated its entire range of stationary laboratory testing products. It introduced innovative modifications for the analysis of pulmonary function (Quark PFT), cardiopulmonary exercise testing (CPET Quark) and the determination of resting energy expenditure (Quark RMR) and launched the plethysmograph cabin (QBOX). These

improvements were brought about by applying innovative approaches to user-driven input while marrying ICT solutions with effective product design. The products combine hardware and firmware with interface control (a house-developed proprietary software suite called Omnia, which is encrypted for security and runs on Windows platforms).

Over the years, Cosmed has established strategic and business agreements with other companies and institutions, as both supplier and customer. These companies include Ergoline, Bosch, Adidas (Germany), US Army, Apple Inc. (US), Nihon Kohden (Japan), NORAV (Israel) and the University of Rome Tor Vergata (Italy). Cosmed products have also been used in high-profile settings such as the James Bond film Skyfall, and the White House.

“In this market, you cannot claim to have cutting-edge products and then let your customers discover that you don't have any patents. You must have patents.”



Paolo Brugnoli
Head of R&D and lead inventor,
Cosmed



Cosmed's K5, a wearable metabolic system designed for measuring metabolic parameters both in the field and in the laboratory.

Reputation-backed IP

Intellectual property plays a crucial role for Cosmed. The company has adopted a comprehensive approach to making the best use of patents, together with trade marks, design rights and copyright, to cover individual products. Cosmed's FitMate, for example, is protected by patents, registered as a trade mark, and uses copyright-protected software.

The worldwide market for metabolic devices has a limited number of players, which makes the competitive environment more intimate. Because of these conditions, reputation is of the essence and is boosted by a solid IP portfolio. Establishing a strong IP position is instrumental in growing the company's market share, keeping other companies at bay and maintaining the capacity to enforce patents against infringers if necessary. Cosmed has added to its portfolio by acquiring a small manufacturing company with an attractive set of products and patents.

Cosmed relies on its patent portfolio to build its reputation in the med-tech industry, where high-tech and IP are synonymous with reliability and quality. In doing so it assures users that its products are of a high standard and designed for a positive impact on human health and life. A strong IP portfolio also justifies premium pricing for pioneering technology. Cosmed's brand name, market visibility and recognition are bolstered by a comprehensive IP portfolio, including trade marks and design rights that cover high-tech, user-friendly products.

Dealing with market particularities

Before they can be put on the market, medical devices must comply with regulatory requirements for safety and compatibility and must acquire certification. They must be reliable and affordable, and easy to use, clean and store. It can take up to ten years for a product in the med-tech field to go from concept to market. Obtaining intellectual property rights early on creates safer conditions for investing in design and testing. Patents offer protection from imitation until the product can eventually be sold.

TAKEAWAY

HOLISTIC IP MANAGEMENT

It is important to have strong, high-quality patents originating from sound IP management in which internal and external influences on the patent portfolio are under control.

To develop innovative devices, Cosmed co-operates with external experts and consulting firms specialising in health-care product design. Here again, careful management of intellectual property is very important to avoid loss of control of its innovative efforts and to prevent dilution or confusion with a third party's knowledge and concepts. Co-operation is safer when IP ownership is clearly defined from the outset. Established IP creates "transactional security", which makes parties more comfortable sharing information and open to co-development efforts that do not impinge on the proprietary knowledge and expertise of partners.

TECHNOLOGY PROFILE



The K5 is the fourth generation of Cosmed's family of wearable metabolic systems developed and designed for the measurement of metabolic parameters such as oxygen production (VO₂), carbon dioxide production (VCO₂), ventilation, energy expenditure and heart rate. The K5 unit contains 3D motion sensors and GPS in order to combine metabolic analysis with speed, cadence, stride, steps and related parameters. It also includes the IntelliMET patented dual gas sampling system (EP2769673), which allows users to choose between two different breathing modes. The mixing chamber mode can be used to obtain average measurements of oxygen and carbon dioxide consumption within a number of breathing cycles and is suitable for use on athletes. The breath-by-breath mode can be used to carry out instantaneous measurements of consumption during each breathing cycle and is suitable for applications in the clinical field.

Positive side-effects

Owning IP gives Cosmed a competitive advantage in public procurement bids, since the uniqueness of products protected by patents is one of the criteria that public administration bodies in Europe can apply in their bidding procedures for the purchase of products directly from dedicated suppliers.

Under the optional “patent box” tax regime recently introduced in Italy, and which also exists in similar form in many other countries, Cosmed has applied to the tax authorities for a so-called ruling agreement, which would give the company an extended tax break based on the contribution that its IP portfolio makes to its revenues. Although the agreement is still being negotiated, it is expected that Cosmed’s large and composite IP portfolio will result in significant benefits.

Last but not least, IP is instrumental in contributing to Cosmed’s equity value. The company is family-owned and its financial position is rock-solid. While there are no plans to sell the company or go public, senior management is always looking to boost corporate value. The company’s IP is a crucial component of its intangible assets, as it helps to increase the visibility of R&D investments for potential investors and financial analysts while reinforcing Cosmed’s credit rating.

User-centred strategy that reduces risk

Filing for IP protection comes with risk. Drafting and validating patent applications at national level is expensive, especially if it is not yet clear whether the product will ever reach the market or have a satisfactory uptake. To reduce such risks, Cosmed goes about product development with a user-centred approach and bottom-up design that aim to address the needs and requirements of users while realising spearhead products. When looking at user applicability, the company searches competitors’ patents, both as a source of information, to improve on existing designs, as well as to assess freedom to operate (FTO) and avoid infringing third-party patents.

TAKEAWAY

PRIOR ART SEARCHES

In-depth prior art searches must be conducted early in the creative process, before research begins, and then professionally verified once the patent application has been drafted.

Cosmed’s traditional business model is based on device sales, so keeping alignment with the technology roadmap, products and patents, as well as other types of IP, has always been central to its IP strategy. Occasionally, patent applications are filed for elements such as disposable parts rather than for entirely new devices, which can offer a significant market in high-volume sales. In this case, intellectual property becomes instrumental in protecting post-sale markets that include the supply of spare parts and maintenance services.

IP management that works

Because of budgetary constraints and uncertainty in relation to new product development, Cosmed exercises caution and foresight in its patenting decisions, particularly when it comes to protection in multiple countries. It uses an external IP firm to check that inventions are properly disclosed, to draft and prosecute patents, and to interact with patent authorities worldwide. The firm was carefully selected for its excellence, since it is vital to have high-quality patents that can be enforced in court. Strategic decisions about IP are taken by Paolo Brugnoli, head of the R&D Department and lead inventor of all Cosmed’s patents, who has a direct report to the CEO.

Looking at the entire value chain from R&D to market entry, Cosmed conducts a number of activities in-house, from FTO analyses to prior art searches. When a potential invention is identified, the company sends a report to its IP firm for an initial evaluation, after which Paolo Brugnoli makes the final decision on whether or not to file. The IP attorneys then draft an application, which is reviewed by Cosmed before being filed.

TAKEAWAY

EXTERNAL IP SUPPORT

IP strategy cannot be outsourced, but external expertise and support is important for feedback and for implementing strategic choices.

There are no formal guidelines for IP management within Cosmed, since too much formalisation is perceived as a hindrance to creativity, but an informal internal procedure is in place. Through exposure to certification and quality control procedures, the company has learned how to manage complex processes, while its operations have been successfully kept lean.



Cosmed's Bod Pod Gold Standard is a body composition (fat and fat-free mass) tracking system that uses whole body densitometry.

Patent filing strategy for the future

In the past, Cosmed has filed patent applications in Italy to earn a priority date and then extended them to US and EP levels, and on occasion to China and Japan. At European level, validation decisions are driven by budgetary considerations, and the more appealing markets are typically those where Cosmed has direct sales through subsidiaries, although the European market is turning out to extend into countries beyond those where the patents have been validated to date. Recently, at least where it is clear that a product could have a wider market penetration, Cosmed has used the EP as a priority filing, to save money and time. The Unitary Patent will present an opportunity to cover an even larger market at European level, at a reduced cost. The savings can then be parlayed into future patents, thus reinforcing Cosmed's portfolio.

Although its patent portfolio is not huge, Cosmed has some difficulty coping with its management and the associated costs, particularly at the validation level, when budget constraints become more demanding and costs increase as a result of translations, renewal fees, issuance fees, validation fees at national levels, and so on. The Unitary Patent is likely to make the decision-making process much easier. Moreover, a system that allows for savings and wider geographic coverage will reinforce Cosmed's position on the European market, where its patent protection is currently limited to five countries (Italy, Germany, United Kingdom, France, the Netherlands), while its products are sold all over Europe.

TAKEAWAY

PATENT PORTFOLIO MANAGEMENT

Budget considerations are necessary. It is important to reduce costs without sacrificing quality when creating and maintaining a portfolio, as long as it reinforces the business case and the patent system allows for it.

Although Cosmed hopes to avoid litigation in future, the prospect of a Unified Patent Court is appreciated, as past experience with enforcing patents has made management aware of the disruption litigation can introduce. Litigation in multiple countries could have had even more disastrous consequences. With strong patents to enforce, the Unified Patent Court seems to be the best solution and will also be a deterrent for potential infringers.

When it comes to the future, Paolo Brugnoli, an electronic engineer by training, has no doubt that the Unitary Patent system will provide more benefits, such as reduced administrative steps, which are his responsibility. It is also expensive for the company since he, as a senior manager, has to facilitate strategic decisions, as well as handle the particulars of the patent administrative procedure. Of course, the company could reorganise internally and have someone else be responsible for patents, but the current set-up has the advantage of having the head of R&D directly involved in IP management and in close contact with the corporate CEO.

COMPANY PROFILE

COSMED S. R. L.

- › Headquarters: Albano Laziale, Italy
- › Year of establishment: 1980
- › Staff: 120
- › Turnover: EUR 17 million
- › www.cosmed.com

PRODUCTS/SERVICES

Biomedical devices for the measurement of resting metabolic rate, maximum oxygen consumption and spirometric parameters. The products are a combination of hardware and firmware with interface control.

MARKET AND TECHNICAL AREA

Biomedical devices and software

CUSTOMERS

Hospital care, universities and research centres, nutrition clinics, sports teams

SELECTED AWARDS

2013 Product of Outstanding Interest
(European Respiratory Society)

PATENT PORTFOLIO

Three patent families, including EP2769673, EP0196396

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EPO SME CASE STUDIES | MICREL MEDICAL DEVICES

Smart infusion pumps for treating patients at home

Micrel Medical Devices is a Greek medical technology company that develops, manufactures and markets a full range of ambulatory infusion pumps, accompanying administration sets and patient infusion control and monitoring systems. An unfortunate experience with patents thirty years ago taught the company that it pays to take IP seriously. Nowadays it uses patents strategically to safeguard future product lines, and patent information to analyse the market, monitor competitors, ensure freedom to operate and find inspiration for new technical developments.



Micrelcare allows remote reporting and monitoring of clinical and technical information and instant control of the infusion therapy.

Micrel Medical Devices is a family-owned company founded in Greece in 1980. Its first product, an ambulatory syringe pump, allowed patients suffering from thalassaemia, a rare blood disease that is prevalent among people of Mediterranean descent, to be treated at home instead of in hospital. Following that success, Micrel developed a full range of ambulatory volumetric and syringe infusion pumps for home and hospital care, all with the aim of making the treatment of patients more comfortable.

Micrel continues to specialise in the design, manufacture and marketing of “smart” drug delivery systems for hospital and home care applications. One example is a new rhythmic web-programmable ambulatory pump for clinical research. These innovative and user-friendly infusion pump systems are tailor-made for delivering specific therapies, including pain control, parenteral and intravenous nutrition, and Parkinson’s disease and cancer treatment. The products are small in size and have a low power consumption, which makes them particularly user-friendly.

The current medication practice is still to infuse drugs to unattended patients, based on preliminary tests resulting in a provisional treatment schedule. In many cases, the patient has to stay in hospital until the doctor finds a working prescription protocol. Using Micrel’s solutions, doctors can send the patient home and refine the treatment over the internet. Patients can easily inform healthcare staff about their state of health and can live a normal life while their therapy parameters are being monitored. Doctors, nurses and home-care service providers can access the status of their patients’ infusion and therapy outcome online from anywhere. Nurses receive text messages with selected notifications about the status of the infusion and therapy, enabling them to anticipate potential problems.

Micrel is characterised by a market-driven innovative culture with flexible manufacturing and a strong R&D base. Its commitment to research is a key factor in its long-term success, which has allowed the company to grow from 45 employees in 2012 to 80 in 2016 (13 of whom work in the R&D department). Micrel is currently present, directly or through distributors, in more than 30 countries around the world, covering most European markets, the Middle East, Africa, Asia, and South America. It also has subsidiaries in Germany and Sweden.

Micrel’s main competitors are large multinationals such as Smiths Medical, Becton Dickinson and Hospira. But Alexandre Tsoukalis, CEO and co-founder of the company, is confident that Micrel is prepared to face the challenges ahead, as it already has the right technologies in the pipeline, and is in the process of expanding its activities into the large volumetric pump (LVP) market.

TECHNOLOGY PROFILE

Rythmic™ connect

Remote control for home infusion therapies



Rythmic Connect is a real-time wireless technology which uses a GPRS device (“IP Connect”) to enable an ambulatory pump to communicate with a web server and provide its infusion status online through the MicrelCare system. The system provides instant feedback on therapy results and side-effects. This feedback can be obtained by inserting an implantable catheter tip into the bloodstream to measure parameters such as temperature, blood pressure, glucose, oxygen and certain ions via sensors embedded in the catheter or by the pump asking the patient about conditions such as diarrhoea, vomiting, nausea or pain. This web-based service enables healthcare staff to monitor clinical and technical information relating to the infusion therapy and to adjust the infusion protocol remotely.

“There is no need to be scared by the big multinational companies. Change will come from SMEs. They have the creativity and speed to innovate.”



Alexandre Tsoukalis
CEO and co-founder,
Micrel Medical Devices

Pioneers in smart health

Micrel has a long tradition in developing pioneering technologies. These technologies create new markets and value networks but, compared with operating in established markets, the process can take longer to develop, and the accompanying risk is higher. In 2003, the year GPRS, one of the earliest communication-via-satellite services, entered Europe, Micrel exhibited the first infusion pump with a GPRS module on the market at a trade fair in Dusseldorf. At the time, vital signs monitoring through satellite communication was limited to military applications, and the terms “Internet of Things” and “smart wearables” were unknown. Micrel’s communicating drug delivery system represented a major breakthrough in monitored ambulatory patient care. However, the market and existing telecom infrastructure were not ready to implement this spearhead system. It took ten years for the technology to be successfully established on the market. Alexandre Tsoukalis assumes that the growing use of mobile phones had a large impact on the acceptance of the technology: “In 2006, doctors were still afraid of connected technologies. They were using the pumps but not the server. Now their attitude has changed.”

The fact that Micrel’s monitoring system is covered by a patent application filed in 2001 (EP 1385420), which secured exclusivity for the invention, allowed it to keep investing in the technology and moving it forward in its early years. It is very cost- and labour-intensive to establish a breakthrough technology, as there is no market or infrastructure for it initially. Without patent protection the technology leader would be copied, especially by big companies, as soon as the market understands the technology and starts to adopt it – at a fraction of the pioneer’s cost. Micrel has continuously improved and enlarged its product line. The second-generation product, providing an even better and more user-friendly server, has been on the market since 2011. In parallel, the company has been careful to protect the inventions involved. The superior quality of the products, in combination with IP protection, underpins brand creation and the setting of premium prices for Micrel’s products.

The smart healthcare market is set to experience significant growth over the next few years, particularly in the area of mobile and wireless health. Many new companies will enter the field. Micrel’s competitive edge comes from its deep understanding of patient and doctor needs: its main sources for innovation are customer requests, end-user feedback and its own market foresight.

Smaller and connected

One focus of Micrel’s development lines is miniaturisation. Patients want greater mobility, anaesthetists want to replace existing syringe pumps with a more compact system to have more space in the operating theatre, and drug-device combinations need smaller pumps.

Linear peristaltic pumps and bedside syringe pumps are state of the art in these applications. To achieve a new dimension in miniaturisation, Micrel took the 100-year-old concept of rotary peristaltic pumps and improved it. To date, rotary pumps have not been applied in medical devices because of problems such as high friction and power consumption and poor accuracy, but they have one great advantage – you can make them very small. Micrel’s recently patented new features overcome these disadvantages, achieving a very good linearity of flow, reducing power consumption and increasing accuracy levels, and at the same time meeting user demands. The technology can potentially replace with one device both LVPs and syringe pumps in bedside applications, while being very easy to move. The first patent has been granted in the USA and is pending at the EPO; another is pending at both offices. The new pump will be on the market in 2019, integrated with the MicrelCare server support as a connected device.

TAKEAWAY

MAKE INNOVATION COUNT

Continuous innovation is a major success factor. Micrel listens to patients, doctors and key opinion leaders and takes their needs seriously, as this can lead to new inventions as well as to adaptations of existing products. The ability to quickly adapt to changing market requirements distinguishes SMEs from large companies and gives them a competitive advantage.

Another of Micrel’s development focuses is drug safety. Pharmaceutical companies are moving towards “personalised” medicine, so topics such as combinations of drugs and devices, drug delivery, safety and efficiency will become even more important. Apart from pharmaceutical companies, companies engaged in pharmaceutical packaging will also move into that area for items such as prefilled bags with readymade drugs and disposable pumps. It is essential to assign the right drug to the correct pump and person. Micrel has patented specific radio frequency identification (RFID) and barcode labelling for drug, people and device identification associated with other technologies that eliminate medication error. It will combine the technology for prefilled analgesic drugs to be used in reservoirs specific to infusion pumps and RFID identification with its miniature pumps for

an ambulatory and easy-to-use drug-delivery infusion system. For general hospital fluid and drug infusions, Micrel technology will enable pharmaceutical companies to label or tag drugs directly, which will be readable anytime by Micrel's ambulatory LVPs, thereby preventing medication errors. Tsoukalis intends to approach pharmaceutical companies to establish strategic partnerships for advancing these innovations. The safety of these drug device combinations is a feature that could allow these companies to differentiate themselves from other producers. The competitive advantage they would then have could be particularly significant in markets for generic drugs, where lapsed main patents give rise to fierce price competition. In these partnerships it will be crucial to have patents, as pharmaceutical companies usually demand exclusivity.



Miniature bedside infusion pump that can be operated with one hand.

Earning their spurs

“It could have turned out completely differently”, says Tsoukalis. In the early 1980s, Micrel was producing conventional infusion equipment for therapies, blood testing and laboratory equipment. At the time it was too expensive for a young company to consider patenting, especially in several EU countries, and Greece did not join the EPO until 1986. Even freedom-to-operate analyses were difficult and costly: all Micrel could use was patent information on microfilms.

While developing a new ambulatory syringe pump, Tsoukalis became aware of a UK patent protecting related subject-matter which was standing in the company's way.

Although Micrel did not have much experience with IP and had no patents of its own at the time, it tried to overcome this obstacle by changing features of its product to take it outside the scope of the UK patent. However, it was eventually forced to withdraw the product and as a result lost a significant market share in the UK, which amounted to fifty percent of its turnover.

Since then, Micrel has consistently patented its inventions. It has more than 21 patent families and a long-standing collaboration with a German patent attorney. Its patent portfolio includes products, methods and computer-implemented inventions. Although patenting your own inventions is no guarantee against infringing someone else's patents, Tsoukalis notes that competitors hold professionally managed IP in high regard and generally respect the IP position of other players. Micrel has not had another infringement case since.

TAKEAWAY

STAY COMPETITIVE THROUGH IP

Patents allow SMEs to compete with large companies and to stay ahead of the game. Technology-based companies such as Micrel must protect their inventions and take IP issues seriously.

Tailor-made IP strategy

Micrel takes a tailor-made approach to IP protection. Inventions with an expected high market potential are patented and the IP used offensively. To protect these promising innovations more effectively, additional patents are clustered strategically around the core patents. At the moment, Micrel has three such patent groups, all aimed at preventing competitors from entering the company's areas of interest. One example is the core patent describing a mobile and internet connected system for monitoring medical parameters (EP1385420), which laid the foundation for the Internet of Things in the health sector. It is complemented by related patent applications EP3217304 and EP2767919.

