



ANNUAL REPORT 2014

You can't innovate on your own



 **sirris**
driving industry by technology



2014 ANNUAL REPORT



A FEW CONCRETE RESULTS FROM 2014

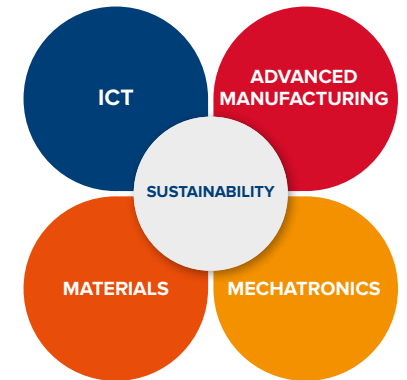
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FOREWORD

Ever since it was founded by Agoria in 1949, Sirris's mission has remained the same: help companies in the technology sector improve their competitiveness through innovation.

“The federation Agoria brings together and promotes the interests of companies in the technology industry. It operates on behalf of the future of these companies and the nearly 275,000 people they employ. As a collective centre, Sirris helps these same companies to make the right technology choices and to translate

innovation into marketable products and services.”

Agoria and Sirris therefore work towards the same goal: serving companies in the technology sector. Their close cooperation – during communication campaigns, by sharing knowledge or in connection with joint projects – is apparent and necessary to these organisations.

One example of fruitful cooperation is the **Made Different** action programme, started by the two organisations in 2012 to help production companies

transform into 'Factories of the Future'. More than 200 Belgian companies have already launched their transformation process thanks to the programme, which enjoys the support of the Flemish and Walloon regional authorities. Belgium's first four 'Factories of the Future' were announced and awarded in February 2015. In 2014, Made Different also opened up to other sectors, such as food and textiles.

Another joint Sirris-Agoria project is the much more recent **Masterplan Innovation**. This is a practical framework

that companies can use to gain insight into innovation along three key lines: 'factory of the future', 'business of the future' and 'product of the future'. More specifically, for Sirris the Masterplan Innovation means it can guide companies in the choices they make in the technology domain. Thanks to the Masterplan Innovation, Agoria can develop a vision and offer a framework that helps companies to define their priorities and actions that must be taken in innovation - and not just technological innovation.

In addition to these joint projects, both organisations are linked to each other in their operation: *"Marc Lambotte, CEO of Agoria, is the Vice Chairman on the Board of Directors of Sirris. Starting in September 2015, I will take up the positions of both General Manager of Sirris and Director*

of Agoria's Expertise Centre, just like my predecessor Jos Pinte did, who left Sirris in June 2014 after a career spanning more than 40 years."

Sirris's 140 experts help companies with their technological challenges - both individual and collective - on a daily basis. But innovation cannot be done alone. Accordingly, one of our priorities is initiating and developing partnerships between organisations, collective centres, universities and other players in technological innovation in the three regions of Belgium. That is why Sirris invests time, energy and funds to help the Belgian technology industry perform better.

Partnerships such as initiating and further developing the strategic research centre **Flanders Make** for the

manufacturing industry in Flanders, supporting its evolution from the **'Materials Engineering Cluster'** to 'Manufacturing' issues in Wallonia and the launch of a **strategic platform on information security** in Brussels are just some examples of partnerships launched in 2014. They have just one goal: to directly or indirectly help companies in the technology sector to be or remain competitive via technological innovation.

"Innovation is one of the keys to success. Our Belgian industrial companies understand this. In 2014, Sirris carried out no fewer than 3,000 interventions at more than 1,500 companies."

While the figures are stable, we can see two major trends developing in recent years. Companies' interest in

perhaps returning to small production run at local level – thanks, among other things, to the advent of additive manufacturing and flexible robots – and the digital revolution in companies, from manufacturing to marketing the end product.

Products that contain software, interconnected machines and a business that is increasingly digitised... that is the future for which our companies have to prepare today. Sirris is prepared to help them with its experts, its Masterplan Innovation and its many partners.