TAKEAWAY

SAFEGUARD YOUR INVESTMENT

In view of the time and effort required before a new product can be successfully brought to market, patent protection can help safeguard investments and reduce risk. Without patent protection, competitors can easily copy products once they have been introduced.



Miniature bedside infusion pump hanging from medication reservoir, directly reading RFID or barcode tags.

Micrel also patents incremental improvements which have a certain value but which do not necessarily constitute a pioneering innovation. These are protected so that they can be used defensively against competitors. All other technological details, especially if they can be hidden, are kept as trade secrets.

Although it is often vital to have a patent granted as quickly as possible, in some cases, especially if the market is very dynamic, it can be advantageous for it to take longer. This allows more time for the claims to be amended within the boundaries of what is described in the application and postpones the patent validation decision, meaning that market feedback can be taken into account.

TAKEAWAY

CHOOSE YOUR FILING STRATEGY

Most patent systems offer applicants the opportunity to accelerate the patent granting procedure (for example, the EPO's PACE programme). Alternatively, filing routes are available which enable the substantive examination of the patent application to be postponed (for example, filing an international PCT patent application). Having a patent application pending allows more time to find the best claim wording, or to choose the right markets in which to validate the patent.

Active IP management

Micrel's IP management lies mainly in the hands of Alexandre Tsoukalis. His son, Achilles Tsoukalis, Micrel's R&D and quality director, is also regularly involved in market analyses and decisions on IP. Strategic IP issues are discussed and agreed at board level. New developments begin with a strategy meeting of the board, for which a systematic market analysis is made. Ideas for novel technologies or innovative products come mainly from the R&D, sales and marketing departments.

The patenting activities of the company's main competitors are regularly monitored. Every Monday, Alexandre Tsoukalis is notified about new patents in the relevant patent classes and containing the relevant keywords, using the alert systems offered by public patent databases. With these searches Micrel can ensure that it has freedom to operate for new products and will therefore avoid infringing third-party patents. The results also yield valuable market information and inspiration for new developments. Micrel's idea for the RFID technology (EP2987517) came about as a result of analysing the published patent applications of another company. Based on the need identified in the prior art to prevent medication errors, Micrel created an improved way of achieving this aim. The improvements comprised better manufacturing properties, technology use and safety aspects, and pharmaceutical labelling and tagging.

TAKEAWAY

MAKE THE MOST OF PATENT INFORMATION

It is important to perform regular searches in patent databases. In addition to allowing you to monitor your competitors, analysing new prior art can help you find “white spots” in the patent landscape which may reveal opportunities for further innovations.

Filing strategy and considerations for Europe

In its filing strategy, Micrel concentrates on covering the larger markets. It files with the USPTO and EPO, validating in France, Germany and the UK. Although its main competitors act worldwide, Tsoukalis acknowledges that, in view of the high cost of obtaining and maintaining a patent in a large number of countries, the only reasonable way for an SME with limited resources to proceed is to protect its innovations in the larger countries only, even if this means that it has to operate without patent protection in some markets.

Tsoukalis expects that the Unitary Patent will be much better for SMEs than the existing European patent system. One of the main benefits in his view is that it will be easy to get broad territorial protection in Europe at lower cost. Due to their limited resources, SMEs typically validate their European patents in the larger countries only. “Especially for smaller countries like Austria or Greece,” says Tsoukalis, “it will be essential to take part in the Unitary Patent”. It will become especially important for Micrel when it enters into co-operation with pharmaceutical companies, as these companies usually extend their patent portfolios over a large number of European countries. With regard to the Unified Patent Court, Tsoukalis points out that having a single court that really understands patents and has jurisdiction over most of Europe will also be of great importance to SMEs as it will help reduce costs and complexity and increase legal certainty by avoiding contradictory judgments by national courts in parallel proceedings.

COMPANY PROFILE

MICREL MEDICAL DEVICES SA

- › Headquarters: Athens, Greece
- › Year of establishment: 1980
- › Staff: 80
- › Turnover: EUR 17 million
- › www.micrelmed.com

PRODUCTS/SERVICES

Development, production and marketing of smart drug delivery systems, such as ambulatory volumetric and syringe infusion pumps for hospital and home care

MARKET AND TECHNICAL AREA

Medical devices

CUSTOMERS

Pharmaceutical firms, medical device manufacturers, medical practitioners, hospitals, home care providers, research centres and universities

SELECTED AWARDS

- 1994 National nominee
- European Community Design Prize

PATENT PORTFOLIO

21 patent families, including EP2289579, EP1385420

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Editors: Thomas Bereuter, Yann Ménière, Ilja Rudyk | Author: Karin Hofmann | Photos: Micrel Medical Devices SA

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EPO SME CASE STUDIES | MARINOMED

Using red algae to fight the flu

Founded in 2006, Marinomed is an Austrian biopharmaceutical spin-off from the Veterinary University of Vienna. The company's main technology platform is based on the natural polymer Carragelose, which is isolated from red algae and is active against respiratory viruses. As a drug discovery company, Marinomed is heavily dependent on patent protection. It has three main patents, which have been validated in almost 100 countries, and a trade mark registered in around 50 countries. The company actively manages its patent portfolio and grants licences for its technology. Marinomed has experienced infringement of its patents, but was able to resolve the cases without going to court.



Marinomed develops therapies against respiratory diseases based on an anti-viral respiratory technology platform.

Marinomed was founded in 2006 by four scientists, three of whom still work for the company. It was spun off from the Veterinary University of Vienna, where it is located to this day. With a staff of 25, the company develops biopharmaceutical products based on natural marine compounds.

Focusing on the therapy of respiratory disease, Marinomed markets anti-viral and immunological treatments. To do this it uses its innovative MAVIREX technology platform, which is based on the special antiviral properties of a natural polymer called Carragelose, derived from red algae. Despite being a rather young company, Marinomed has already been able to establish worldwide use of Carragelose in a variety of over-the-counter (OTC) medicines against respiratory illnesses such as colds and flu. Typical products include nasal sprays and lozenges.

The OTC market for such remedies is worth about 30 billion US dollars globally and two billion US dollars in Germany alone, with significant growth in emerging markets. The industry is highly fragmented, with intense competition between large multinational companies and a number of smaller players, some of whom have high market shares in certain limited geographical areas.

A promising technology pipeline

Marinomed applies its MAVIREX technology to the development of additional influenza treatments and combination therapies for asthmatics and other high-risk patients.

Marinomed also develops novel treatments against type I allergies and eye diseases based on the MARINOSOLV technology platform. MARINOSOLV, which enables stable aqueous solutions of substances that are normally hardly soluble, is intended for use against diseases affecting mucosal tissues such as those found in the nose, throat, eyes and lungs. One of the products is already scheduled for Phase III clinical trials. The company offers licences for the technology to interested companies working in other fields.

Patents in pharmaceutical research

The biopharmaceuticals area is subject to the same business rules as the general drug development business. This entails a major R&D investment to find new active compounds, and subsequently a long and expensive approval phase.

Current products and product pipeline using the MAVIREX and MARINOSOLV compound platforms

Compound platform	Products	Indication	Discovery	Development (MD*)			Commercial	Regulatory status
MAVIREX Carragelose®	Three nasal sprays, lozenges, throat spray	Common cold & influenza-like illness	■		■		■	OTC, MD*
Compound platform	Products	Indication	Discovery & Lead optimisation	Preclinical & Phase I	Phase II	Phase III	Commercial	Regulatory status
MAVIREX Carragelose®	Decongestant antiviral nasal spray	Common cold & influenza-like illness	■	■	■	■		OTC, MD*
	Antiviral NA inhibitor combination	Seasonal influenza	■	■				Prescription
	Steroid/ Carragelose® combination	Allergic rhinitis – cold prophylaxis	■	■				OTC
MARINOSOLV	Dissolved Budesonide nasal spray	Allergic rhinitis	■	■				OTC
	Dissolved Fluticasone nasal spray	Allergic rhinitis	■	■				OTC
	Dissolved Fluticasone eye drops	Conjunctivitis, blepharitis	■	■				OTC/ Prescription
	Dissolved acrolimus/ FK506 eye drops	Inflammatory eye diseases	■	■				Prescription

* Medical device (different development route)



Nasal spray containing Carrageenol, a natural polymer.

Marinomed incurred heavy costs in the identification of Carrageenol, and this was followed by a long and equally expensive phase to obtain the necessary regulatory approvals for the new product. A typical example, Marinomed's nasal spray, has been approved in almost 50 countries so far. Although the approval process for over-the-counter products is usually shorter and cheaper than for prescription drugs, it still takes around three to five years and costs several million euros. The time taken for a new medicine to come to market is therefore relatively long. Solid financing is essential to bridge the gap between the research and the revenues generated after market entry. Finally, most medical compounds can easily be copied once they are available, so strong IP protection is an absolute prerequisite for any business activity in this field, in order to recover the associated investment and approval costs. Patents help to effectively fend off possible copycats or generic producers during the patent lifetime. This is why Marinomed has patented its main inventions in just under 100 countries.

For a drug discovery company like Marinomed, patents are a prerequisite for attracting investors and getting funding agencies on board. Without solid IP there would not be any funding. The company recently received financial backing from public funding institutions, venture capitalists and bond investors to cover the global roll-out of its products, as well as the costs of R&D and patenting.

“Marinomed is an IP-driven company. It is vital that we own and manage the IP associated with our products.”



Andreas Grassauer
CEO, Marinomed

Dual IP exploitation approach

Based on its patent portfolio, Marinomed has developed two distinct business models, both of which focus on the creation and exploitation of IP. The first is a classical licence agreement, according to which the licensee receives the rights to produce, market and distribute the product in certain countries, resulting in upfront payments, milestones and running royalties for Marinomed.

The second is a distribution partnership, according to which the partner purchases the products from Marinomed for distribution in a defined geographical territory. The products are fully customised according to the needs of the partner, and include the partner's name and logo only. Marinomed does not manufacture the product itself, but outsources and supervises its production.

The choice of model depends on the business partner, the product licensed, the technology and the commercial environment. For Marinomed's partners, it is essential to have patent protection in each of their main markets. That is why Marinomed validates its core patents in an exceptionally high number of countries. Currently, the second licensing model is more successful, not only in terms of sales. Under the second model, Marinomed is closer to the individual local market and can provide its partners with various forms of support.

TAKEAWAY

LICENSING

Flexibility in licensing models increases the chances of creating win-win situations for all parties.

TECHNOLOGY PROFILE

Activity of polymers against HRV types 2 and 14

Polymer	HRV-2	HRV-14
Iota-carrageenan	+	+
Kappa-carrageenan	+	-
Lambda-carrageenan	+	-
Chitosan	-	-

Carragelose (iota-carrageenan) is a sulphated galactose polymer derived from red seaweed which has unique anti-viral properties. It works by coating viruses, preventing them from binding to and entering mucous membrane cells. Viral replication and associated symptoms are reduced, and the polymer forms a soothing and protective film of moisture on the mucous membranes.

Managing IP

Marinomed's CEO, Andreas Grassauer, knows a lot about IP. He is the (co-)inventor of numerous patents and has founded several companies, all of them based on IP. All Marinomed employees are expected to have a basic understanding of patents. In other words, they need to know what IP means and be able to read and understand patent specifications. To this end, all staff, including lab researchers, receive dedicated in-house training.

“It is very important for all our staff to have a basic understanding of IP. You cannot delegate this understanding to one single expert.”

Andreas Grassauer
CEO, Marinomed

Marinomed also involves an external IP specialist at a very early stage in its R&D. It knows it would be too late to wait until after an invention has been created. The goal of the company is not only to identify a new drug, but also to bring it successfully to market, which means it must be ring-fenced for specific market applications in the specific territories that are commercially relevant for the company. It seeks the IP expert's advice on how to design the first experiments so as to show not only the activity of a new compound, but also to obtain research data for equivalent compounds in order to anticipate work-arounds by competitors. This kind of data can support a strong and broad patent application, something that really pays off in the mid-term.

TAKEAWAY

EXTERNAL EXPERTISE

IP specialists can make a valuable contribution at the R&D planning stage. Their early involvement can help create the data required for strong patent protection for commercial applications later in the process.

Protecting IP

So far, Marinomed has never been accused of infringing third-party patents: before starting any new project, it makes sure to commission an FTO analysis from external specialists. On the other hand, it has been the victim of a number of infringements of its own IP. That's why the company and its licensing and distribution partners work together to implement an active monitoring process for detecting infringers. This is usually not too difficult, since medical products need regulatory approval before they can be sold.

Up until now, the company has been able to resolve all these cases by contacting the infringers through a local patent attorney and reaching a settlement under which the infringers agreed to take their products off the market, although Marinomed would have been prepared to go to court if necessary.

TAKEAWAY

INFRINGEMENT

FTO and infringement analyses are crucial for any technology company. Negotiations can often solve potential infringement problems. Litigation is a means of last resort.



The Carragelose polymer is derived from marine red algae.

Developing sound patent protection

When Marinomed was spun off from the university, the two parties came to a special arrangement. Since the initial funding was public money, the university was awarded a share in Marinomed in return for giving access to its research facilities. Marinomed, however, owns all the IP.

Marinomed has three core inventions, which are protected in a number of jurisdictions, providing a very broad geographical coverage. The first and main patent family relates to the use of Carragelose against rhinoviruses, which cause the common cold. It has been validated in the 99 countries in which Marinomed's licensing and distribution partners are active. The second patent family protects the use of the compound against other respiratory viruses, and the third relates to a different polymer and its use in combating viruses.

This extensive coverage represents a huge investment, so the patent portfolio must be carefully managed. It may be necessary, for example, to consider abandoning patent protection in countries where it might be no longer needed or abandoning a patent altogether. Marinomed's management team reviews the portfolio at least once a year in close co-operation with the business development department and adjusts it where necessary.

Any strategic decisions it takes are based on business criteria such as costs versus benefits, and must be approved by Marinomed's board of directors. Licensing and distribution partners are included in the decision-making process, as they might disagree with Marinomed and be in favour of retaining protection in a specific country. If this happens, a solution might be for the business partner to bear the cost of maintaining protection.

TAKEAWAY

ACTIVE PORTFOLIO MANAGEMENT

It is important to invest time not only in filing patents but also in evaluating the follow-up payments, balancing costs against benefits.

Marinomed also owns a trade mark for Carragelose. Partners with a classical licensing agreement have their own trade marks and hence do not need the Carragelose mark. However, under the second business model or distribution partnership arrangement, the licences for the patents are usually, although not always, combined with a trade mark licence as well. As a result, the trade mark has been registered in 50 of the 99 countries where the patent is valid. The trade mark gives partners the opportunity to capitalise on the international use of the brand. The decision on whether to file for trade mark protection is again based on a cost/benefit analysis, taking into account the needs of the partners.

TAKEAWAY

COMBINING PATENTS WITH TRADE MARKS

A trade mark can add value to your patent and extend protection and licensing revenues beyond the patent's lifetime.

The new Unitary Patent system

Marinomed has closely followed discussions on the Unitary Patent over the last few years. The Unitary Patent will bring a substantial reduction in validation costs, both in terms of renewal fees as well as in terms of indirect costs arising from the validation and maintenance of a European patent, such as translation fees and publication fees as well as fees charged by local attorneys. This is a big advantage.

Another important aspect of the new system is the Unified Patent Court, which offers Europe-wide enforcement. This is a real benefit, since one action at the Unified Patent Court will result in a single judgment covering almost all EU countries and will mean that the owner will not have to start cost-intensive and complex parallel proceedings in different jurisdictions individually, with the risk of contradicting outcomes. Of course, it will also be possible to challenge the validity of a patent with one action at the UPC, which may be perceived as a risk. But in the end this will also lead to a harmonised assessment of granted patents, instead of diverging decisions on patent validity by national courts, and will result in a more predictable business environment.

COMPANY PROFILE

MARINOMED BIOTECH AG

- > Headquarters: Vienna, Austria
- > Year of establishment: 2006
- > Staff: 25
- > Turnover: > EUR 5 million
- > www.marinomed.com

PRODUCTS/SERVICES

Anti-viral and immunological treatments

MARKET AND TECHNICAL AREA

Biopharmaceuticals, biotechnology, medical devices

CUSTOMERS

Hospital intensive care, home care

SELECTED AWARDS

- 2010 Step Award
- 2016 Houskapreis

PATENT PORTFOLIO

12 patent families, including EP2178533, EP2101792 and EP2046345

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Editors: Thomas Bereuter, Yann Ménière, Ilja Rudyk | Author: Christian Hackl | Photos: Marinomed Biotech AG

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EPO SME CASE STUDIES | WEBDYN

Integrating ICT creates solutions for the Internet of Things

Webdyn, a French SME based in Paris, provides hardware and software components for complex networks, especially in the solar energy area, and advises industrial clients on how to implement the Internet of Things (IoT) to manage their smart energy systems. At its inception, Webdyn was able to create a significant leadership position, thanks to a European patent that was obtained prior to the market boom. While still at the application stage, the patent provided not only an exclusion right but also valuable leverage in securing freedom to operate in the company's business area, allowing it to negotiate a non-enforcement and de facto licensing agreement before the patent was even granted.



Webdyn designs and produces material and software solutions for machine-to-machine communication on the smart grid, energy, environment and transport markets.

Webdyn is a EUR 4 million revenue company which was created and funded by early investors in 1997, with additional financing by venture capitalists in 2010. Located in Paris and with an export office in India, it currently has 30 employees. Its core business is to help industrial clients – mainly in the smart energy sector – to successfully implement the Internet of Things (IoT) in their operations.

Webdyn offers low-consumption hardware and software components through product sales and software licensing, as well as engineering services for their implementation in automation systems. Its products include IP gateways (used to connect wide area networks to local area networks), end points such as ICT concentrators (used to collect local sensor-generated data from local area networks, aggregate them and send them through wide area communication networks), and complete ICT systems for data collection, management and control. It has also developed advanced skills in advising industrial clients on energy management.

In particular, Webdyn has established strong positions in solar energy generation installations, smart energy distribution networks (smart grids) and smart energy consumption networks (smart building, transportation or heavy industrial processes). It develops and integrates specific systems for use in networks of smart connected objects, including the control of energy storage systems, battery charging systems and security systems for photovoltaic farms. These systems process an array of parameters such as costs, energy demand, production capacity, consumption data, contracts and market data, as well as weather conditions. Depending on energy demand, they enable Webdyn’s clients to optimally select between energy storage (battery), immediate consumption and the injection of electricity into the grid.

According to Philippe Faugeras, CEO and founder of the company, Webdyn was one of the first movers to provide solutions to the increasing need for integration of ICT and big data processing modules. Since then, its business has been expanding worldwide, especially in regions where solar power activity is high (India, China, South-East Asia and Africa). It is currently one of the few companies, all of which are European, that are active in this growing market.

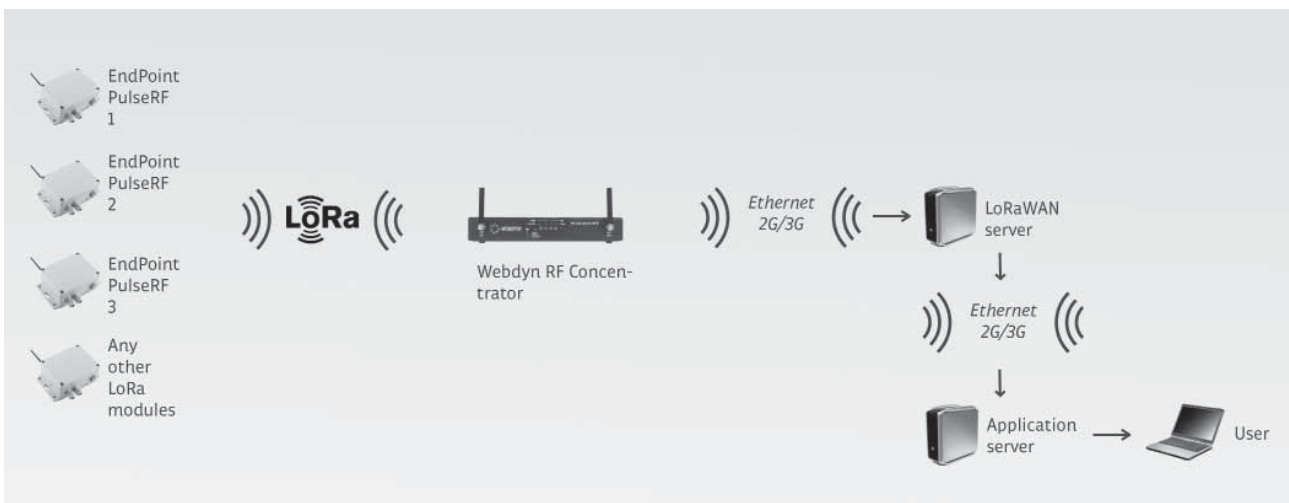
Fast mover

Webdyn’s IP strategy choices are dictated by the speed of technical change in the IoT area and by the increasing commoditisation of hardware and software for the IoT. As Faugeras sees it, Chinese suppliers may come to dominate this market as time goes on. Webdyn’s competitive advantage chiefly depends on its ability to maintain clients’ trust in its high value-added development services, in addition to the hardware and software it will continue to provide.

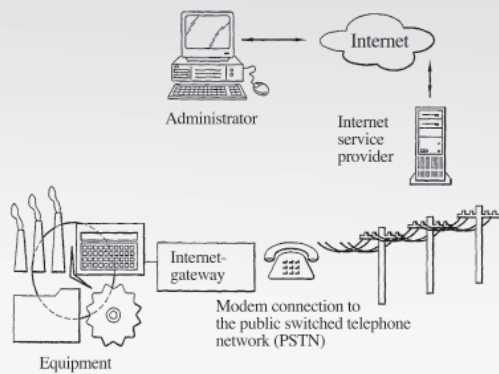
“We continue to use IP to create strategic value for the company as well as commercial benefits for our customers.”



Philippe Faugeras
CEO, Webdyn



WebdynRF LoRaWAN is a platform dedicated to wireless networks using the LoRa radio technology. It is designed to link counters, sensors and a data server via the LoRaWAN network.

**Fig. 4**

The patented invention (EP1523832) relates to a method for connecting an electronic system to a communications network through an access provider, such as the internet, and a device, a gateway, for carrying out the method. Gateways act as a communication link to the data generated in electronic equipment and one (or more) computer platform that operates the data received from equipment. With such architecture it is possible to manage remote, electronic equipment using standard IT tools (TCP/IP and other Web-based tools). The use of standard tools and protocols reduces implementation and operational costs and facilitates the dissemination of the process and systems.

To stay ahead of the market, Webdyn relies on its know-how to quickly adapt and integrate the latest technologies into its systems. Early-stage integration of new industry standards is especially critical in this respect. Compliance with these standards is achieved through certification and dedicated agreements. Technical specifications issues are dealt with by original equipment manufacturers, who offer compatible modules that embed all standard licences. Webdyn buys these components and can integrate them in the knowledge that they have already been certified as compliance-capable.

Webdyn leverages its ability to anticipate future industry requirements to take a leading position in integrating these technologies. Besides well-established wireless communication standards such as 3G and WiFi, new low-consumption standards such as RFID, LoRa and Sigfox are becoming popular in the IoT business. Webdyn takes an active role in the alliances that aim to create these standards. It contributes to the interoperability specification documents that are prepared within these alliances, which is much appreciated by its customers and creates a significant part of its marketing value.

Early patent key to company growth

Being focused on staying agile in a fast-moving environment, Webdyn no longer invests in developing and patenting its own inventions. However, the company is still benefitting from a patent filed in its early days, when it was creating proprietary technology. This patent, which covers major European countries, was filed to protect a method allowing an administrator to inspect the client's systems remotely and to provide whatever intervention is required.

Webdyn profited from its patent when building and developing its marketing and corporate strategies. The patent, though still pending at that time, was instrumental in getting recognition for the company's advanced engineering position in complex system integration. Its publication naturally led customers to ask Webdyn to design, integrate and install complete automation networking solutions – an advantage which it has again enjoyed more recently in the fast-growing solar segment. The patent also protects one of the core intangible assets of the company and helped Webdyn to attract new risk capital for its expansion in 2010.

The main benefit from the patent was, however, the freedom to operate (FTO). During its expansion, the company entered into negotiations with a number of prospective major customers from the transport and energy sectors. One of these customers had patented early technology developments in Webdyn's field of operation, and contended that Webdyn was infringing these patents. In response, Webdyn analysed the customer's products, comparing them with its own patent application, and was able to identify a number of potential overlaps.

TAKEAWAY

STRATEGIC USE OF PATENTS

Patents can be used as tools for negotiating with rival companies. When you file a patent application, it is vital to consider not only the countries that you want to target, but also those that are most important for your competitors, even if you do not expect to enter these territories with your products or services.

At this stage, the two parties concluded that there was no advantage to be gained in enforcing their exclusion rights against each other. They agreed to combine forces to benefit from each other's patent protection, expertise and products.

TAKEAWAY

CROSS-LICENSING

A strong patent can be useful for securing freedom to operate, for example by means of a cross-licensing agreement. The licence does not always have to be a formal grant; freedom to operate can also be achieved by means of a covenant not to sue.

Interestingly, Webdyn's patent was still pending during these negotiations. The fact that an application had been filed was sufficient leverage in what was a crucial business transaction.

TAKEAWAY

PENDING PATENT

A patent application can have a significant business value, even though the patent is still pending. It can act as a signal to potential infringers that they might be liable for damages (including back-dated royalties), seizure and injunction once the patent is granted.

Patent prosecution – lessons learnt

Webdyn chose to file its European patent application via the international (PCT) route. Compared with the direct EP route, this gave it an extra 18 months before it had to decide whether or not to request examination. Securing legal exclusivity quickly was not deemed essential for its business at that stage. The company preferred to have more time to decide whether or not to incur the cost of continuing the application process. This also gave it the option to target different potential markets (i.e. Spain, Italy, Germany and France) for product manufacturing. It originally designated 24 countries, of which eight were eventually selected for validation (Germany, France, Italy, Netherlands, Spain, Great Britain, Belgium and Luxembourg).

TAKEAWAY

COST-EFFICIENT PATENT PROTECTION

The cost of patenting is a major factor. By choosing a particular filing route you can save time and delay costs. The time gained can be used to develop commercial activities and acquire information before you decide whether or not to continue.

The patent prosecution phase was long and involved a number of office actions and discussions with the EPO examiner. The main issue at stake was the difficulty of properly defining the scope of the invention in a complex and emerging technology field. Looking back, it would have been better if Webdyn had carried out not only a prior art search but also an early FTO study, in order to get a clearer idea of the state of the art before writing the application. Such a study would have helped it to optimise the application process and reduce costs, as well as proactively release it from dependent third-party rights. It could also have revealed other patentable ideas.

COMPANY PROFILE

WEBDYN S.A.

- > Headquarters: Saint-Germain-en-Laye, France
- > Year of establishment: 1997
- > Staff: 30
- > Turnover: EUR 4 million
- > www.webdyn.com

PRODUCTS/SERVICES

Engineering services for automation systems and the Internet of Things, production of low-consumption hardware and software components

MARKET AND TECHNICAL AREA

Information and communication technology

CUSTOMERS

Energy, transport and industry

PATENT PORTFOLIO

One patent family: EP1523832

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Editors: Thomas Bereuter, Yann Ménière, Ilja Rudyk | Author: Pierre Ollivier | Photos: Webdyn S.A.

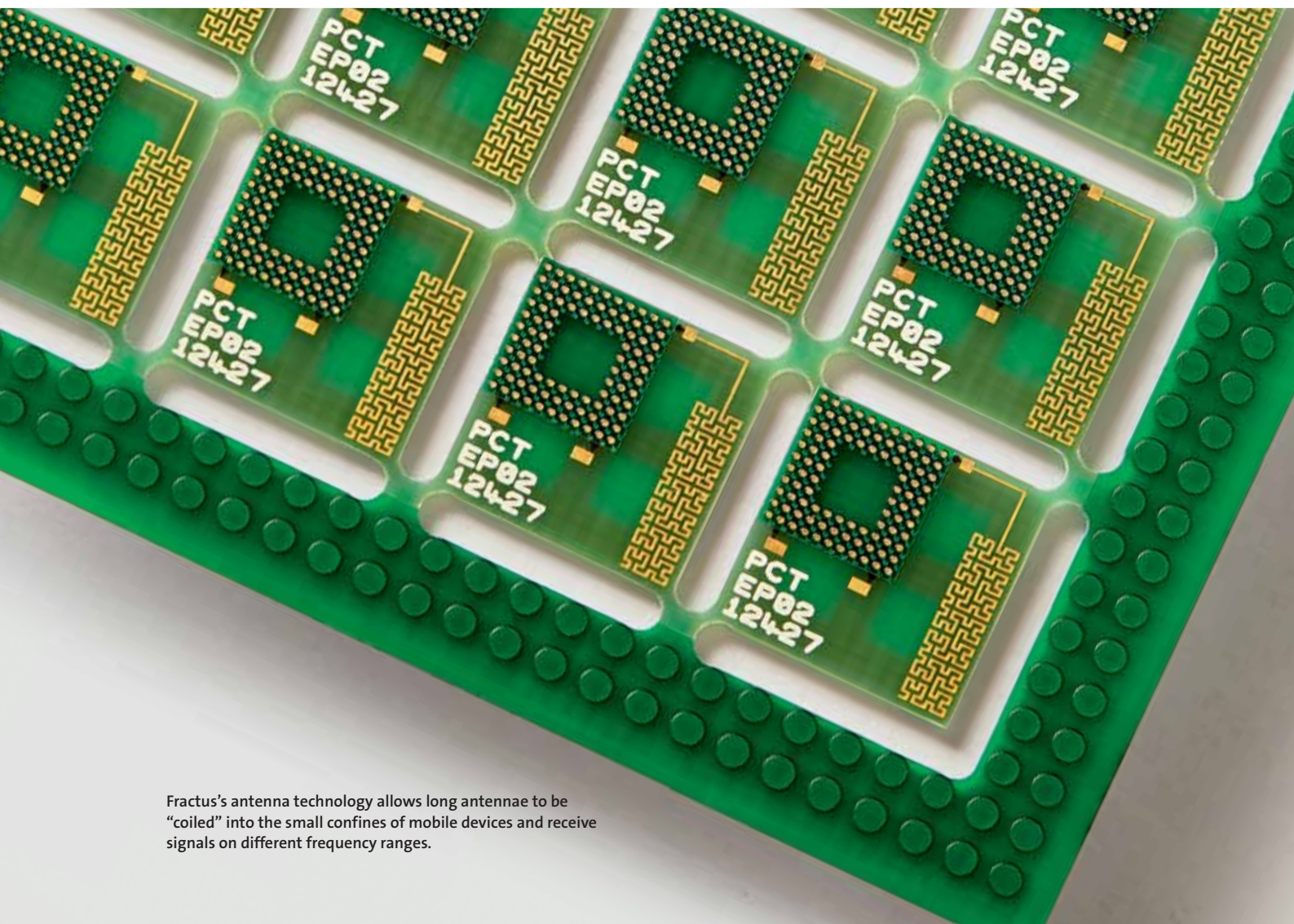
Disclaimer: Any opinions expressed in this case study are those of the author or the company and not necessarily those of the European Patent Office.



EPO SME CASE STUDIES | FRACTUS

Snowflake pattern precipitates new application for antennae

Spanish company Fractus began life as a contract engineering service-provider and design laboratory specialising in antennae based on fractal formations for use in devices such as smartphones, tablets and pacemakers. It suffered patent infringements by customers that almost cost it the business. Its turnaround strategy was possible thanks to its strong patent portfolio, which allowed it to seek litigation against infringers. Fractus is now a technology development and licensing company, relying heavily on the ability to enforce its IP. The company sees the Unified Patent Court as a promising venue for patent disputes without the disadvantages of the current fragmented, multi-country litigation system in Europe.



Fractus's antenna technology allows long antennae to be "coiled" into the small confines of mobile devices and receive signals on different frequency ranges.

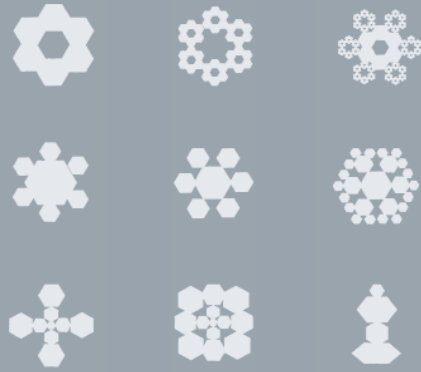
Fractus was co-founded in 1999 by Rubén Bonet, its president and CEO, and Carles Puente Baliarda. It originally positioned itself as a products and services company, developing customised antennae for leading smartphone manufacturers (Samsung, LG, Siemens) and network operators (Telefonica). The firm was in consolidation phases until 2002. During this time it was able to raise EUR 20m from first-tier venture capital firms and to expand its workforce to 30 employees. International expansion followed with the opening of an office in Korea in 2003, with annual sales revenues reaching EUR 4m and staff expanding to 70 employees shortly afterwards.

The original Fractus invention concerned fractal-based antennae, the technology which was the focus of co-founder Carles Puente Baliarda's academic research. Today, Fractus's core technology range remains that of antennae and arrays for telecom mobile terminals, connected devices, communicating wearables and stationary networks. These antennae are multiband and miniaturised and have low visual impact. End-user markets include smartphones and tablets, connected objects, medical and wearable technology and telecom networks.



Fractus was an early pioneer in developing internal antennae for mobile phones.

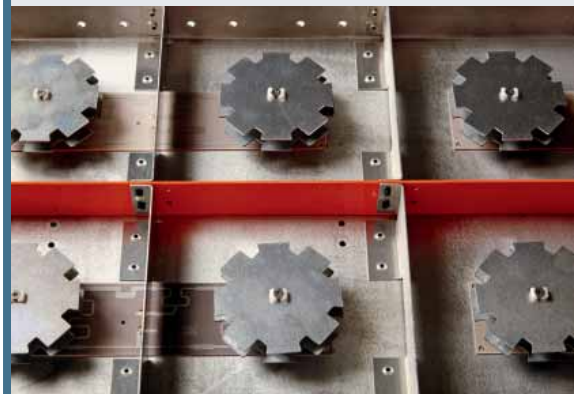
TECHNOLOGY PROFILE



Fractal-based antennae are characterised by a structural pattern that repeats on multiple scales. Each scaled repeat corresponds to a given range of frequencies, so that the antenna can operate over multiple frequency bands while remaining spatially compact and affordable in terms of manufacturing costs. Antennae developed by Fractus are suitable not only for smartphones (they can be integrated into the “shell” of the handset), but also for numerous smaller connected objects from the Internet of Things.

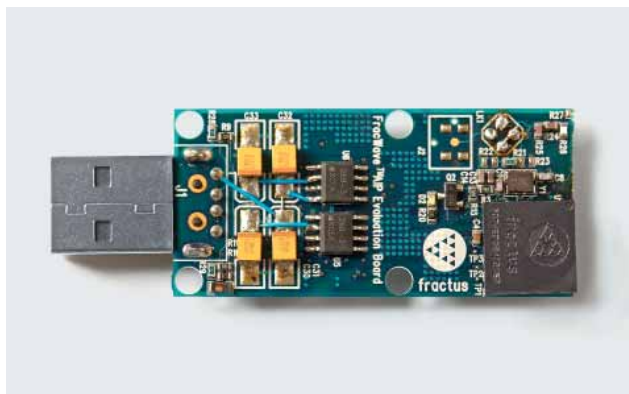
Above: examples of possible fractal-based multilevel antennae structures based on hexagons (EP1223637).

Below: a base station antenna with a “snowflake” geometry which ensures a highly efficient surface for minimal overall dimensions.



Sustaining protection

From the beginning, Fractus's strategy was to build a robust IP portfolio. This was met with reluctance by some customers, who sought to claim IP ownership of the projects they commissioned Fractus to carry out. However, Fractus decided early on to include strict clauses in its business and engineering contracts. These clauses specified that ownership of the IP rights associated with its custom-designed antennae would remain with Fractus and that customers would receive the product or the service only. In practice, this meant that



Internal antenna in a wireless dongle product.

supply agreements did not concede any IP rights to the client which instead had to be licensed. The company was ready to lose business from customers or partners who were not willing to accept such conditions, and this did in fact happen on one or two occasions. However, the policy enabled the company to grow from two original patent families in 1999 to almost 40 families in 2007. Today its portfolio includes over 120 patents and patent applications worldwide.

TAKEAWAY

CONSISTENT IP STRATEGY

Patience is a cardinal virtue, and tangible returns on investment on any IP strategy take time to materialise. It can therefore be dangerous to switch strategies just to grab financial quick wins.

Fractus also took care early on to “mark” its patents, by building claim chart proofs to make it easier to detect infringement. These documents compare technical evidence from a client’s product (obtained by dismantling it) with the specific claims of a Fractus patent, in order to establish whether or not the product incorporates one or more elements of Fractus’s patented technologies.

The 2007–2009 period proved challenging for the company: product revenues stagnated at less than EUR 4m, and an increasing number of clients used Fractus’s patents on their smartphone models without paying royalties. For example, some clients who had paid for antenna designs for a number of terminal models duplicated these designs on other models without notifying Fractus. This meant that they also were not paying the company for new developments. As a result, the company started downsizing, and management had to explore alternative growth opportunities. The firm’s IP portfolio became its major asset for attracting the new capital equity that was crucial to its turnaround, and its future hinged on boosting the value of its IP, i.e. adopting a patent monetisation business model.

Running the gauntlet

The change in Fractus’s business model was both risky and challenging. Its founders envisioned a move from a products and services company developing customised antennae designs for a limited number of very large clients to a technology-licensing company creating excellence in antennae technologies while serving numerous customers in multiple markets.

In 2009, Fractus engaged a Texas-based IP litigation law firm, which agreed to work for the company on a performance basis, taking no money upfront, but receiving a percentage of any damages won in court. The company decided to sue (in the US, which provides a jury court system) ten handset manufacturers, including some previous customers (Samsung, LG, RIM, HTC, Sharp, Palm, etc.), for patent infringement. Some of them opted to settle at an early stage and take a licence instead. Motorola, for example, agreed to negotiate upfront, becoming the first public licensee in 2010 and creating a positive precedent.

In 2010 a virtuous circle started when nine of the ten companies sued signed licensing contracts, prompting many smaller clients worldwide to do the same. Only Samsung resisted in court, with the litigation dragging on until 2014, when Fractus eventually won USD 23m in back-due royalties, plus USD 15m in damages. The decision was granted in Tyler County, Texas. Fractus’s “marking” of its own patents provided decisive evidence which, in combination with expertise from its US-based litigation lawyers, led to a successful outcome.

This success proved to the outside world that Fractus was not a company which “bit the hand that fed it”, but an inventor defending its legitimate IP rights. As a result, licensing revenues, which were practically nil in 2009, reached over USD 100m in 2015.

“Looking back, adopting a sophisticated IP strategy early on, when Fractus was still a start-up with limited resources, was the most important strategic decision we made.”



*Rubén Bonet,
co-founder and CEO, Fractus*

Agility in transformation

Fractus thus turned itself into a technology-licensing company that continues to strengthen its IP creation pipeline through constant R&D investment, which is primarily self-financed from its royalty revenues. The company today owns more than 40 patent families and as many pending applications, resulting in over 120 granted patents and patent applications worldwide. About 90% of company revenues arises from licensing, while the remaining 10% comes from sales of its products and services.

TAKEAWAY

IP LICENSING

IP monetisation can be an integral part of a company's value-creation process. However, it must be supported by a sustained R&D effort, ensuring technical innovation that continually adds value to the technology licences offered to clients.

IP strategy is oriented towards securing financing from investors and bankers by proving the company's value-creation potential, which justifies investors' long-term commitment. It is also meant to guarantee the company's independence, since royalty revenues from technology licensing fund 100% of Fractus's R&D activities, ensuring continued renewal of its IP portfolio.

Fractus prefers – and typically engages in – the non-predatory and amicable negotiation of licensing contracts concerning existing patented technologies (between five and seven years old) that have been adopted by players in various sectors who may or may not be customers of Fractus. Fractus then makes itself known as the original inventor and offers to permit continued use of the patented technology through a licensing contract. The targeted company is considered a “good faith infringer” since it was not aware upfront of the identity of the inventor. The licensing contract simply turns it into a lawful licensee.