Herman Derache
General Manager Sirris

INNOVATION IS OUR BUSINESS

Sirris has been helping companies develop, test and deploy technological innovations for more than 60 years. We give them access to our broad expertise, extensive network and state-of-the-art infrastructure. And in so doing, we help to sustainably enhance the competitiveness of our technology industry.

Our mission as an industrial competence centre is successful if innovations are translated into easily marketable products and services. Or, to put it simply: if companies can harness our support in order to manufacture more effectively, make smarter products and deploy more efficient business processes.

PASSIONATE EMPLOYEES EMBEDDED WITHIN A BROAD NETWORK OF PARTNERS

More than 140 engineers, scientists and technicians – all of them passionate about market-oriented innovation – are spread out across our seven sites. They closely examine companies' objectives and the challenges they face. They translate their questions into focused and often multidisciplinary innovation.

In turn, they work together with a wide network of universities, research centres, companies, associations and institutions throughout Belgium and Europe. Sirris exchanges staff, knowledge and methods with these partners. This ensures we are always a step ahead of the latest technological developments.



DOUBLE LEVERAGE: TECHNOLOGICAL AND FINANCIAL

At the same time, we build bridges – regionally, nationally and internationally – to reach out to industrial partners and supporting public services. For many of our contributions, companies are eligible for financial subsidies: support for research programmes, project subsidies as well as subsidies in the form of consultation and training vouchers. This is how Sirris successfully offers companies both technological and financial leverage.



SIRRI 2014

NETWORK AND FIGURES



140
technological experts



50 partners
(industry, academics
& research centres)



5.000
clients



More than **2.300**
members



3000
industrial operations



1.500
companies, of which
75% are SMEs



1.500
billable projects



1.500
free consultancies



25M
in income



Nearly **5 million**
in investments in
high-tech infrastructure



/ innovation is our job / 'materials engineering cluster'

EVOLUTION FROM "MATERIALS ENGINEERING CLUSTER" TO "MANUFACTURING" ISSUES

Nearly ten years ago, Sirris, CRM and the University of Liège established the Wallonia Materials Engineering Cluster (PIMW) with the financial support of the Walloon Region. At this joint site these three institutions combine their skills and infrastructure in materials, the aim being to create synergies in applied research and leverage the support of Walloon industry.

In 2014, in accordance with the evolving needs of and strategic approaches taken by the partners, the cluster thoroughly considered how it should develop. The ensuing conclusions and actions

were developed in a plan focusing on integrating skills focusing more sharply on "Manufacturing" issues.

Consequently, this will include the combination of skills covering the entire value chain, from the development of raw materials, to production and on to the recycling of the end product. The activities of the three partners will focus on combining their specific know-how, divided into three topics: 2D additive manufacturing, 3D and reverse metallurgy.

This is implemented by incorporating in the cluster a combination of key investments in these technological domains and by creating a unique portal for supporting industry.



GEM³ BEARS FRUIT

GEM³ (Génie Mécanique, Métallurgique et Matériaux - Mechanical, Metallurgical and Materials Engineering) was created in January 2013 under the aegis of Agoria for the purpose of combining the activities of Sirris, CRM and Cenaero in order to respond more efficiently to the needs of and challenges facing Walloon industry.

It has gone on to implement a collection of research projects and activities coordinated between various centres. In 2014, GEM³ identified and supported two ambitious key topics. Firstly, a project focusing on management and the effective substitution of

natural resources (reverse metallurgy), and secondly, a project focusing on the rapid deployment of additive technologies in Walloon industry (lawatha or InnovAktion en Wallonie par les Technologies Additives - Innovation in Wallonia via Additive Technologies).

As the leader of the lawatha project, Sirris developed - with the support of the GEM³ partners, the Mecatech and Skywin centres of excellence, and numerous companies in the manufacturing sector - an ambitious research, investment and transfer project. The primary objective is to bring together all of the

competences present in the additive technologies sector in Wallonia so as to make it possible to quickly eliminate a series of technological barriers associated with these technologies and to ensure their efficient and rapid transfer to the manufacturing industry in Wallonia.