TAKEAWAY

INTANGIBLE VALUE OF IP

Critical IP monetisation decisions (prosecution milestones, licensing negotiation, litigation) must also take account of the non-financial costs and benefits, such as image, goodwill, human resource gains and losses, partnership opportunities, and so on.

Litigation, which can be lengthy, expensive and of uncertain outcome, is kept as a last resort. The company has not undertaken any infringement litigation since the Samsung case. However, this precedent still serves as a permanent warning to future infringers that Fractus is prepared to sue if necessary.

TAKEAWAY

ENFORCING IP

Litigation must always be a last resort. However, the credibility of licensors depends on their determination to fight for their rights and take wilful infringers to court.

For the first time in its history, Fractus has enough market recognition and technological maturity to consider potential IP partnerships for developing new patentable technologies and know-how. Following an open innovation approach, this “insourcing” of innovations would widen its profitable IP portfolios and provide faster coverage of critical technologies, market segments and geographic areas.

Internal strategic planning

IP has been a fully fledged part of Fractus's corporate strategic planning since 2009. From inventor incentives to patent prosecution and potential litigation, the design, deployment and monitoring of IP is a corporate process personally supervised by the CEO, Rubén Bonet, and supported by the CTO, the marketing VP (responsible for comprehensive business intelligence), the IP director (supervising detection and formal description of in-house inventions, patent filing and prosecution) and the licensing director (supervising all licensing negotiations). They form Fractus's in-house IP engagement committee.

TAKEAWAY

DEVELOPING IP POLICY

Designed at CEO level and frequently redefined by experts in-house, a company's IP policy should have its origins in its corporate vision. It should be proactive, rather than merely reactive to external factors and should preferably form an integral part of the corporate and technology strategies.

Fractus shares all IP-related assumptions and decisions with its outside partners, including patent attorneys, IP litigation lawyers and IP consultants, who then provide feedback and constructive criticism on the initial draft plans. While Fractus's management are responsible for formulating and monitoring IP policy and measuring its value, implementation is partly outsourced to its outside partners.

The company focuses its resources on its technical capabilities, so there is no need to maintain in-house patent attorneys or litigation lawyers. It selects top-level, internationally competent professionals as and when required. However, regardless of the strength of their credentials, the limits of their tasks and responsibilities are strictly defined and enforced by the top management. Fractus seeks to forge mutual trust and long-term relationships and foster excellence and durable commitment.

TAKEAWAY

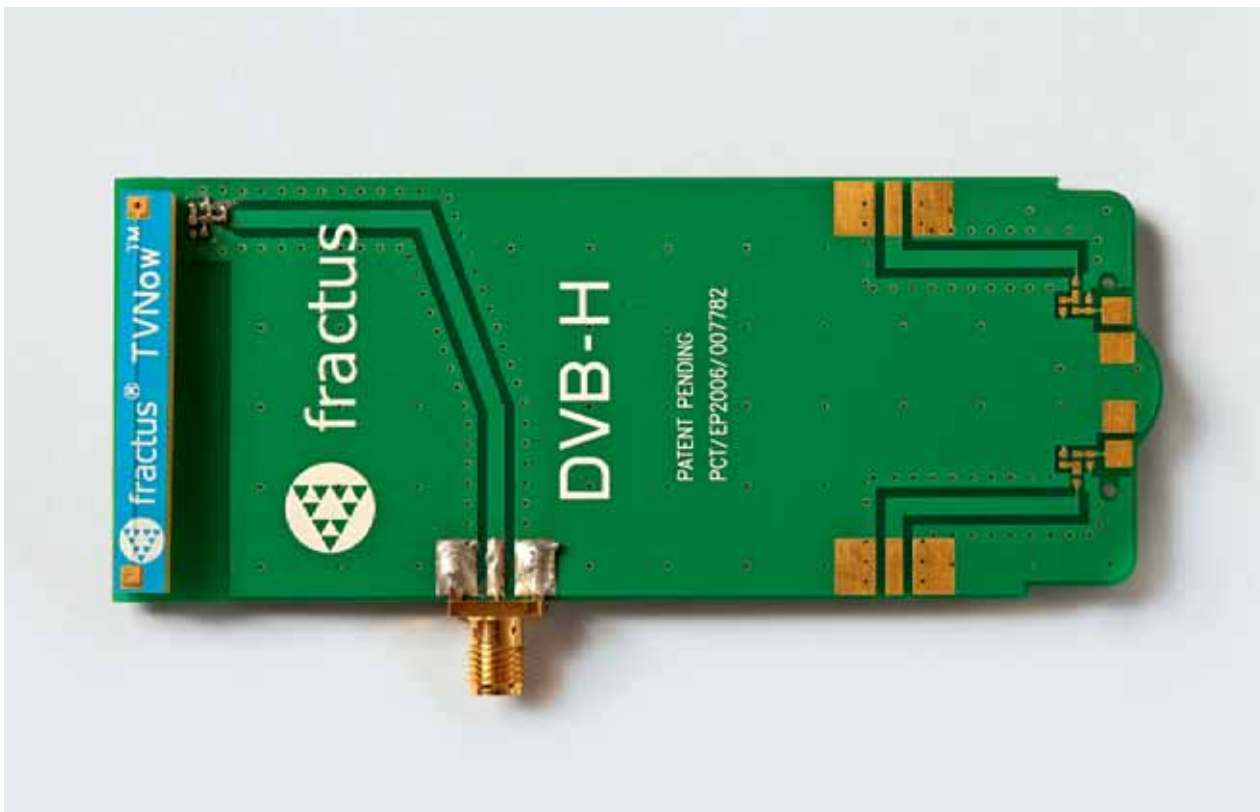
EXTERNAL IP SUPPORT

IP subcontractors (patent attorneys, IP lawyers, strategy consultants) are expected to execute strategic decisions effectively and contribute to their refinement. It is essential for relationships with them to be based on trust and transparency.

Patents and trade marks are Fractus's major IP assets, although formalised know-how plays a significant role in the firm's success and is protected by a strict confidentiality policy.

When it comes to patents, it is the firm's policy to file applications for all patentable inventions arising from its internal R&D. The company's in-house IP engagement committee decides on the patentability of inventions, and on whether to file an application. Fractus also relies on IP data-mining, using public databases such as Espacenet (EPO) and PATENTSCOPE (WIPO) to map competitors' patents.

The company's patent policy involves filing US provisional applications and EP applications to generate a search report, which is later used to optimise PCT applications covering Japan, China, India and South Korea and, in Europe, primarily Spain, France, Germany, the Netherlands and the UK. The Unitary Patent may therefore reduce Fractus's filing and maintenance costs in Europe while automatically extending protection to all other participating EU countries.



Fractus's TVNow is an off-the-shelf internal antenna solution for portable DVB-H applications.

Adjusting the scope

In 2009, Fractus had little choice but to enforce its patents in the United States. The company's intention was to obtain reasonable damages for the infringement of its patents and establish its credibility in the largest possible market. Achieving similar results in Europe would have been difficult. Fractus would have been exposed to the risk of parallel litigation in several national jurisdictions, a complex and costly option that was quickly discarded.

Litigating in the US courts involves much higher costs and delays than in a single European jurisdiction. However, the expected damages in US jurisdictions, which are perceived as favourable to "smaller" plaintiffs, are also much higher than what European courts would grant. Moreover, the US law firm that handled the case for Fractus agreed to compensation based on the licence agreements enforced and damages awarded by the court. European IP law firms are normally not allowed to propose such performance-based compensation agreements.

While it still considers litigation as a final recourse, Fractus would probably opt for the Unified Patent Court (UPC) in a similar case in the future. The new court, offering efficient and faster proceedings, would save part of the litigation costs in the US. Europe-wide enforcement will be less cumbersome for patent owners, and will reduce costs and increase legal certainty, as there will be no need to engage in parallel patent litigation in different member states. Similarly, the Unitary Patent could facilitate the ramp-up of Fractus's licensing programmes by easing the overhead costs of a nationally fragmented European market. Escalating from five countries to potentially 26 European participating countries at no additional cost is a clear advantage for a multi-client licensor like Fractus.

COMPANY PROFILE

FRACTUS, S.A.

- > Headquarters: Barcelona, Spain
- > Year of establishment: 1999
- > Staff: < 100
- > Turnover: > EUR 100 million since inception
- > www.fractus.com

PRODUCTS/SERVICES

Geometry-based antennae provide miniature and multiband internal antennae for wireless devices and network infrastructure. Thanks to their multiple iterations, the antennae can operate over multiple frequencies and bandwidths while remaining spatially compact.

MARKET AND TECHNICAL AREA

Telecommunications, Internet of Things (IoT)

CUSTOMERS

Leading players in the mobile telecom market, IoT, smart wearables and semiconductor manufacturers

SELECTED AWARDS

- 2004 European Technology Innovation Award (Frost & Sullivan)
- 2005 Technology Pioneer (World Economic Forum)
- 2014 European Inventor Award (EPO)
- 2017 European Inspiring Company Award (Elite Stock Exchange)

PATENT PORTFOLIO

Over 40 patent families, including EP2273611, EP1597794, EP1592083

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Editors: Thomas Bereuter, Yann Ménière, Ilja Rudyk | Author: Philippe Simon | Photos: Fractus S.A.

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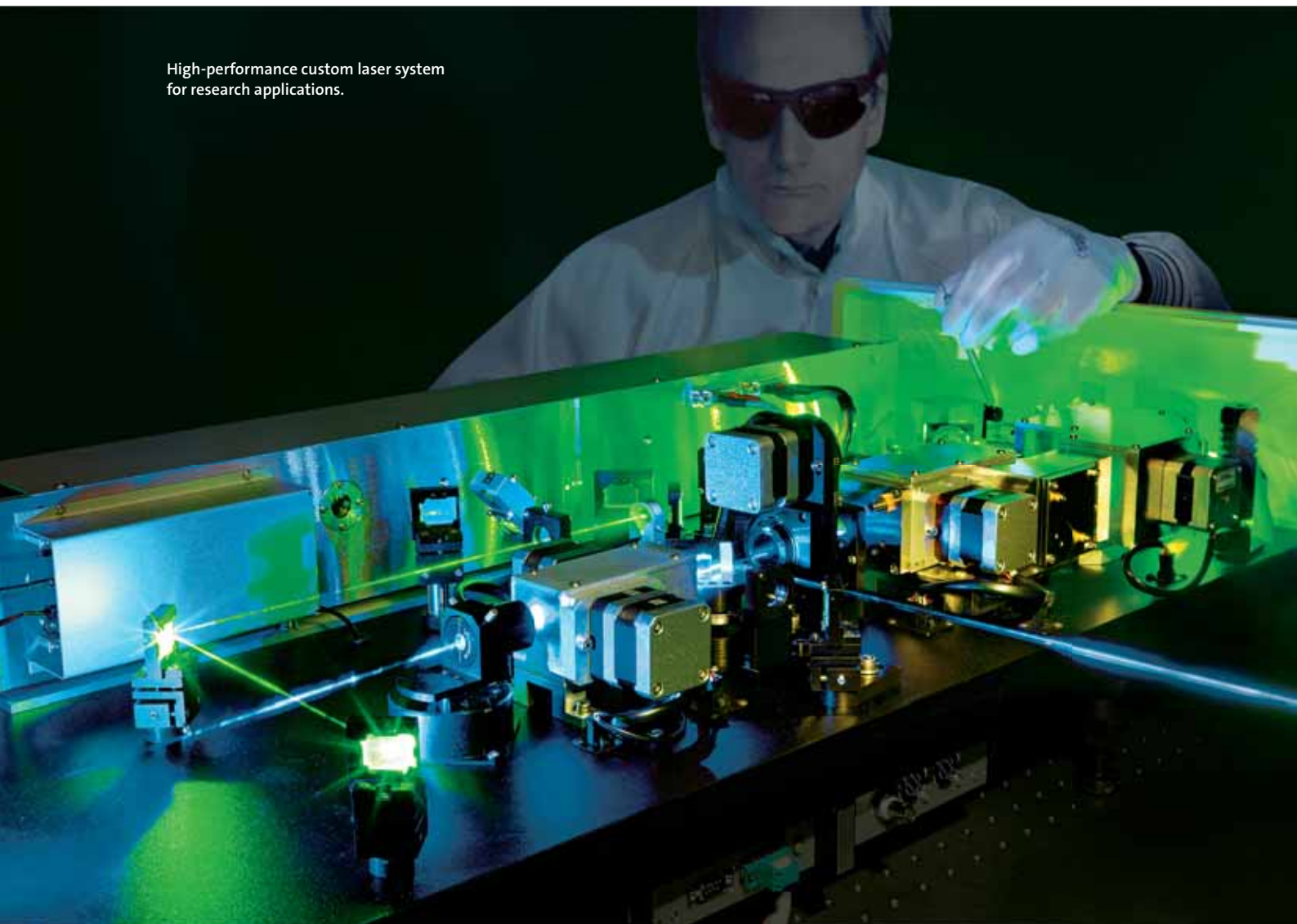


EPO SME CASE STUDIES | EKSPLA

Leveraging IP: from research tools to industry applications

EKSPLA, a Lithuanian SME set up in 1992, started off supplying customised high-performance laser systems to scientific laboratories. It later extended its product range to standardised laser systems for industrial applications. The move to producing standardised lasers made IP more important. EKSPLA now owns twelve patent families. In addition, some of its incremental innovations are kept as trade secrets. EKSPLA participates in EU projects and co-operates on R&D with contract manufacturers. Decisions to file patent applications are taken together with its partners. As its main competitors are based in Europe, EKSPLA looks forward to the Unitary Patent as a means of securing more extensive patent protection in the region.

High-performance custom laser system
for research applications.



EKSPLA is a research-driven photonics company with 120 employees. Based in Vilnius, Lithuania, the company originated from a pilot plant called EKSMA Co., which was set up in 1983 by the Institute of Physics at the Lithuanian Academy of Sciences. In 1992, the laser design and manufacturing part of the business was spun off to form EKSPLA. Established by private initiative, with no foreign investment or direct government support, the new company concentrated on making stand-alone short-pulse solid-state lasers and accessories for the scientific market.

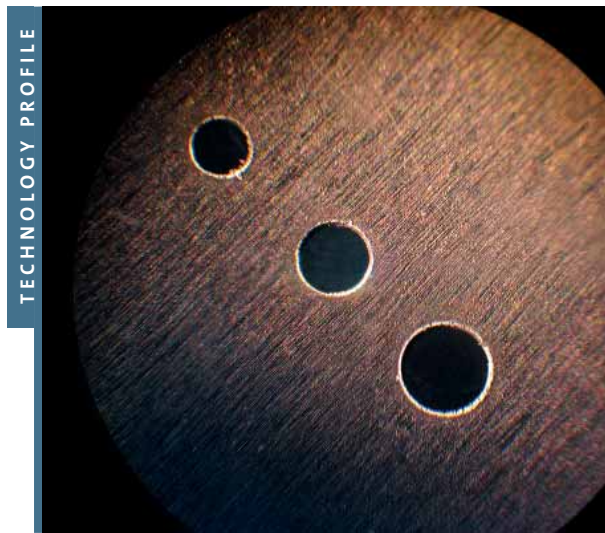
Over the years, EKSPLA has extended its range to include products for industrial customers. Today the company supplies high-performance laser systems and laser components such as diode-pumped solid-state lasers, ultrafast fibre lasers, optical parametric oscillators, laser optoelectronics and tailor-made laser systems. According to Andrejus Michailovas, Science Director at EKSPLA, customers like the unique features of EKSPLA's lasers. The wide range of wavelengths, together with competitive prices and the option to purchase customised lasers, are what persuade scientific and industrial clients to buy from EKSPLA. Customisation is particularly important for public research laboratories with highly specialised requirements.

Current sales are almost evenly split between scientific institutions and industry, which means that the company's strategic decision to expand its product range to the industrial market has been a success. EKSPLA sells over 90% of its products on the international market, and sales are divided equally between Europe (outside Lithuania), North America and Asia.

Applications for EKSPLA lasers

EKSPLA's laser systems and accessories for R&D applications and complete spectroscopy systems are well known and highly valued within the international scientific community. The company was selected to develop the European Union's Extreme Light Infrastructure (ELI) facilities in the Czech Republic and Hungary. Together with an American partner, it is currently installing the world's most powerful laser systems in Prague.

In response to the growing demand for high repetition rate and ultrafast lasers for material processing, EKSPLA has been focussing on its industrial product line. Its low-maintenance industrial lasers are reliable, compact and cost-effective. High repetition rate combined with great stability has made its picosecond lasers a good choice for industrial high-throughput material processing systems that require both speed and precision. The range of applications includes the marking, drilling, cutting, scribing and patterning of various materials, including heat-sensitive media.



TECHNOLOGY PROFILE

EKSPLA is focused on high-performance advanced solutions. New products are designed, developed and manufactured in-house. Short and ultrashort pulse generation and amplification, optical parametric amplification, nonlinear spectroscopy and optoelectronics are among its core competencies. EKSPLA also produces lasers for material processing and supplies lasers for industrial equipment manufacturers. The image above shows holes (0.5, 0.4 and 0.3 mm diameter) cut in tantalum with 1064 nm picosecond laser radiation.

New business model – new approach to IP

EKSPLA started out as a supplier of customised laser systems for scientific laboratories, developed for individual customers in a small niche market, so there was no real need to protect the company's unique technology at the time. It would not have made much sense economically for a competitor to copy EKSPLA's innovations, since the market was simply too small and not expected to grow.

Around 2005, EKSPLA decided to target the fast-growing market of industrial laser applications as well, a move which was facilitated by its adoption of the new laser diode pumping technology, which can be used in laboratories and industry alike.

The decision to manufacture industrial lasers entailed a change from bespoke manufacturing to what is effectively serial production. As a result, some innovative features that were previously only relevant to individual customers became of more general interest. From then on, it was essential for EKSPLA to protect its technology: competitors are much more likely to copy successful products in a larger and growing market. The company made a strategic decision to become more IP-active and to safeguard its innovations for the new field of industrial applications. It now owns six active international patent families and six national patents, protecting twelve inventions in total.

TAKEAWAY

IP STRATEGY

It is important to have an IP strategy early on, even if your company is not yet in need of formal IP protection. Later changes to your business model, involving targeting new markets or new customers or offering new services or products, may mean you have to make quick adjustments to your IP strategy. These are easier to implement if your company is already aware of its options and how to achieve them.

IP boost for international standing

EKSPLA's patents played an important role in establishing its reputation as a serious player in high-performance laser innovation. Patents made it more attractive to its client base and raised its profile as a knowledgeable partner for international projects. Participation in EU projects is a vital part of EKSPLA's business. It demonstrates the company's top-class know-how in the high-tech laser field. A company's patents help to demonstrate its competence when it comes to forming international consortiums or applying for project funding. Recent examples include OPTIX, an advanced system for detecting explosives in terrorist situations, and APPOLO, a consortium for establishing and co-ordinating dialogue between end-users and manufacturers to validate change process feasibility.

TAKEAWAY

FUNDED PROJECTS

Applications for participation in EU or other internationally funded projects are assessed on the basis of objective criteria, including technological know-how. This in turn is often assessed on the basis not only of scientific publications but also of granted patents or promising patent applications. The same criteria are applied when the results of funded projects are evaluated.

Wake-up call

EKSPLA's first encounter with IP was back in 2000, when it was accused of infringing another company's patent. The year spent in intense negotiations with the plaintiff's lawyers used up valuable resources. With hindsight, EKSPLA realises that proving non-infringement could have been easier if it had applied for a patent rather than keeping its technology secret, as this would have demonstrated that it had its own alternative technical solution. Although EKSPLA was eventually able to prove that it had not infringed the patent, this event led to greater awareness of the importance of patent protection in general. From then on, EKSPLA began to pay attention to protecting its own inventions, with the company filing its first patent application in 2004. To partly finance patenting costs, it made use of a public funding scheme in Lithuania that offers financial support for SMEs filing patent applications under the PCT or EPC.

“If we had had a patent, it would have saved us all the time and hassle involved in proving that the other company wrongfully claimed an invention.”



Andrejus Michailovas
Science Director, EKSPLA



Compact picosecond fibre laser.

Co-operation with partners

Although EKSPLA is a laser manufacturer, it does not grow laser crystals or produce other optical components itself. Its primary business focus is the assembly of optical components for laser systems, so most of its innovations concern novel types of assembly process and system control. However, it also works with contract manufacturers to improve individual components. Under this arrangement, EKSPLA comes up with a novel concept for a better component, which is then developed and produced by the contract manufacturer.

For components produced exclusively for EKSPLA, it is usually agreed with the manufacturer that the know-how will not be patented but kept as a trade secret. However, if the manufacturer intends to sell the component to other customers as well, a joint patent application is filed, so that both parties can benefit from the invention, thus creating incentives for co-operation and the exchange of new ideas in the future. One example of such a case is European patent No. EP2965852, which was filed in partnership with Altechna R&D UAB.

Usually, there is no exclusivity clause for EKSPLA in the patent ownership agreement, so that the manufacturer is free to sell products applying the patented process to other customers who may potentially be competing with EKSPLA. The parties therefore agree that EKSPLA will be able to purchase the component at a more favourable price.

TAKEAWAY

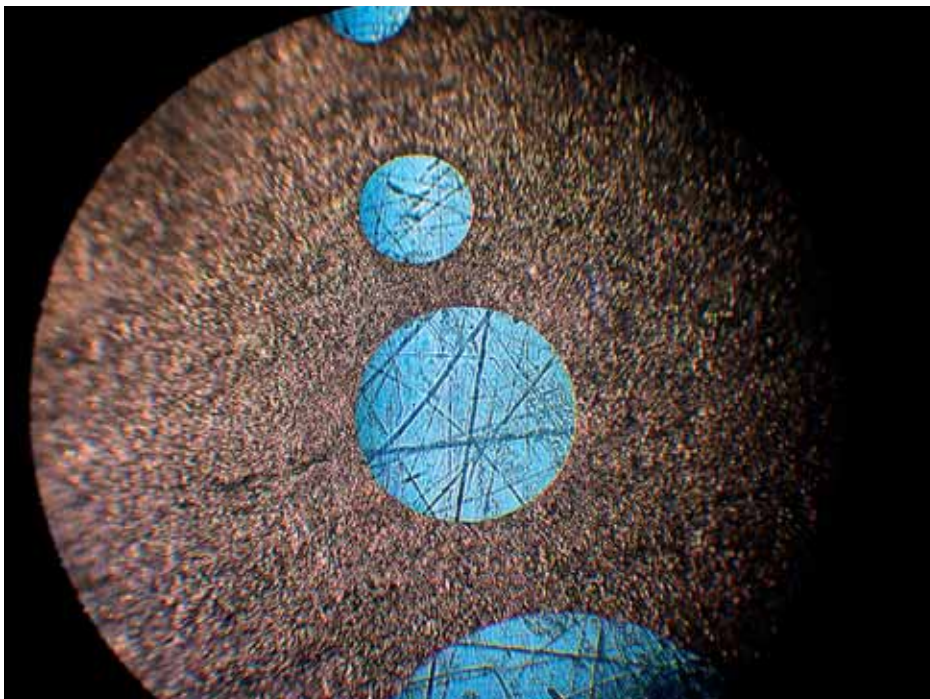
JOINT INNOVATIONS

Co-operation with partners can often result in co-inventorship. When this happens, it is important to have a clear agreement on whether the invention is to be patented or kept secret, and, if a patent application is to be filed, how ownership and exploitation rights are to be distributed. This will allow both parties to benefit from the invention and will at the same time strengthen the partnership.

“Patents alone do not always provide optimum protection. Sometimes the best option is a combination of patent protection for the basic technology and trade secrets for details of the invention.”



Virginija Petrauskienė
IP specialist, EKSPLA



Holes (0.5 and 0.3 mm diameters) cut in tungsten with 1064 nm picosecond laser radiation.

Managing a patent portfolio

When EKSPLA decided to build up a patent portfolio more than ten years ago, its senior management set a target of filing two patent applications per year and established a dedicated fund for this purpose. It was a difficult start for a company with no previous experience in IP management, but since then EKSPLA has steadily increased its filing activities. In order to manage patenting costs, the portfolio is constantly reviewed and patents sometimes abandoned.

TAKEAWAY

IP PORTFOLIO MANAGEMENT

Renewal fees for granted patents are usually due annually. Although relatively small in the early stages, they can accumulate over the years with a growing patent portfolio, and the cost can add up. Patents should therefore be reviewed on a regular basis in the context of their commercial relevance and abandoned if necessary. Software tools for patent evaluation and management, as well as service providers for patent renewals and validations, can help with this.

The Science Director decides which inventions should be protected. If he is in favour of filing a patent application, EKSPLA's IP specialist prepares a first draft, which is then forwarded to the external patent attorney for review. Having gained experience in drafting patent applications over the years, the company does not need to involve the patent

attorney too early in the process. It prefers to draft a fairly advanced specification in-house and send it to the attorney for comments, claim drafting and final improvements, thereby saving both time and money.

Filing routes

In the past, EKSPLA filed first in the USA for patent protection. However, over the years, the main focus for patent protection has shifted to Europe, where the company's main competitors are based. Filings are initiated through the national route, with a European patent application being filed within the 12-month priority period. Generally speaking, EKSPLA's patents are validated in three to five European countries, chiefly in Lithuania, France, Germany and the UK, and sometimes in Italy too, since these are the main markets for EKSPLA and its competitors.

If it had been less expensive to patent its technology in other European countries, EKSPLA would have added other potentially relevant markets, such as Greece, Spain, the Netherlands, Switzerland, and the Baltic and Nordic countries. The company expects the Unitary Patent to provide a cost-effective way of protecting its inventions in more countries and make portfolio administration easier and cheaper.

Patents or trade secrets?

EKSPLA sometimes decides that, rather than file a patent application, it will keep the innovation as a trade secret instead. The choice is determined on a case-by-case basis, and always entails a trade-off. Incremental improvements, such as mechanical layout, do not have to be disclosed in a patent application, so the cost of patenting can be saved – and an infringement might be difficult to prove anyway. However, if a competitor does then copy the development, no protection is available.

TAKEAWAY

TRADE SECRETS

Applying for a patent is more expensive than keeping an invention secret by contractual means. However, not having a patent can prove to be immensely costly, for example if your invention is reverse-engineered, knowledge is leaked, or the invention is patented by someone else.

Sometimes, a combination of the two options is the preferred strategic choice. The primary invention is patented, and hence revealed to the outside world, while the special technical feature addressing a specific problem in a particular application – based on this root invention – is kept as secret in-house know-how.

COMPANY PROFILE

EKSPLA UAB

- > Headquarters: Vilnius, Lithuania
- > Year of establishment: 1992
- > Staff: 120
- > Turnover: EUR 17 million
- > www.ekspla.com

PRODUCTS/SERVICES

Solid-state lasers, high-performance laser systems and optoelectronics for a wide range of research and industrial applications

MARKET AND TECHNICAL AREA

Scientific and industrial lasers as well as laser systems

CUSTOMERS

Research institutions, industry and original equipment manufacturers (OEM)

SELECTED AWARDS

- 2006 Innovative Company of the Year
- 2010 Prism Award for Photonics Innovation
- 2012 Business IQ of the Year

PATENT PORTFOLIO

12 patent families, including EP2965852



Europäisches
Patentamt


European
Patent Office

Office européen
des brevets

EPO SME CASE STUDIES | ORCAN ENERGY

Recycling waste heat to cool down the planet

A renewable energy company founded in 2008, Orcan Energy offers standard components for heat power generators that recycle waste heat by turning it into electricity, using the Organic Rankine Cycle (ORC), a process similar to that used in steam engines. Having started as a spin-off from the Technical University of Munich (TUM) in Germany, Orcan now has 65 employees. Patents are important, because the risk of Orcan's standard components being copied is high. Eight early patents were filed by the TUM and then subsequently acquired by Orcan. Ownership of these patents was vital in order to attract funding. Orcan co-operates with other companies, but simplifies patent management by avoiding joint ownership. It has a detailed patent protection strategy and understands when to file a patent application and where to file it.



Orcan Energy's compact ORC module offers up to 25 kW of electrical power. Stacks of two or more modules can be used where needed, depending on the customer's waste energy output.

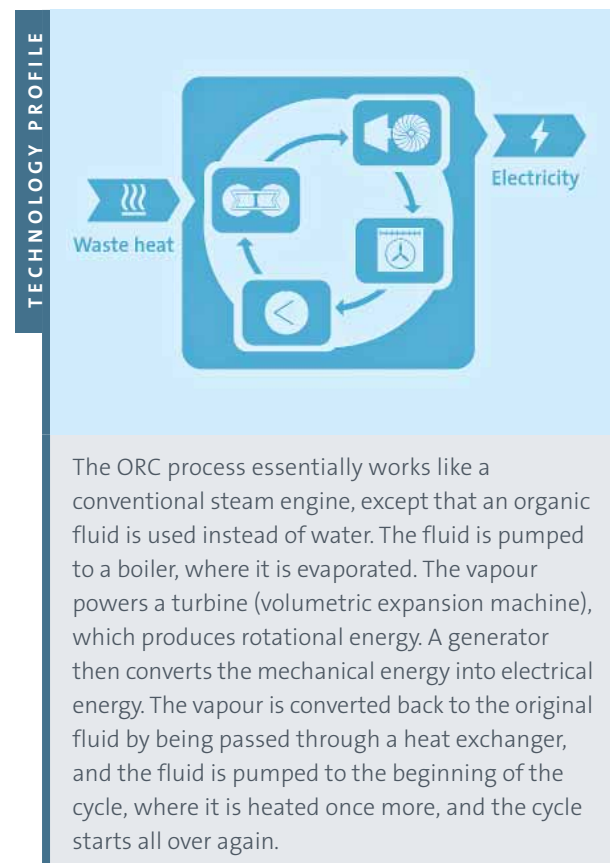
Orcan Energy is a renewable energy company founded in 2008 by three researchers – Richard Aumann, Andreas Sichert and Andreas Schuster – as a spin-off from the Technical University of Munich (TUM). Today the company has 65 employees (2013: 35). Despite its international business reach, the company is still based in Munich, where it is firmly rooted by its research co-operation activities.

The company emerged from a government-supported programme for university-based business start-ups. A research group was given the task of building a compact and cost-efficient ORC (Organic Rankine Cycle) system for waste heat recovery from combustion engines. The main challenge was to find suitable technical components from adjacent fields such as compressors or expanders that could be adapted for use in the ORC process. This resulted in two main inventions, protected by two patents covering the basic technology (EP2499343 and EP2476869), and several related patents on specific aspects.

Orcan designs and constructs heat power generators to produce electricity from heat. Its innovative technology enables energy to be produced from recycling waste heat using the ORC process. Its current core business is waste heat recovery in three fields: renewable power plants and combined heat and power (CHP) units, industrial applications, and marine and stationary power systems. The fleet of reference plants is based in Europe, and preparations are underway for developing the business in North America and China.

Like a steam engine

The ORC process is analogous to that of a conventional steam power plant, which works by converting heat, transferred in the form of steam, into electricity. However, as the name implies, in the ORC, the water is replaced by an organic fluid. Smart selection of the fluid allows the engine to operate at a lower temperature due to a lower liquid-vapour phase change compared with water, enabling the use of lower-temperature waste heat to run the process. Examples of such low-grade heat sources include the waste heat from industrial processes or biogas, solar or geothermal plants. In energy terms, waste heat equivalent to 100 million litres of diesel is produced every hour across the globe. Recycling this heat as electricity could bring about a significant reduction in the amount of CO₂ emissions.



The ORC process is not new, nor is its application in the recovery of energy from waste heat sources. However, ORC installations used to be individually tailored to large-scale equipment with a high engineering workload. Orcan has made a number of adaptations to the process, moving away from a bespoke to a standardised product business, avoiding the high engineering workload for each facility. The use of standardised and tested industrial components makes it cheaper, simpler, more reliable and easier to maintain. There is also an operator model for customers who do not want to be involved in the operation or maintenance of their installations.

However, the move to standard components required a great deal of technical innovation. The components had to be sourced from completely different applications and adjusted for integration into the new application in terms of process control and the way they are operated in the cycle.

Dealing with cavitation

One example where inventive skills were required was in the prevention of pump cavitation (EP2499343). This occurs when liquid suddenly evaporates in the inlet of a pump, resulting in a reduction in pressure to a level lower than the saturation pressure of the liquid at this point. Cavitation can cause two problems. Firstly, the vapour created blocks the pump, so that the pumping effect stops immediately. Secondly, the sudden condensation of the vapour can cause massive damage to the blades of the rotor, due to extremely high local temperatures of more than 1000°C and pressure of up to 10 000 bar.

These are well-known problems in the industry, and ways to mitigate them, such as increased apparatus height and subcooling, have been developed. But none of these methods could be applied in Orcan's small-scale installations. Orcan's innovative solution was to add a special non-condensing gas such as nitrogen to the working fluid. This applies a partial pressure which increases the overall system pressure, thus eliminating cavitation.

More than 100 granted patents

Orcan's standard components could easily be reverse-engineered by competitors, so patents are essential if the company is to stop its assets being copied. However, a single patent is not enough to protect Orcan's products, as the ORC process as such is an established technology. Instead, the company has made sure that it protects the relevant innovative aspects of the components that make up the control system. It has 23 patent families and more than 100 granted patents in its portfolio. Although most of them are the result of in-house development, eight of them stem from research carried out during the founders' time at the TUM. These patents hence belonged to the TUM.

“Without patents we would never have been able to attract early funding from professional investors.”



Andreas Sichert
Co-founder and CEO,
Orcan Energy

When the company was spun off, it was important for it to get access to these patents as quickly as possible. Patent protection is critical when it comes to venture capital funding for early-stage technology companies, who need to actually own the patents rather than just license them. There are two reasons for this. Firstly, the company must be able to minimise complexity by being able to control and manage patent issues related to their key assets direct, so as to reduce the risk of delaying decision-making or missing deadlines. These aspects were especially important for Orcan's investors. Secondly, through patents, backers can create a return for their investment even if the young technology company fails in the first instance and a turnaround is required. This would not be possible if the patents were simply licensed. Last but not least, the fact that a technology-driven start-up has its own patents is good for its reputation.

TAKEAWAY

UNIVERSITY SPIN-OFFS

University spin-offs need access to the relevant university-owned IP early on.

Once business angels and venture capitalists showed an interest in Orcan, there was very little time left to negotiate a win-win deal with the university. As Andreas Sichert recalls, although the TUM supports spin-offs, it also has to protect the interests of inventors who are not involved in the venture, as well as those of the taxpayer, by securing a fair and competitive market price for its patents. The fact that there is no transparent and established market makes it intrinsically difficult to assess a market price.

In 2010, Orcan and the TUM reached a transitional agreement under which the company was able to acquire the patents in return for a fair remuneration. These patents were one of the reasons why the company was awarded two big research projects early on, one in the marine industry and one for industrial waste heat. They helped to communicate the company's technical advantage and innovation skills.



Use of Orcan Energy's compact ORC module in an anaerobic digestion plant.

Open innovation and patent strategy

Orcan also engages in Open Innovation. It works closely with other manufacturers to investigate and develop new applications of standard components, often resulting in jointly created inventions. Ownership of these inventions has to be carefully negotiated and agreement reached on the commercial terms for exploiting them. Orcan and its partners have therefore agreed to make things much simpler by avoiding joint patent ownership. Instead, the parties agree on who will file the patent, this normally being the partner for whom the invention is more business-relevant. The other partner then obtains the freedom to operate (FTO) through cross-licensing arrangements. Special arrangements granting the licensee more rights than usual can be made to cover scenarios in which the invention is equally relevant for both parties.

Orcan's agreements with its partners cover aspects such as the sharing of patenting costs and potential licensing revenues, as well as filing and validation strategy for the patent. In its co-operation with universities, it pays special attention to agreements that benefit both parties. University students can also be considered in such arrangements, either as part of the university agreement or as individuals. If they are not employed by the university they can retain ownership of their inventions.

TAKEAWAY

R & D CO-OPERATIONS

You can simplify the IP management that results from co-operation by avoiding joint ownership of patents. Each partner should file an application for those inventions which are relevant to them. FTO for the other partner can be achieved, for example, by means of cross-licences.

Orcan has not yet considered out-licensing to other players, nor has it explored opportunities to exploit applications of its patented technologies in different markets. It is, however, in the process of evaluating the potential to expand its business model accordingly, and is aware that its IP strategy will have to be adjusted as well.



The compact ORC module with its registered design. The characteristic shape of the housing is a special design feature of Orcan Energy's products and won the prestigious iF Design Award in 2016.

Growing the IP portfolio in a smart way

Orcan places great weight on the importance of innovation and encourages its employees to submit invention disclosure reports on a regular basis. For promising cases, a first patentability check and FTO analysis are carried out in-house, and an external IP specialist consulted if necessary.

TAKEAWAY

IN-HOUSE RESOURCES

Filing for patent protection creates work for the inventors too! They not only have to draft an invention disclosure report, but also contribute to the evaluation of the invention and the drafted patent application. They may also get involved in the patent prosecution process, if the attorney has to respond to the search report and other communications from the patent office during the patent examination procedure.

“To get patent applications granted successfully, close collaboration between the patent attorney and the inventor is essential. Excellent results will only be reached if the legal expertise of the attorney and the technical experience of the inventor are combined.”



Andreas Schuster
Co-founder and CTO,
Orcan Energy

If the overall evaluation is positive, the documentation is shared with a patent attorney, who then drafts a patent application. The final decision on whether to file is taken by the in-house IP specialist and a general manager. A major criterion is whether the claims of the application will support Orcan's business activities.

TAKEAWAY

CO-OPERATION WITH PATENT ATTORNEYS

The time and money spent discussing your technology with your patent attorney will be worth it, as it is vital that they understand the essence of the invention and your business case, so that they can come up with the best solution for optimum claim coverage.

The application is usually filed at the EPO first, to obtain a high quality search report within the priority year. Alternatively, the company might decide to file an international (PCT) application and then select the EPO as the international searching authority.

The geographical scope of the patent protection depends on the importance of the invention to the company. A distinction is made between key patents covering the basic technology and patents relating to specific, narrower applications of the technology. Countries are ranked in order of importance, based on the location of Orcan's main customers and competitors. The current top four European countries are Germany, Italy, France and the UK. Further major markets are the USA and China and, for some patents, Japan.

While Orcan's earlier, key patents covering the underlying main technology were validated in a larger number of countries, subsequent patents limited to details relevant to certain applications only were considered not to require such broad geographical coverage. The choice of which countries to patent in is based on a cost-benefit analysis. The Unitary Patent will make this decision much easier in the future as, in addition to simplifying the administrative processes involved, it will allow the company to obtain patent coverage in a larger number of countries more cost-efficiently.

TAKEAWAY

UNITARY PATENT

The Unitary Patent will make it easier to manage patents and will offer better-value patent protection in Europe.

Orcan owns the trade mark family for the company name, which is protected in the main markets, including the EU (EUTM013909478), the USA and China. It also has a number of registered designs (EM002922898).

COMPANY PROFILE

ORCAN ENERGY AG

- > Headquarters: Munich, Germany
- > Year of establishment: 2008
- > Staff: 65
- > www.orcan-energy.com

PRODUCTS/SERVICES

Waste heat power generators using the Organic Rankine Cycle (ORC) process

MARKET AND TECHNICAL AREA

Energy

CUSTOMERS

Energy producers and suppliers, transportation companies, AD plants

SELECTED AWARDS

- 2016 iF Design Award 2016
- 2016 TOP 100 Innovator Award

PATENT PORTFOLIO

23 patent families, including EP2574742, EP2538040 and EP2469047

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EPO SME CASE STUDIES | SKELETON

Graphene draws on capacity for energy storage

Skeleton offers one of the first commercialised technologies to use graphene, a ground-breaking and Nobel prize-winning material. This Estonian company develops, manufactures and sells ultracapacitor energy storage cells, modules and systems based on patented advanced materials and designs. Its IP portfolio has been created to protect the company's technology along the whole value chain, including development, production and sales. The IP and business strategies evolved simultaneously, starting with a platform built on protection for the core graphene-centric technology and a focus on protecting inventions with the best business potential first. Employees at Skeleton are cross-trained so that everyone is aware of and has competencies in the company's IP strategy and is familiar with how it relates to the R&D strategy.