/ innovation is our job / manufacturing industry

COOPERATION BETWEEN SIRRIS AND FLANDERS MAKE BENEFITS MANUFACTURING INDUSTRY

Flanders Make was officially launched on 20 October. Now companies in the manufacturing industry have their own strategic research centre that combines and further develops the strengths and know-how of FMTC, Flanders' DRIVE and laboratories at the five Flemish universities. This initiative can support manufacturing companies via pre-competitive research in order to enhance their international competitiveness. It was set up at the initiative of Agoria, with substantial support from Sirris.

Herman Derache, General Manager of Sirris, explains the need for a strategic research

centre in Flanders: "Combining strengths in business-focused, leading-edge research is an important asset for being able to offer our manufacturing industry a future by boosting competitiveness. With the advent of Flanders Make, it will be possible to more quickly implement research findings in innovative products and processes in companies."

Sirris as a 'technology adoption aid'

However, exploitation of Flanders Make's research findings will go beyond the companies directly involved in the leading-edge research. Flanders Make's research

findings and competences will be made available to all companies in the technology industry. This challenge suits Sirris perfectly: it will ensure that Flanders Make's findings find their way through its conventional services - e.g. technological advice, collective research, implementation support and demonstration equipment - to more than 3,000 other manufacturing companies in Belgium. New research output from Flanders Make on technology on the factory of the future will, via channels such as Made Different, be introduced quickly and appropriately across the entire industry.

/ innovation is our job / industry 4.0

A NEW SIRRIS SITE: INDUSTRY 4.0 TECHNOLOGY CENTRE IN WEST FLANDERS

Economic players and policy are betting heavily on the industrial sector. This is taking concrete form in West Flanders, the province with the most industrialised economy. Nearly one quarter of Flemish industrial employment is generated by companies in West Flanders. Half of that is in mechanical engineering and mechatronics. Accounting for more than a quarter of employment in the metalworking industry and more than 40% of Flemish employment in mechatronics, this cluster is very important to West Flanders. In West Flanders alone, this sector provides jobs for 42,000 people.

At the request of a number of leading local mechanical engineering firms and at the initiative of the West Flanders Provincial Development Company (Provinciale Ontwikkelingsmaatschappij West-Vlaanderen), Sirris deployed 'Industry 4.0' as a key area for a new, future-oriented technology centre. Within Industry 4.0 it is impossible to imagine there not being a link between real and virtual reality. It offers many possibilities, both product-based and process-based. If our industry is able to quickly anticipate these possibilities and become a leader in them, this will

once again give industry a headstart over other industrial regions in the world. From a study carried out previously a number of themes came to the fore around which a unique, future-oriented expertise will be developed so that our industry does not miss the 4.0 boat: cyber-physical systems, networked manufacturing, flexible and smart automation, augmented reality, self-managing systems and integrated product development.

On that basis, industry and the government, Sirris and West Flanders Provincial Development Company found each other quite quickly. The

partners quickly reached a conceptual agreement before moving forward resolutely with the development of an 'Industry 4.0 Technology Centre' in a way that fully complements the initiatives of Flanders Make (the strategic research centre for the manufacturing industry), and embedded in the heart of the sector, specifically in West Flanders.

The new leading-edge technology centre - which will be not just a Flanders Make unit, but also an additional local base for Sirris - will enter development in 2015. The total cost of the centre is estimated at €4 million, of which around

€1 million is needed to acquire the necessary demo and testing infrastructure. This will make it possible to better reach and support the many West Flanders SMEs and, by extension, all companies in this sector in Belgium in their technological innovations.

SELOUD DEVELOPS SECURITY FRAMEWORK FOR CLOUD APPLICATIONS

How can software developers provide answers to the various security risks associated with the cloud? As part of SeCloud (Security-driven Engineering of Cloud-based Applications), a research project, Sirris is working together with a multidisciplinary combination of 10 different partners on a platform that helps them address these challenges. The project is part of Innoviris's more extensive Strategic Platform Action 2014 – Information Security.

Most new applications - SaaS or mobile - are developed in the cloud. They are based on infrastructure and use cloud-based services, including data

storage and secure payment.

At the same time the number of directly involved parties has increased exponentially: developers must now work together with partners that provide infrastructure or services and ensure that their applications can run perfectly alongside those of third parties. This situation – a new playing field and more players involved – requires a new look at security.

Industrial platform

The SeCloud project is researching a holistic set of tools and technologies to support developers of SaaS and mobile applications. Security aspects in architecture,

infrastructure, programming and processes are covered extensively. The ultimate aim, an expanded model for managing security risks, will be made available to the industry after validation by a panel of Brussels-based software and technology companies.





/ innovation is our job / innovation vouchers

INNOVATION VOUCHERS FOR COMPANIES IN BRUSSELS

The Brussels-based industry comprises many small and very small enterprises. They create jobs and drive economic growth. But these companies are vulnerable: due to their structure, they are not immediately eligible for existing financing programmes. Which is why Innoviris launched the 'Innovation Vouchers' campaign in early 2014.

The campaign gives small companies with or without an in-house R&D system easy and low-cost access to innovation and enables them to have a one-off commission performed by one of the five

Brussels-based research centres, including Sirris.

In 2014, Sirris carried out 10 Innovation Vouchers projects. Half of the projects were carried out by Sirris experts in ICT and Software Engineering, located in Brussels itself, the other half by the various Sirris expertise groups in Wallonia and Flanders. A majority of the projects involved a technological feasibility study or the exploration of possible materials or manufacturing processes.

The total budget for these projects carried out in 2014 was €93,800, with

an additional €65,000 in support from Innoviris for the companies involved. Of the total budget, €12,000 was deployed by third parties.

INNOVATION MASTERPLAN

A VISION FOR THE FUTURE,
MADE FOR AND BY
INDUSTRY

In an effort to map out the key technological, economic and industrial trends in Belgium, Sirris opted to involve industry more deeply in its initiatives and to let companies from various sectors - SMEs and large enterprises - set the course.

Sirris - in conjunction with Agoria - distilled the input from these more than 120 representatives from industry, combined with more than 200 studies and roadmaps, into the Innovation Masterplan.

The Innovation Masterplan aims to serve as a practical framework within which companies develop new ideas for their future innovations.

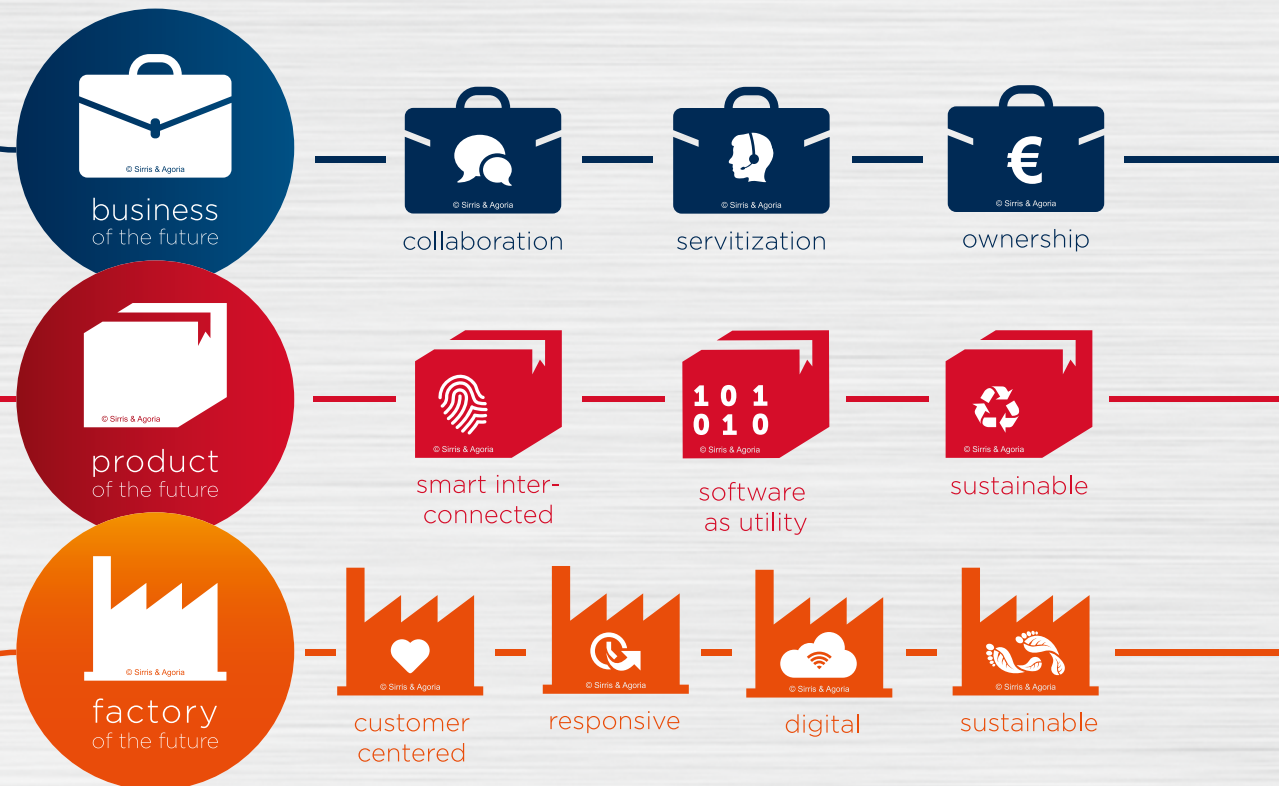
It does this by helping them to determine which products, manufacturing techniques and corporate strategies they can anticipate for current and future developments and by supporting them in striking a balance between product/service, production and the business model.