SkelCap ultracapacitor cell series uses patented graphene-based materials for mass market applications in the motorsport, automotive and aerospace sectors in particular.

Founded in 2009, Skeleton is a young and ambitious company. To date it has raised more than EUR 40 million in investments and has spent considerable time and resources developing its technology into a product suitable for commercial-scale production and use. With roots in a private research institute conducting contract work for Toyota Motors, the two young Estonian non-tech founders Oliver Ahlberg and Taavi Madiberk from the University of Tartu, in collaboration with scientists Jaan Leis and Anti Perkson, started Skeleton with a technology and IP base focused on advanced materials. Madiberk's father was a scientist in the field during his career, which provides a link between the technology and its commercialisation that supports Taavi's entrepreneurial spirit. All four founders still work for the start-up as employees and shareholders.

Once Skeleton had been set up, the management was able to swiftly translate the technology into a commercial product. In 2011, the European Space Agency signed a contract with Skeleton, which gained the company a lot of publicity and recognition. Investors were attracted, and in the period 2013–2014, a pilot manufacturing plant was built in Tallinn with money invested by UP Invest (an Estonian venture capital and private equity firm). By 2015, a full manufacturing plant was up and running. The last milestone in the commercial production scaling was reached in 2017 with the finalisation of another plant in Saxony, Germany, to meet growing customer demand.

A new and better way to store energy

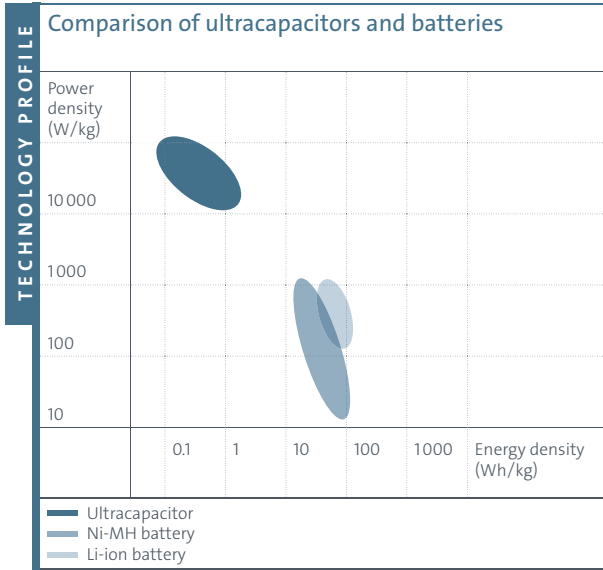
Skeleton's innovation is based on a breakthrough graphene material. The company produces high-power-density energy storage solutions using ultracapacitors, made possible by advancements in nanomaterials. Skeleton's products address the increasing need for efficient energy storage to accommodate the fast-growing remote use of electricity, stronger reliance on intermittent sources of energy from wind and sun, and volatile energy prices. Ultracapacitor technologies deliver stability and economic benefits across numerous fields, including heavy transportation (maritime and land), and the automotive, aerospace and (renewable) energy markets, as they can be used as quick-charge buffers and provide the most efficient way to recuperate braking energy and re-use it for acceleration.

The combination of greater power density, instant recharging, longer lifetime and lower resistance has fuelled commercial growth for ultracapacitor energy storage of around 30% yearly since the mid-2000s. According to a 2015 report by IDTechEx, sales of ultracapacitors are expected to grow from around EUR 243 million in 2015 to EUR 1509 million in 2021, giving them a significant share of the energy storage market. Despite their lower energy density and increased cost, ultracapacitors have numerous technical advantages over competing batteries. Shorter charging time, longer lifetime, low resistance (no significant resistance $> 0.12 \text{ m}\Omega$), improved efficiency and environmental friendliness have all contributed to making ultracapacitors a real alternative. They work well paired with high-energy-density storage technologies such as lithium-ion batteries, which can be connected in parallel to create combined power supply units.



Skeleton's SkelStart is a powerful engine start module based on ultracapacitor technology developed for the demanding needs of the mining and heavy machinery industries.





The superior performance of Skeleton’s ultracapacitors is due to a patented curved graphene nanotechnology which has major advantages over the activated carbon used by other manufacturers. Curved graphene is superior to the organic precursors, usually coconut shells, used for carbon synthesis by competitors. The patented process allows for optimum pore size distribution and for the fine-tuning of pore size for a perfect matching with the electrolyte ions, resulting in maximised capacitance as well as superior electrochemical stability and low resistivity of the material. Moreover, this process yields a highly pure graphene material compared with activated carbons, making ultracapacitors more reliable and longer-lasting. Skeleton’s SkelCap-branded ultracapacitors are not only more advanced and have double the energy density of competing products, but they also have the lowest equivalent series resistance (ESR), which translates into energy-efficient cells, since the amount of energy converted into heat is low. This reduced energy consumption creates the additional possibility of downsizing or removing cooling systems in many applications.

Aim high, conquer all

Skeleton’s business model is based on the development, production and sale of ultracapacitors to a variety of industries. The company has addressed the task of controlling its technology throughout the whole business-to-business value chain. Its patent portfolio aims to protect competitive advantages throughout, with a few strong patents (the number is restricted by budgetary constraints).

Skeleton has taken on the challenge of creating a commodity for established markets (automotive, transport, maritime, electric grid, aerospace) where it needs to convince the big incumbent companies to switch from their current technology and actively choose Skeleton. Its unique selling point is, of course, the performance of the curved graphene material. While the production and application of this material is technically sophisticated, it could still be reverse-engineered by target customers and other big companies with the capacity to either outsource development or develop parts and materials themselves. Thus, protection of the technology and material is immensely important and paves the way for win-win oriented collaborations. Patents, in combination with know-how, were essential to protect the company’s investments in R&D as well as production set-up and consequently to raise capital in the company’s early days. The branding power of Skeleton’s patents is also used as a marketing tool to convince customers of the uniqueness and superiority of the technology.

Growth through co-development and standards

For Skeleton to continue growing as a company, it must not only ensure freedom-to-operate (FTO) status for its protected technology, but also actively contribute to expanding the ultracapacitor market together with other actors in the business, so it actively collaborates on the co-development of technologies.

Skeleton is a developer and manufacturer of components that need to be adapted for integration into its customers’ products. To ensure interoperability, it designs its ultracapacitor cells, systems and modules in co-operation with its customers. Such collaborations allow the company to build internal competence by incorporating technology and know-how from its partners. Conversely, Skeleton may also share sensitive know-how with external partners. Patents are then a necessary condition for safely disclosing information while keeping the company’s technology adequately protected.

Skeleton's collaborations may also be instrumental in creating a competitive advantage through standardisation. Since the market for ultracapacitors is still nascent, there are opportunities to influence future regulatory standards for the interoperability and safety of ultracapacitor systems. This requires active participation in standard-setting bodies, backed by industry co-operations and strong IP positions. Skeleton has at this point relied on a few strategic patents and trade secrets. However, in order to grow and shape the market as it develops, the company needs to strategically expand its patent portfolio to gain more authority in standard-setting bodies, and in order to actively contribute to the creation of standards.

Evolving IP strategy

"Our IP strategy evolved together with the company," says Taavi Madiberk. The first phase began with a focus on advanced material technologies and an early strategic decision to concentrate on the ultracapacitor application for energy storage. According to Madiberk, "That was the most marketable product from a business case point of view." An IP strategy was then created primarily to build up the patent portfolio, particularly with regard to the process for synthesising the new material with the hexagonal graphene structure. The goal was to use the portfolio as a platform for further applications for advanced materials.

TAKEAWAY

TIMELY IP STRATEGY

Having put into effect an IP strategy as soon as the company was formed, Skeleton ensured that the patenting of inventions in the initial stages of R&D has been streamlined with early product development. This led to three benefits: **1** better IP capture; **2** a better idea of the value of the invention, which is of huge importance at the beginning, where investment is crucial, and **3** the ability to assess whether the company will be able to use the invention without being dependent on others (FTO investigation).

The focus in the second phase was to build cell modules and storage systems, and align the company's IP strategy to support this new phase. At this stage the company analysed the technological and patent landscape to re-evaluate and design the ultracapacitor applications that the R&D team worked on. The goal was to identify the applications which not only had the best IP protection but also a technological advantage and business potential.

The third phase was to establish a proper process for IP creation and IP management. This culminated in the realisation that cross-trained employees (employees trained, in addition to their core discipline, in IP, business and/or science) are necessary for a functional IP management process. "All R&D personnel need a basic understanding of IP, and some need specific and extended IP knowledge," says Madiberk.

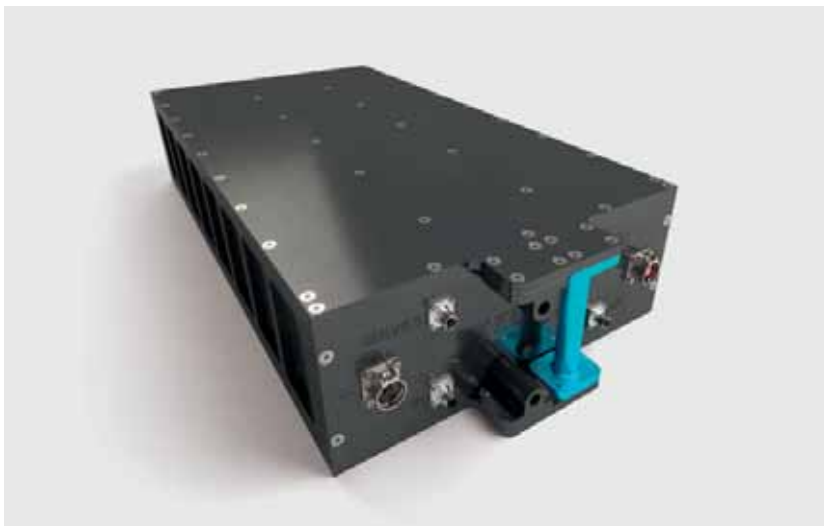
TAKEAWAY

IP TRAINING

The whole innovation team needs to think in terms of IP rights, as well as to be competent in the use of patent search tools. This will enable them to realise the full potential of their R&D (more efficient and effective R&D processes), translate R&D into innovations (through FTO analysis) and understand how to protect innovations through IP rights.

The fourth phase was to implement a detailed R&D scheme in alignment with the IP strategy, directed at recording and evaluating as much of the knowledge created as possible, and linking short-term research aims with long-term IP opportunities. The R&D scheme is modular: scientific goals are broken down into separate objectives and divided between cross-trained scientists, each of whom has a specific responsibility for one part of the overall technical challenge to be solved.

Skeleton's production lines have recently been established and are delivering the company's first products to market. So far, only a limited budget could be allocated for patent protection, so those technical inventions with a clear competitive advantage are patented and the remaining technology is kept as trade secrets. The actors in the market are currently not suing each other, and Skeleton has not been sued nor has it petitioned for infringement of any of its patents. However, Madiberk still recognises the importance of a strong IP portfolio: "Larger markets lead to more IP litigation as a general rule. Skeleton's emerging and growing business will attract a lot of competition and IP litigation will come in the future, so it is very important to be prepared now – and we are."



SkelMod ultracapacitor modules for applications in heavy transportation, rail applications, pulse power supply, regenerative power and peak assistance in power grids and industrial applications.

Cross-training for IP competence

IP management at Skeleton is the responsibility of the R&D manager, who is assisted by three people in the R&D department with special IP responsibilities. These cross-trained specialists are employees with in-depth knowledge in their field who receive specific training in IP, to ensure that IP competence is present at the source of innovation. This enables the team to assist in evaluating ideas and communicating with external IP experts. The four-person IP team is supported by the CEO, to maintain alignment between corporate and IP strategy. The IP team provides monthly reports to senior management. This is integral to the R&D process because of Skeleton's strong focus on identifying what can be protected with IP rights. Patent attorneys are mostly used at an operational level, primarily for the drafting of patent applications, but they are also relied on for their input on IP strategy issues. IP experts are chosen based on previous experience and relevant competencies, and are usually identified through recommendations.

TAKEAWAY

INTERNAL IP EXPERTISE

In-house IP specialists can be used to complement external patent attorneys when drafting corporate and IP strategies. They can assist in the development of internal organisational processes, helping the company to consider the relevant IP questions and integrating IP as part of both its strategy and its in-house training.

“IP is key to our competitive advantage, and it is important for management to understand more than just the basics.”



Taavi Madiberk
Founder and CEO, Skeleton

Budgetary aspects

The Skeleton patent portfolio consists of 15 patent families covering different elements, including material, modules and cells, providing comprehensive protection along the value chain. The geographical scope is geared towards the big markets in Europe (Germany, France, the UK and Estonia), as well as the US. The rationale behind the portfolio is to create as much patent protection as possible in the main markets (Europe and the US), while taking into account the limited funds available to the company as a start-up.

Madiberk recognises that the priority for IP management is to obtain more IP. However, it is expensive to apply for multiple new patents, as well as maintaining a large and growing portfolio. For him, therefore, the Unitary Patent will aid the company's IP management in Europe. Its benefits will not affect Skeleton's fundamental IP strategy, but will allow the company to consider more protection and better enforcement at lower cost and with less bureaucracy. “The wider patent coverage offered by the Unitary

Patent would not change much now for the company, but in the future, it will be very beneficial,” Madiberk says. One of the long-term IP management goals at Skeleton is to police and enforce its IP rights. Madiberk sees advantages in the Unitary Patent in combination with the Unified Patent Court. “For a small company, it is better to put all your eggs in one basket than to become involved in litigation in multiple jurisdictions!” he says. “What it boils down to is that if you have a strong patent portfolio, the risk is low.”

TAKEAWAY**UP-TO-DATE INFORMATION**

You can save a lot of time and money by keeping up to date with changes and developments in the patent system.

Creation, selection and protection

At Skeleton, the R&D manager is responsible for IP management, in particular prior art and FTO searches, which, together with monitoring competitors’ patent applications, provides intelligence for both R&D and IP purposes, a process also known as patent landscaping. “The first question to answer is whether you can patent something, and whether the R&D is up to date. You can then use patent landscaping to ensure that you are not developing something that has already been invented or for which there is no FTO. It is also a good way for researchers to find inspiration and ideas,” says Madiberk.

The IP team decides in two phases which inventions they will select for protection. The first phase involves evaluating the invention in-house together with the inventors. The second phase is done in collaboration with external patent attorneys, who perform a more detailed and complex assessment of the invention, e.g. a prior art search, and then decide on the best way to draft the patent claims.

Since Skeleton introduced IP training for its team, patent quality and alignment with corporate strategy have improved. “It [the creation of patents] is best done together with patent attorneys. Without this internal-external collaboration, the result would be a patent that doesn’t fit the overall strategy. At the end of the day, it all comes down to the disclosure of sufficient and appropriate content in the drafting of the patent specification in order to ensure that the claims provide strategic protection in relation to the business case. Patent lawyers can be competent and good, but for them to fully understand the company strategy is difficult, so we have gained IP capabilities and use internal specialists as well,” says Madiberk.

Further SME case studies at epo.org/sme

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Editors: Thomas Bereuter, Yann Ménière, Ilja Rudyk | Author: Anton Svensson | Photos: Skeleton Technologies OÜ

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Patents or trade secrets?

Skeleton has implemented a structure for protecting technical know-how that cannot be patented or which it has been decided should be kept as a trade secret. A system with various levels of access has been set up to manage secrecy on a compartmentalised and need-to-know basis. The system is used to transfer knowledge between different positions within the company. At its heart is an internal database of knowledge. Madiberk explains: “It is important to know what others are working on, so researchers don’t work on the same thing, or tackle a question where the answer is already known. It is an internal arrangement for knowledge transfer.”

COMPANY PROFILE**SKELETON TECHNOLOGIES OÜ**

- > Headquarters: Tallinn, Estonia
- > Year of establishment: 2009
- > Staff: 90
- > www.skeletontech.com

PRODUCTS/SERVICES

Ultracapacitors, ultracapacitor modules and full energy storage systems. The use of curved graphene, a nano-material, allows the ultracapacitors to achieve high power and energy density.

MARKET AND TECHNICAL AREA

Energy storage

CUSTOMERS

Automotive, electric buses, trucks, aerospace, renewable energy and the electric grid

SELECTED AWARDS

- 2016 RSM European Entrepreneur of the Year
- 2017 RSM European Entrepreneur of the Year
- 2017 Bloomberg New Energy Pioneer

PATENT PORTFOLIO

15 patent families, including EP2633532, EP2614512



Europäisches
Patentamt

European
Patent Office

Office européen
des brevets

EPO SME CASE STUDIES | VOLTEA

Capacitance creates a watershed in purification

Water-softening and deionisation have been highly dynamic fields, especially over the last decade. Dutch company Voltea has managed its IP by embracing technological and market opportunities through two distinct phases of growth. The company was initially created as a spin-out from Unilever, with the IP rights being transferred to the newly created firm. In the second phase, when it had limited resources, Voltea used IP to build commercial co-operation and partnerships. Patents also allowed it to expand into new markets with new applications for the core technology.



Voltea's technology is designed to remove dissolved salts from a variety of water sources, from tap water and brackish groundwater to industrial process water.

Voltea offers products, software for data/system control, services for online data tracking and integrated solutions for softening and deionising water. Most water impurities are in the form of dissolved salt that can be removed by deionisation. The process, which can be done quickly and inexpensively using electro-deionisation, produces high-purity water.



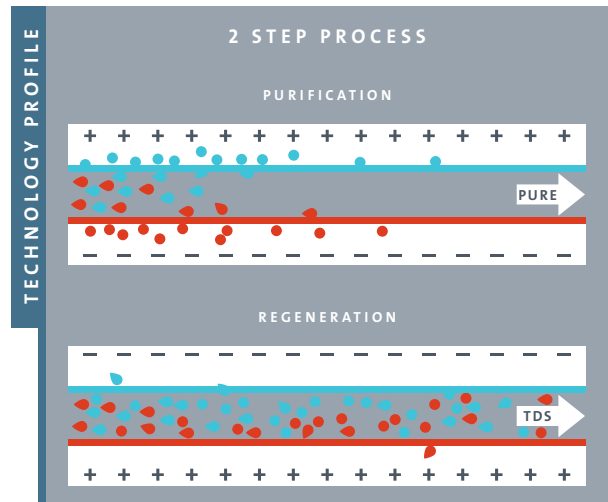
Voltea's CapDI water deionisation system with 24 modules. Each module produces approximately 0.5 m³ of clean, deionised water per hour. Like electricity smart metering, the CapDI system is controlled online, and no operator is required.

The idea behind the electrochemical deionisation of water initially emerged in 1960, with the first patent applications appearing at that time. Its commercial relevance became apparent in the late 1960s. From 1990 onwards, water capacitive deionisation gained in importance thanks to the development of new materials such as carbon nanotube electrodes. The term CDI (capacitive deionisation) was first introduced in 1996, and the phrase membrane CDI appeared around 2004. The pace of patenting accelerated through all these periods and is still growing.

Technical superiority with an environmental outlook

The key difference between Voltea's technology and standard CDI technologies is that the former uses capacitive carbon electrodes and ion exchange membranes to remove ions such as chloride and calcium from various water sources, including tap, well and brackish water. This increases the ion storage capacity of the carbon electrodes by up to 40% compared with standard capacitive non-membrane electrodes, which in turn results in improved efficiency and water recovery. Moreover, the use of ion exchange membranes reduces the sensitivity of the electrodes for scaling and fouling, which gives Voltea's CapDI module a longer life than competing solutions.

When applied to cooling towers, the main advantages of Voltea's technology are high water recovery, often above 80%, which means a more efficient use of the feed water and greater overall water savings in the cooling tower system, low energy use that allows for lower operational costs, temperature stability and a longer lifetime, which together make for a more environmentally sound process.



How does Voltea's technology work? Its membrane capacitive deionisation (CapDI) system is designed to remove ions from feed water by applying an electrical potential difference between two parallel electrodes covered with selective ion exchange membranes (purification step). The extracted ions are temporarily stored in the electrical double layers which are formed at the electrode surface. Once the electrode polarity is reversed the ions are released. The resulting concentrate stream then flushes the captured ions from the module (regeneration step).

“Patenting is a great way for businesses to protect innovative advances, but an effective IP strategy must balance commercial potential with the cost of reducing inventions to practical utility, and then ensuring enforcement.”



Bryan Brister
CEO, Voltea

Growth phase 1: R&D-driven

Voltea originated from an internal project at Unilever R&D in 2004. Back then, the objective was to develop an ion softener for washing machines and other consumer appliances. Unilever recognised the potential of its innovation and moved the project from Unilever R&D to Unilever VC (Venture Capital). In 2006, the project outputs formed the core technology for the spin-out, Voltea, which was founded by two inventors from Unilever, Bert van der Waal and Hank Reinhoudt. As part of the transaction, six patent applications were assigned to Voltea. In return, Unilever VC became the major shareholder. Since then, Unilever's role is mainly that of venture capital investor; it no longer has any function at R&D level.

Voltea, then still part of Unilever, began by focussing its R&D efforts on the development of a product based on a core technology (CapDI) in the field of water softening and deionisation. It made further developments to the membrane CDI technology invented by another company, Biosource Inc., giving it superior levels of performance (up to 90% water recovery), robustness, capacity and durability. Its technology then became unique compared with other CDI technologies available on the market at the time. From an IP perspective, the combination of Voltea's early patents with those of Biosource created a significant barrier to entry for competitors. Voltea was now the only company in the market with patents on the use of ion-exchange membranes in CDI devices.

As with many other high-tech start-ups, most of the value of Voltea was in its IP, especially during the first few years, when the company was not yet generating a profit. In this initial period, the business was characterised by negative cash flows, along with significant expenditure on building prototypes and assessing the technology's economic and commercial viability. Finding financing during this phase was difficult because few investors were willing to take on

the high-risk nature of the enterprise. However, the IP acted as a signal to future investors that Voltea might have a sustainable competitive advantage.

TAKEAWAY

IP PROTECTION

Applying an R&D-driven approach, first protect the key components of the core technology and get strong patents. There should be a good match between IP and the product, and this needs to be reviewed at each stage of product development.

Thanks to its intensive research and development activities, Voltea filed additional patents on its core membrane CDI technology for the purposes of establishing technology leadership and a reputation of excellence. Such strong IP protection gave investors confidence in its business potential. With the assistance of new investors Pentair and Rabobank, Voltea began to grow, both internally and externally. In 2008 it acquired Biosource Inc., the original developer of the membrane CDI technology. One of the main reasons for the acquisition was Biosource's patent on using ion exchange membranes in CDI systems (US6709560), which Voltea needed to gain a competitive edge over the standard CDI technology. The acquisition also ensured Voltea's freedom to operate.

Defensive IP

Voltea used its IP primarily to protect its membrane CDI technology applications and products in its core markets, such as the cooling tower business in Europe and point-of-entry/point-of-use (POE/POU) water softening in North America. POE systems are installed at the main water line where water first enters the home. POU systems are installed at a single water connection, typically under the counter of a kitchen or bathroom sink.

Patents were also used to protect and improve Voltea's market position. This was accomplished by watching competitors and enforcing patents against alleged infringers via legal action if required, and by seeking exclusivity, which secured market leadership. Voltea monitored the market, using feedback from consumers and resellers, reverse-engineering, claim chart analysis and other business intelligence/patent analytics to identify possible infringers. Such market policing also gave the company a proactive approach to identifying licensing opportunities for its CapDI technology and acquiring new clients, such as Atlantis, which Voltea had not been aware of previously. Atlantis eventually took a licence with a supplier agreement for Voltea's technology, which helped to better integrate it with Atlantis's products.

By 2011, Voltea had secured a solid IP position around its core technology, the membrane CDI, to protect its key components and to retain exclusivity for its products in the market. Patents helped to minimise risk when investing in innovation development, protection and exploitation in line with Voltea's funding requirements. The company systematically reviewed new inventions from R&D and sought protection in its current and potential markets.

Growth phase 2: commercially driven

The year 2011 was a turning point for Voltea. The pace of innovation in the field of water deionisation had already doubled compared with 2006 and continued to grow fast during the following years.

TAKEAWAY

EVOLVING IP STRATEGY

The role of IP changes as a company evolves. At an early stage, it is uncertain whether patents might attract the interest of investors. However, at a later stage, investors tend to favour companies ready for higher (IP) governance. That means that patents and IP should be part of the business strategy in order to help companies mature rapidly.

Voltea had to respond swiftly to that change. It did so by securing additional funding to support the commercialisation of its CapDI technology. Voltea executives had a strong commitment to leveraging its IP, which proved to be instrumental at this stage. The company evaluated as yet untapped markets by looking out for niches and new business opportunities in order to develop and protect further commercial applications. Eventually, they realised that the CapDI technology could indeed be applied in industry segments other than washing machines (as initially sought by Unilever R&D). In fact, it brought the same environmental benefits to a wide range of applications, all having the common goal of saving water and reducing energy use.

In terms of exploitation during this phase, IP played a new role as an enabler of commercial co-operation and partnerships, especially with leading players for mass market applications, and this became the largest revenue stream for Voltea. This approach differed from the defen-

sive approach taken in phase 1. Voltea recognised that IP could generate extra value, affording benefits that went beyond securing market shares and royalty fees from licensing. Co-operations and partnerships promoted Voltea's entry into new businesses. It started developing commercial applications for the automotive industry (e.g. water recirculation in a paint line), horticulture and agriculture (recirculating water by removing excess levels of sodium), and residential areas. It began exporting its technology, servicing new markets in the USA, Europe, China, India, Japan and Mexico, while maintaining its presence in Germany, France, Italy, the UK and the Netherlands. Margins were higher in these European markets thanks to a pricing policy based on a premium which was justified by Voltea's unique technology.

Collaborative IP

Because of this expansion across industries and countries, Voltea and its 30 employees quickly reached a limit in terms of in-house R&D capacity. It realised that large companies could provide R&D support, the necessary business networks and distribution channels. For such multinationals, proprietary technology is important for partner selection. A typical example is the 2012 partnership with Pentair for the development of a new electronic water purification system, under which Voltea's technology was licensed exclusively to Pentair for some residential and light commercial applications in the US.

TAKEAWAY

PARTNERSHIPS AND CO-OPERATIONS

Generate extra value via co-operation and partnerships which are enabled by IP. In an integrative strategy, parties collaborate to define and reach a win-win situation by focusing on each other's interests and developing mutually beneficial synergies.

Through co-operation agreements with its partners, Voltea also gains access to IP rights, thereby achieving and maintaining freedom to operate (FTO) for its products. Since it makes its own systems for installations in industrial and commercial markets, securing FTO for its products is important.



The CapDI Development Test Kit allows customers fast and simple exploration of the potential of CapDI systems for their applications.

Managing IP

To respond to these new challenges and growing complexity, Voltea needed to expand its IP portfolio in terms of scope and territorial coverage, and to adapt its IP management accordingly. During phase 2, Piotr Dlugolecki took over as R&D and technology manager. He introduced new systems and processes for senior management to improve day-to-day in-house IP management in co-operation with external IP consultants regarding decisions such as whether or not to file, what to do at the end of priority periods, responses to office actions, payments, and so on.

Voltea focused primarily on the aspects relating to IP capture and protection. In order to generate patentable inventions internally, it organised innovation workshops aimed at protecting promising technology applications. Point-of-entry and point-of-use systems are two prominent examples of applications with high-impact mass-market potential. Both were developed in co-operation with leading partners, who were then still under joint development contracts. Other IP management processes related to keeping notebooks, disclosing inventions, carrying out patent searches, documenting know-how and recording copyright had been introduced as well.

TAKEAWAY

DEVELOPING IP SKILLS

IP professionals need new and advanced skills and tools (e.g. commercialisation and licensing expertise) when it comes to strategic IP management, if they want to keep an active role in the future.

In addition, Voltea also focused on operations associated with IP exploitation such as patent evaluation, competitor watches and FTO analyses. IP evaluation was particularly important, since the value of the company was mostly attributable to its IP, especially during the early years.

Voltea succeeded in growing and exploiting its portfolio as it moved the company from phase 1 to phase 2. The direct results of these changes included the development of the patent portfolio in terms of country and scope. The pace of patenting increased rapidly from the years 2006–2010 (phase 1) to the years 2011–2016 (phase 2). This supported the company's expansion in terms of markets (especially the US and European countries) and applications.

Scenarios for the future

As far as Voltea is concerned, the Unitary Patent is likely to reduce IP management costs such as those relating to renewal fees and translations. It may lead to streamlined administrative steps for patent protection in Europe beyond grant, where the maintenance of files and fees for individual countries is no longer required. The Unified Patent Court (UPC) will establish a harmonised definition and interpretation of patent claim scope throughout Europe, which will bring clarification, simplification and visibility when it comes to deciding on patent protection (similar to the US to a certain extent), leading to a less fragmented protection of Voltea's products and technologies in Europe. In retrospect, if the Unitary Patent had existed when the company transitioned from phase 1 to phase 2, it would probably have helped the company avoid any difficulties regarding the country selection for European patent protection.

In future, Voltea's management will decide on a case-by-case basis, depending on the relevant markets at the time and taking into consideration crucial aspects such as litigation risk and patent strength. As the company also pursues a licensing strategy, the Unitary Patent can secure market opportunities in what are currently peripheral areas.

Furthermore, for Voltea and its integrative approach in phase 2 – seeking co-operation and partnerships with leading players for mass-market applications – the new system will give all parties additional protection thanks to its centralised action against counterfeiting. When the UPC comes into existence, it will help Voltea to police the market, which it currently does by watching competitors and enforcing patents against alleged infringers through legal action in the national courts. The UPC will allow Voltea to obtain a central court action instead, which will create significant efficiencies in the enforcement process.

TAKEAWAY**HOLISTIC IP MANAGEMENT**

Take a holistic approach to IP management, involving planning with other company divisions (marketing, finance, etc.), preferably at executive level. Patents should be treated as part of a larger and complex exploitation system with multiple internal stakeholders.

Voltea continually reassesses its IP management and strategy. Long-term IP investment planning may prepare the company for its next phase of growth, where IP will be used more proactively (driven by the company's long-term goals) rather than reactively (driven by external changes). Voltea is following a holistic approach to IP management, with a forward-looking IP strategy in which management consolidates past IP achievements with those that have already contributed to the company's growth, while preparing for the future. The company is convinced that its IP plan should be developed at board level, rigorously implemented at top management level, and subsequently monitored and adjusted to give a sustainable drive to innovation development, protection and exploitation in an environment with growing competition and complexity.

COMPANY PROFILE**VOLTEA B.V.**

- › Headquarters: Sassenheim, The Netherlands
- › Year of establishment: 2006
- › Staff: 30
- › www.voltea.com

PRODUCTS/SERVICES

CapDI: tunable, low-cost water deionisation technology which removes dissolved salts from water using electrochemistry

MARKET AND TECHNICAL AREA

Global industrial and commercial water treatment markets, residential water softener market

CUSTOMERS

Food and beverage, hotel and resort operators, automotive industry, steel industry, commercial laundry and many others

SELECTED AWARDS

- 2010 Water Technology Idol (Global Water Summit)
- 2013 Blue Truffle Award

PATENT PORTFOLIO

35 patent families, including EP2344423, EP2322486, EP2212254

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Editors: Thomas Bereuter, Yann Ménière, Ilja Rudyk | Author: Arnaud Gasnier | Photos: Voltea B.V.

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EPO SME CASE STUDIES | LITHOZ

3D printing opens up a new chapter for ceramics

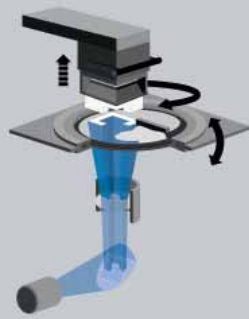
A spin-off from the Vienna University of Technology (TU Wien), Lithoz specialises in the 3D printing (additive manufacturing) of high-performance ceramics. Thanks to the university's far-sighted IP strategy, this Austrian company is able to offer complete systems comprising lithographic printers and materials. Staff are encouraged to develop – and are rewarded for coming up with – new and patentable ideas. For Lithoz, not every invention has to be ground-breaking to be worth patenting, and the company is now focussing on building up its own patent portfolio to strengthen its market position.

3D-printed sensor mountings, impellers and gears for industrial applications.



Lithoz is an additive manufacturing company that has developed patentable methods and formulas for fabricating high-performance ceramic products with industrial applications that could not have been realised using traditional technologies. It has created 3D printers, a variety of new ceramic materials and dedicated software for printing production. Before the development of the lithography-based ceramic manufacturing (LCM) process, the density and strength of 3D-printed ceramics were not sufficient to meet the standards of the ceramic industry. With its technology and materials, Lithoz now achieves a high level in the material properties of density and strength, and its quality and precision are such that the process can be used for serial production.

TECHNOLOGY PROFILE



In contrast to subtractive ceramic forming processes, in which the desired component is carved out of a solid, 3D printing is additive. The technology is based on the selective curing of a photosensitive resin which contains homogeneously dispersed ceramic particles. The illustration shows a projection system, slurry in a transparent vat, a building platform and a recoater. In Lithoz's LCM process, the printed product is not released from the building platform until it is pulled out of the vat. Bottom-up exposure keeps material consumption very low. The process can run with a capacity of only 10 ml, and the remaining material is left for further use. Due to the quick-locking cartridge system, a change of material can be completed within five minutes. The LED-based projection system requires no special safety precautions and keeps energy costs at a very low level. After sintering, the final density is well above 99% of the theoretical density, meaning that the mechanical properties are equal to conventionally fabricated parts.

An opening in the market

Lithoz was founded in 2011, and delivered its first production-ready machine a year later. It has already received a number of industrial awards, and in 2014 saw its revenue pass the EUR 1 million mark. Its main customers are universities, research institutions, companies producing ceramic parts, and biomedical companies. The market for additive-manufactured, high-performance ceramic parts is new, and growing rapidly. Other companies are attempting to penetrate the market, but the quality and variety of Lithoz's material remain unmatched.

Continuous expansion of the business into sectors including the manufacture of ceramic cores for turbine engine components and solutions for biomedical components such as blood pumps and bone implant materials has allowed the company to grow systematically and hire new staff, bringing the total number of employees to 36. In addition to its standard products, Lithoz also offers customer-specific developments, feasibility studies and customised solutions. In 2015, the company expanded into the US and Chinese markets, and joint research activities with a Chinese university started in the same year. Although material development and production is now also undertaken in the US, every new machine is produced in its entirety in Austria.

Partners in IP

Lithoz founders Johannes Homa and Johannes Benedikt started their academic careers at TU Wien, where the core IP for Lithoz was generated. In the four years prior to Lithoz being founded, Homa and Benedikt's intense collaborative research produced six jointly owned patent families, and eventually the proof of concept in 2010. The team recognised the unique potential for a new class of materials back in 2006, and decided to develop the technology. Once they started work on the development of the ceramic material with Professor Robert Liska from the Institute of Applied Synthetic Chemistry and Professor Juergen Stampfl from the Institute of Material Science and Technology at TU Wien, it soon became apparent that new concepts for machines and software were also needed.

“The combination of patents and trade secrets is very important for a small high-tech company such as Lithoz, as they allow us to stay ahead of our competitors for longer.”



Johannes Homa
Founder and CEO, Lithoz

TU Wien sought a commercial partner to fund the necessary further developments, and in 2007, after six months of conducting experiments on its own, it was joined by dental company Ivoclar Vivadent AG from Liechtenstein, who agreed to sign up to a joint development programme, providing financial support as well as input from their in-house research. Ivoclar was already well established in the fields of dental instruments and materials across the entire treatment and fabrication process for direct restoratives and prosthetics.

TAKEAWAY

UNIVERSITY/SPIN-OFF INTERACTION

A university's IP strategy can have a big impact on the success of its spin-offs and can bring additional benefits to industry sponsors, creating a win-win situation for all involved. In the past, a research co-operation contract would probably have granted the sponsor, in this case Ivoclar, exclusive rights to all applications of the developed technologies. Instead, since Ivoclar's business case is focused on dental applications, TU Wien secured the freedom to pursue new business opportunities for all other applications. The outcome of this agreement allowed new and innovative research projects to be fostered, which led to the successful spin-off, Lithoz. The research and licensing income generated by this helps the university to attract and retain valuable researchers on new applied projects. At the same time, Lithoz gains expertise and technological advantages from the university. Ivoclar, the sponsor, also benefits from its relationship with Lithoz as an industrial co-operation partner.

TU Wien's Research and Transfer Support office divided the exploitation rights into dental and non-dental applications. Ivoclar received the exclusive rights for dental applications. For all other application areas, TU Wien, as co-owner with Ivoclar of the patent families that resulted from the joint collaborative research, has the ability to grant licences. This strategy allowed TU Wien to spin off Lithoz, by providing it with the necessary licences in 2011.

Growing a patent base

The spin-off was based on a licensing agreement with the university which granted access to the patent rights. TU Wien was completely free to license in the non-dental field, which means that Lithoz has access to a large patent portfolio that includes the territories of the EPO, the US, Japan and China. Being a small company, Lithoz's patents are essential if it is to avoid being blocked by competitors when exploiting its technology, and if it is to ensure a premium price for its high-quality products. As 3D-printed ceramics for industrial applications are still an emerging market, Lithoz knows most of its competitors and monitors their activities at conferences and trade fairs to detect products that might violate their patents. Competitor watch is also done in an informal way through customers who identify and report potential infringements in the marketplace. Although it has not had to do so up to now, Lithoz is prepared to take legal action in core areas, if necessary. The question of who takes the lead in such cases will be decided by TU Wien and Lithoz on a case-by-case basis. Legal requirements regarding which legal entity has the right to sue in a particular territory will have to be taken into account.

“Patents on scientific research results are in many cases an essential precondition for starting a technology-based university spin-off company.”



Peter Karg
Transfer Support, TU Wien

In 2014, Lithoz reached an important milestone when Hans J. Langer, CEO and founder of EOS, one of the first commercially successful additive manufacturing enterprises, acquired a shareholding in the company. Lithoz's robust patent base and its know-how played a key role in this strategic decision, which brought benefits to both parties. Mr Langer, who has a strong portfolio in the 3D printing of plastics



CeraFab 7500: Additive Manufacturing System for Ceramics.

and metals through EOS, gained a partner that had mastered the additive manufacturing of ceramics, and Lithoz strengthened its credibility on the world market by partnering with a recognised player in the 3D printing industry, which in turn helps to attract new customers.

Research activities are still of essential importance to the company and generate one-third of its revenue. Lithoz continues to co-operate with TU Wien and other research partners, and is involved in several national, European and international research projects to develop new applications and technologies which will improve upon its products. Under the agreements on which these co-operation activities are based, the ownership of new inventions resides with the partner or partners who create them. Access rights are granted to the other partners on a fair and non-discriminatory basis.

Managing the magic

Lithoz has dedicated staff members who support the management in making IP decisions. One employee with a background in material science manages R&D projects. Another, who has experience with patent management, runs prior art searches, liaises with external patent agents and helps monitor competitors' developments. Patent drafting is outsourced to an external patent agent, who helps the company make strategic decisions in the examination phase.

TAKEAWAY

MANAGING IP

To prevent strategic issues such as patents being overlooked in the course of day-to-day business, it is good practice to have dedicated staff – for example a patent manager and an ideas manager – whose job it is to ensure that the necessary IP management actions are taken in good time and in the right order.