The Masterplan is based on three basic components which are well-known in industry: companies do **business**, for which they develop **products and services** and these products and services must **be made**. For each component various 'trend flows' are distinguished and for each trend flow there are various

models which describe the levels at which a company experiences an impact, bearing in mind the context and ambitions of this company.

An executive summary of the Innovation Masterplan is available on the Sirris website.

masterplan innovation



The Masterplan provides an industrial view of innovation. It does not aim to be complete, but rather to reflect what companies consider important when they think of innovation in the future and what they think should be considered when they look to the near future.

CUSTOMISED TECHNOLOGICAL INNOVATION

HOW CAN WE HELP YOU?

Customised technological consultancy: that - in a nutshell - is why companies ask Sirris for help. From an expert who spends a half-day consulting on a specific issue to multi-year collective research projects: we help our customers to move forward in various ways. From the development of a technology strategy to the implementation of innovations.

In addition to our high-tech infrastructure, our employees' expertise is a crucial part of what we offer companies. Our 160 employees – and especially our 140 experts – work together with companies to research, test and implement the innovations of the future.

INDIVIDUAL SUPPORT

Sirris provides companies with practical answers to their specific technical, technological and operational questions. Or, based on their specific needs, they are guided through an innovation project: from an innovative idea to prototype and pilot testing and on to the final product.

WHO CAN WE HELP?

Both small enterprises and large industrial groups from all sectors of the industry may contact Sirris. Our organisation focuses specifically on Belgian companies that want to remain a step ahead of their competitors by investing in technological innovation.

Sirris has nearly 5,000 customers in its portfolio. More than 2,500 companies are members and enjoy a discount on our services. Over 75% of these companies are SMEs with fewer than 250 employees.

HIGH-QUALITY SERVICES

Sirris attaches a lot of importance to the quality of its services. Since 2003 we have been carrying out satisfaction surveys of our customers for projects worth more than €2,000. The satisfaction rate for services delivered is nearly 90% across all questions.

The survey form was originally sent by post, but in 2014 the postal version was replaced with a digital version that makes it possible, among other things, to obtain results more quickly. The response rate, which had been trending downwards to around 20%, has since risen to nearly 30%!

To improve the relevance of the survey, we produced a special questionnaire for testing laboratories, making sure that the dozens of questions included more

concrete information on the hosting, analysis, reporting and interpretation of tests. Here, too, the satisfaction rate is especially high, with a 94% satisfaction rate across all questions, for 91 customers out of 297 surveyed. Laboratories which obtained ISO 17025 accreditation as well as ISO 9001 and ISO 13485 certification for 'biomedical' services.