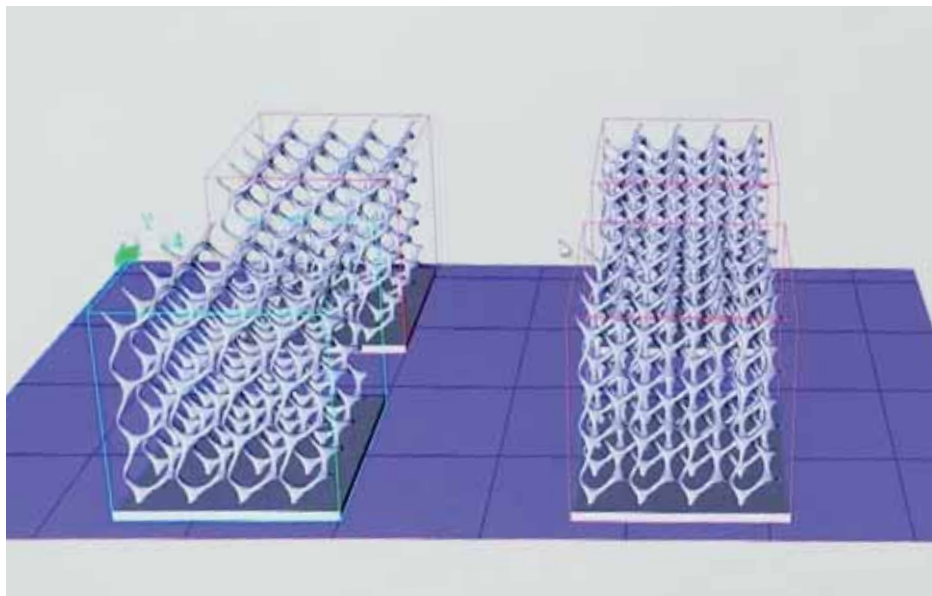
Lithoz also has an “ideas manager”, who serves as the first point of contact for staff with ideas for improvements, and ensures that they are discussed and reviewed by management. Lithoz staff are free to pursue their own ideas. “This creative freedom opens up new ways of approaching existing problems and led to our latest, very promising invention, for which we recently filed a patent application”, explains Homa. An inventor reward scheme, with awards at the filing, grant and use stages, provides additional incentives for creativity.

TAKEAWAY

CREATING IP

To foster the generation of new ideas, it is an advantage to have an open and inviting climate in which people from different backgrounds can come together to solve problems creatively. Lithoz believes it is essential to give employees enough freedom and incentive to pursue their own ideas in order to generate new inventions.

Even though Johannes Homa is responsible for all in-licensing activities, he can still count on the expertise of the university's Research and Transfer Support office for additional support. The office works in close co-operation with Ivoclar's patent department and is able to clarify questions regarding the interpretation and execution of various clauses in the licensing agreement, or the kinds of questions that typically arise about how to adapt it to the company's new fields of business.



Production based on Computer-Aided-Design (CAD) data.

Strategising market protection

Consistent with its business strategy, Lithoz conducts its own research and development activities. With staff in the fields of polymer chemistry, ceramics, mechanical engineering, process management and application and software development, the whole process chain is covered within the company, which helps it to develop its own IP.

Lithoz makes its first filings with national offices or the EPO, and follows these with international (PCT) applications. PCT applications give it time to assess whether the commercial value of the invention justifies further patenting costs, because the decision regarding geographical protection can be extended from 12 up to at least 30 months after the priority filing. Within this time period, the applicant receives an international search report with an opinion on patentability and has time to carry out market research.

As an alternative to the PCT route, the option of filing applications directly in the US, Japan and China is also assessed. Factors to be taken into consideration are the cost of filing, the quality of the search report, and coverage of the key markets. Important inventions aimed at safeguarding the technology pipeline are usually filed with the EPO directly, in order to get the high-quality European search report with an expert opinion within six months.

Lithoz also considers filing minor improvements. “Not every invention has to be ground-breaking to be worth patenting,” Homa says. “Also minor improvements can play an important role in the company’s overall IP strategy.” In these cases, the main aim is to keep competitors at a distance and to strengthen the portfolio for strategic future

business-to-business collaborations and possible cross-licensing options. In cross-licensing, it is usually an advantage to have a larger patent portfolio. Filing patents facilitates the creation of defensive publications, which raises the bar for competitors’ applications, which might otherwise limit Lithoz in its business activities.

TAKEAWAY

EVALUATING IP

When making decisions about patenting, it is important to consider unmet market needs. Even technically minor improvements can play a vital role in a company’s overall IP strategy and may well be worth patenting. In the end, market needs decide what is commercially relevant.

The software developed and used by Lithoz is usually protected by copyright. In addition, one of the in-licensed patents covers a computer-implemented invention relating to the modulation of the printer’s light source and has already been granted in two countries. With the purchase of the 3D printer, the customer is implicitly entitled to use the software, even though there is no explicit licence contract stating this right.

Pushing boundaries

The in-licensed patent portfolio consists of 55 applications in six patent families with priority dates ranging from 2008 to 2012. Ninety percent of the applications have already been granted. The European patents were all validated in Austria, Switzerland, Germany, France, United Kingdom, Italy and Sweden, and some of them in The Netherlands and Spain as well. The selection was done by Ivoclar and TU Wien, although Lithoz was involved in the decision-making. These patents cover Lithoz's key markets; however, Lithoz is now doing business in other countries as well.

Between 2014 and 2016, Lithoz filed three patent applications. "When our next patent is granted in Europe, it would be great if the Unitary Patent system were already in place, as it would make the procedure and our decisions much easier," Homa said. The Unitary Patent system is designed to be simpler, while continuing to provide high legal certainty with wider geographic protection at a lower cost. Thanks to Ivoclar's decision to protect the platform technology extensively in Europe, the core European patents have already been validated in more countries than the university usually chooses. As all these patents were accessed with the licence granted to Lithoz, this gave them a much better starting position. Because Ivoclar had already taken over patent filing costs, Lithoz was at a financial advantage at its foundation, as was the university, because it was not under any pressure to recover these costs. The university, the spin-off and the partner all benefitted from this scenario.

"The Unitary Patent with its wide range of countries and lower cost makes it easier for universities to target the full potential of an invention in Europe."

Peter Karg

Head of Research and Transfer Support, TU Wien

Universities usually have to deal with inventions at an early stage. Very often, these early-stage inventions have many different fields of application, some of which may not even be fully known at the time of patenting. At this early stage, the market potential is hard to predict, making it difficult for university management to justify the cost of wide-scale patent protection. Furthermore, the set of countries suitable for one area of use may not be appropriate for another field of application. This can significantly limit the chances of success for exploitation and also for possible start-ups.

COMPANY PROFILE

LITHOZ GMBH

- > Headquarters: Vienna, Austria
- > Year of establishment: 2011
- > Staff: 36
- > Turnover: EUR 1 million–EUR 10 million
- > www.lithoz.com

PRODUCTS/SERVICES

3D printing systems for high-performance ceramics. The technology is based on the selective curing of a photosensitive resin which contains homogeneously dispersed ceramic particles. The process makes it possible to manufacture extremely dense and strong machine parts with industrial applications.

MARKET AND TECHNICAL AREA

Ceramics manufacturing

CUSTOMERS

Universities and research centres, producers of ceramic parts, biomedical companies

SELECTED AWARDS

- 2013 Phoenix Award
(Austrian Ministry of Science and Research)
- 2014 National Champion
(European Business Awards)
- 2014 Hidden Champion Award
(Austrian Chamber of Commerce)

PATENT PORTFOLIO

Six in-licensed patent families, including EP2505341
Three own applications, including WO2016154645



Europäisches
Patentamt

European
Patent Office

Office européen
des brevets

EPO SME CASE STUDIES | PICOTE

Pipe repairs that break the rules but not the walls

A traditional construction and renovation contractor, the Finnish company Picote discovered and filled a niche when it developed a proprietary method of repairing smaller interior pipes without drilling or digging. With 15 years of business expertise, it designed and developed materials, tools and methods to adapt an existing lining technique originally used for large infrastructure pipes to fit smaller diameter pipes used in buildings. Patents have played a major role in supporting the adoption of this new, innovation-based business model. Picote recognised that IP rights were the most effective means of protection for its easy-to-copy mechanical solutions. Because it is expanding throughout Europe, it is considering using the Unitary Patent and the Unified Patent Court to avoid parallel litigation.



Picote's Smart Cutter is an award-winning lateral cutter for drains that can navigate 90° bends and diameter transitions, shaping openings without damaging the original pipe.

Picote – or Innotia as it was originally known – was set up in 1993 in Finland. As a contractor for the construction, renovation and restoration of buildings in all property categories, the company was a traditional service provider that did similar work to the competition and encountered comparable problems, especially in pipe renovation projects, where it was necessary to demolish walls and remove and exchange pipes in order to repair damaged sections.

In 2008, the company changed its name to Picote and widened its services to include pipe rehabilitation. The expansion was facilitated by the introduction of a proprietary process for lining deteriorating pipes that would previously have been either restored or replaced. The new process was the brainchild of Mika Lokkinen, the company's co-founder and chief inventor. "He thought that there must be a better way, so he started to search for ideas. There were difficulties with the methods available at the time, so to speed up the process and make it easier to use, he created his own tools," says Jami Wilenius, Picote's IP expert. Lokkinen's inspiration came from a technology known since the 1970s that was used to rehabilitate larger-diameter infrastructure pipes underground. This gave him the idea to develop the technology for small pipes inside buildings. In the beginning, the tools were only intended for use within the company, and selling them was not considered. But when some employees left for other companies and asked for the tools, their value became evident. This change in business model opened up new horizons for the company and led to the creation of a new business branch focussing on the design and manufacture of tools for pipe rehabilitation.



The Smart Miller is suitable for drain cleaning, root clearing, lateral re-instatements, collapsed liner removal and more.

In 2009, Picote filed its first patent application for the technology relating to these new tools, which enabled the old method to be used in a new way on smaller pipes inside buildings. The first product on the market, the Smart Cutter, a tool that cuts pipes from the inside out, won the ISTT No-Dig Award for a new product in 2012 and was highly commended in the UKSTT Innovation Award in 2013.

TAKEAWAY

BUSINESS MODEL EXTENSION

Innovation is an opportunity for extending existing business models from services to high-value products. The old and new business models can be mutually supportive, securing growth in traditional, competitive or even stagnating markets.

Ever since, Picote has continued to develop and manufacture tools for the rehabilitation of pipes. The pace has been fast, with Picote now supplying a wide range of products such as lateral cutters for reinstating lateral pipes, cleaning and lining tools, and machines for rotating the tools via a flexible shaft. Picote has something like 30 different types of tool. Bearing in mind the number of different pipe diameters, this works out at a few hundred tools in total. Around 40% of sales are in the US and 40% in the European market. In the company's dual business model, the tools and the contracting currently bring in approximately equal revenue, although the tool division is growing every year, enabling the company to expand as a whole, in spite of relative stasis in the contracting division. The demand for new innovative tools for the stable construction market has increased the demand for relining tools, for which the market is still growing steadily.

Lining instead of rebuilding

Before Picote's products were introduced, if you had a small pipe inside a building that needed to be repaired or maintained, you had to remove it and replace it with a new one. Replacement was traditionally considered the best option, since early methods for lining pipes were only suitable for patch repairs, and not for full rehabilitation. These early methods were slow and required multiple access points to a single pipe. Reinstating a lateral connection was in many cases impossible, so that only a partial repair could be carried out. All these challenges meant that removal and replacement was the most effective technique, at least until Picote introduced its tools and methods for lining pipes.

Heikki Jyrämä, production director, explains the advantages: “The minimal equipment requirement, the simplicity of the resin handling system and the ease of application mean that a crew can line several pipes in one day, increasing productivity for many companies, particularly smaller contractors. Once the basic equipment has been purchased, the day-to-day running costs of this technology are also minimised, because the majority of the system is reused time and again.”

The technology behind the tools makes it easier to clean, cut and line pipes, reinstate connections, and monitor line pressure, power supply and water levels. It can be used on pipe diameters ranging from 32 mm up to 225 mm.

“I’m pretty sure that our business would not exist today without the patents we’ve obtained in the last ten years. It was a good decision to start patenting in 2008, since competitors’ activity has grown in the meantime and our strong patent portfolio protects us. Without IP, it would be risky for us today.”



Mika Lokkinen
Co-founder and chief inventor,
Picote

The lining process begins with the cleaning and descaling of the pipes. To aid technicians, CCTV cameras are widely used to inspect the work, with footage from each pipe being recorded before and after each operation. The second part of the process requires a liner sleeve and a two-component epoxy, which is mixed inside the sleeve to distribute it evenly before air pressure is used to invert the sleeve into the pipe. Inversion turns the liner inside out and the epoxy adheres to the existing pipe. Air pressure keeps the liner in tube form against the existing pipe until the epoxy cures.

As an alternative to this method, Picote has also developed a coating process, which has the advantage that connections are not blocked, so there is no need to reinstate them.

TECHNOLOGY PROFILE



The Smart Cutter system is flexible and can navigate T and Y connections without damaging iron, concrete or newly applied lined pipes. Depending on how the cutter is equipped, it can be used to reinstate, i.e. cut open, connections in pipes of various diameters and broaden the reinstated connection. Picote has also developed an extensive family of Twister products for cutting and cleaning.



A Picote coating pump and Miller Machine pump and coat material into a pipe and brush it onto the inner wall of the pipe. The Picote coating system consists of a two-part formulation resin that fills in deteriorations in pipes. Coating is repeated two to four times for each pipe to ensure that the treatment is thick and non-porous. The rehabilitated pipes can withstand temperatures from -40 to +200 degrees Celsius.

IP protection in an expanding market

Picote is primarily active in Europe, but it also sells its innovative new tools through distributors around the world. Since it was the first mover on the market with these kinds of products, the advantage of having the core patents in the early years was that the company could sell its tools at a premium price and attribute their technical superiority to the Picote brand. When it was first introduced, the Picote system was much less expensive than competing products and was better and faster than the robotic alternatives. Since then, many competing solutions for pipe rehabilitation and the construction of pipes inside old pipes have come onto the market.

At the moment, Picote has around 30 patent families. The number of patents is explained as a necessity: “We can’t have any trade secrets, as our products are quite simple mechanical solutions. If someone buys one, they could copy it if they wanted to. And it seems that there is quite relentless copying in this field. Despite our patent protection, some competitors are actively copying our solutions,” says Jami Wilenius. Picote has also expanded its protection to include other forms of IP rights and has tested the different options. “We have some activity in trade marks, and should elaborate more on that. We also recently submitted some design applications in the US, essentially to test how it would benefit us. But mainly we are protected by patents,” says Wilenius. Although it offers a number of different branded products, the company currently only holds trade marks for its “Picote” and “Smart Cutter” brands. A strategy for protecting other forms of intellectual assets is still to be formalised.

TAKEAWAY

PROTECTING INVESTMENTS

Patents can be used to support business model extension. If imitating is easy, protecting inventions with IP rights is paramount if you want to safeguard your investments.

Staying on the case

Lately, the use of patents as a negative right to prevent others from using the technology has become more important. The construction business is a traditional business involving a large number of small and medium-sized national companies with little knowledge of or respect for IP rights. Since 2012, other construction companies have created tools similar to Picote’s, and have copied the proprietary solutions protected by its patents. “Some people may still be sceptical, but management remains highly

supportive and has faith in IP for long-term growth. We expect that we will soon have our first success from patent enforcement or out-licensing, which will put an end to the scepticism,” Wilenius says, describing the difference in opinion on IP rights within both Picote and this conservative industry.

Picote is facing competition, since other actors have been drawn to the market for lining-related tools as the technique has become more established and more widely used by contractors. Currently there are multiple litigations going on in the Finnish courts, prosecuting infringements of Picote patents. Due to its large patent portfolio in what is a relatively narrow field, Picote is quite confident regarding the outcome of the cases. “Usually the companies that are producing the imitations know exactly what they are doing and don’t care if someone has a patent or not. They know that they shouldn’t be doing it, but do it anyway,” Wilenius says. “Competitors constantly need to be made aware of what patent rights mean.”

Without a designated person or strategy for detecting infringement, Picote relies to a large extent on its network of resellers and customers for information about products that challenge its patents. “We have loyal customers, and our resellers are active and provide us with information if they are approached with a competing product that might be an imitation,” says Wilenius. The niche market of pipe-rehabilitation tools makes infringements easier to detect. Outside this sphere, however, the situation is much more challenging. This is why enforcement actions have only been initiated in Finland so far.

TAKEAWAY

DETECTING INFRINGEMENT

Customers and resellers can provide important information about infringement which can be used to enforce patent rights.

Developing the IP strategy

The early, service-oriented stages of Picote, from 1993 to 2008, did not involve any IP strategy; the company did not apply for any patents nor did it put any effort into IP issues. But since then, its patent strategy has evolved together with its business model to become quite robust.

In the second phase, from 2008 to 2012, Picote realised the value of its IP and applied for patents on the technology in the new tools it developed. Although the approach to IP occurred in an ad hoc manner, and no planning or structure was applied to its organisation, the CEO strongly supported the patenting process.



Quality control of Twister Cleaner in Picote production facility.

In the third phase, which started in 2012, the aim is to take a more organised and strategic approach to IP management. This approach was initiated when suspected copies of Picote's patented tools began to appear in the marketplace. With the continuous expansion of its products via new resellers into most European countries, the company expects to find new local competitors and imitators infringing its intellectual property, which will demand IP enforcement in several European countries in addition to Finland. To make the implementation of an advanced IP strategy possible and to increase its IP know-how, Picote hired a patent attorney previously in private practice.

IP management for the long run

The majority of Picote's 30 patent families, 30% of which were filed at the EPO, provide protection in a number of European countries, although some patent applications were only filed in Finland. Due to the cost of patenting in multiple countries, and the possible benefits of having centralised enforcement instead of parallel litigation with multiple infringers in different jurisdictions on the same patent, Picote will consider the Unitary Patent instead of conventional European patent protection.

“We had one European patent application granted and validated in ten countries. It would have been much more cost-effective if the Unitary Patent had already been available. We aim to protect our products widely in Europe, and we are active in almost all European countries.”

Mika Lokkinen

Co-founder and chief inventor, Picote

With its plan to grow and expand sales in Europe, it is likely that Picote will face new and distinct infringers in countries where it intends to increase its presence. The company envisages filing for Unitary Patent protection for disruptive innovations without much prior art, as it sees advantages in the Unitary Patent, especially if the patent is strong.

However, for incremental inventions with a lot of prior art and less clear-cut novelty and inventive step, it might consider choosing a traditional European patent and opting out of the Unified Patent Court (UPC) at first, until experience has shown how the new court will operate. “If the patent is important for us, but we are not sure if it will stand up to an invalidity challenge in the UPC, then we would choose the traditional European patent (opt-out from the UPC) or the national filing route,” Wilenius argues. “Since there have been zero cases so far at the UPC, we don't have any experience as to how inventive step or novelty will be evaluated.”

The IP management function is now performed jointly by chief inventor Mika Lokkinen and Picote's patent attorney, in association with other company directors. The continuing need for patenting and a desire to control associated costs supported the decision to appoint an in-house expert, who is responsible for much of the legal work, while purely administrative tasks such as paying the annual patent fees are done by a patent bureau, and US applications are managed by a US attorney.

TAKEAWAY**INTERNAL IP EXPERTISE**

Integrating IP experts into the core team can be an opportunity to streamline IP management processes and make them more efficient.

There are strong synergies between Picote's two business models. Ideas for new tools frequently come from identified customer needs, for which Lokkinen can devise solutions. Once a prototype has been crafted and tested, the process of deciding about whether and how to protect it is not complicated, due to the close working relationship between Wilenius and Lokkinen. "When the CEO has a new idea, we do some testing. If he sees value in it and I see a possibility to protect it, I draft a patent application right away," Wilenius explains.

TAKEAWAY**OPEN INNOVATION**

Customer input can be used as a basis for new innovations and to promote synergies between old and new business models.

IP landscaping is also used to provide input into the company's R&D strategy for the development of new tools and also for freedom to operate and patentability purposes. While there are some tool providers in central Europe and the US that patent extensively, they concentrate on different areas and larger pipe diameters. For small-diameter tools, there is usually no prior art. "When improving tools that already exist on the market, doing prior art searches is useful, as is following the competitors on patent databases," says Wilenius. "Other Finnish companies have started to protect innovations through IP rights. When they look at us they realise that they need to stop neglecting IP protection."

COMPANY PROFILE**PICOTE/PICOTE SOLUTIONS**

- > Headquarters: Porvoo, Finland
- > Year of establishment: 1993
- > Staff: 75 worldwide
- > Turnover: EUR 15 million
- > www.picote.fi, www.picotesolutions.com

PRODUCTS/SERVICES

Lining services. Full-service trenchless drain renovation and manufacturing of trenchless tools, such as tools for high-speed drain cleaning, lateral cutters and smart small-drain rehabilitation solutions

MARKET AND TECHNICAL AREA

Construction and pipe renovation

CUSTOMERS

Contractors in the renovation and rehabilitation business

SELECTED AWARDS

- 2012 ISTT No-Dig Award
- 2013 UKSTT Innovation Award – "Highly Commended"

PATENT PORTFOLIO

30 patent families, including EP2539087, EP2567139, EP2780623, EP3017231, EP3030821

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