Sirris has also had a Qfor quality label for many years. It was renewed in 2013 with a satisfaction score of more than 90% and is valid for a period of three years.

CUSTOMISED TECHNOLOGICAL INNOVATION

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SHARING RISKS

INNOVATION IS ABOUT TAKING RISKS. IT REQUIRES NOT JUST MONEY, BUT ALSO TIME, KNOWLEDGE AND INFRASTRUCTURE. BY SHARING THESE INVESTMENTS WITH SIRRIS COMPANIES REDUCE RISKS.



WE SHARE OUR PEOPLE AND EXPERTISE

+ Our specialist **knowledge** and practical **expertise** will help companies make the right strategic, economic and technological choices.

WE SHARE OUR INFRASTRUCTURE

+ We offer them access to a high-technology infrastructure and **Application Labs**, specialising in future-oriented topics such as composites, coatings, microfabrication and wind power.

WE SHARE OUR NETWORK

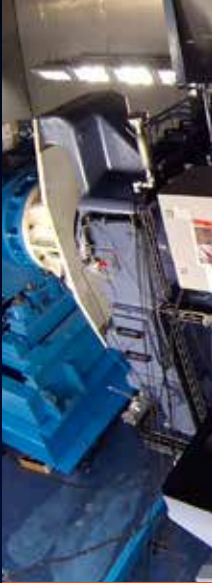
+ Companies can also harness the support of our extensive industrial and academic **network of partners** in Belgium and abroad.

WE SHARE OUR R&D RESULTS

+ In collective research projects we seek solutions for shared **technological challenges**.

WE SHARE FINANCING

+ We also look into the **subsidies** or benefits for which companies may qualify and guide them in seeking optimal financing via private and public resources.



ANTWERP



GHENT



BRUSSELS



CHARLEROI



LEUVEN



HASSELT



LIÈGE



7 SITES

INDUSTRIAL SERVICES - SIRRIS AT YOUR SERVICE

FOR A FEW YEARS NOW SIRRIS HAS BUNDLED TOGETHER ITS CLEARLY DEFINED PRODUCTS AND SERVICES. THE AIM IS TO OPTIMALLY ORGANISE THE DELIVERY OF PROFESSIONAL SERVICES FOR INDUSTRY. THESE INCLUDE BOTH 'BRANDED' PRODUCTS AND SERVICES, AND THE 'TESTING LABS'.



Sirris has decades of experience and expertise in testing metals, polymers and composites. Our high-tech labs in Zwijnaarde and Seraing perform standard tests on materials as well as customised tests on components and systems. Specific tests can be performed to assess various properties, such as impact on bicycle wheels, component fatigue, quality of welds in PE pipes, etc. We have recently gained access to a CT scanner enabling us to perform non-destructive testing and quality control (for example, on castings and 3D printed parts).

In all these analyses performed on materials and products our more than 50 experts deploy their know-how to expertly interpret your results and deliver transparent test reports. And they do this in the shortest possible period of time. In 2014 the average completion time for our standard characterisation tests was just seven working days. Surveys of new customers last year confirmed our performance. They gave us a satisfaction rating of 100% (good or excellent) with regard to both turnaround time and quality of service.

Sirris is accredited by BELAC for eight different tests and measurements. It also received the ISO 17025 quality label for high-quality laboratories. This indicates that we follow quality procedures and build appropriate checks into the testing process. In doing so, we are meeting the needs of customers and the authorities, who are increasingly requiring or recommending accreditation.



#CASE

/ customized technological innovation / industrial services / vcl



HIGH-QUALITY TEST RESULTS ON PLASTIC TUBES FOR VCL

VCL (VervolmakingsCentrum voor Lassers - Advanced Training Centre for Welders) trains and certifies welders working with metal and polyethylene (PE). PE pipes are used for gas and water distribution and must therefore comply with the standards issued by Synergrid, the distribution system operator.

VCL's target group for its PE activities consists of both newcomers and experienced professionals. Every PE welder must have a welding passport, which needs to be renewed annually via a theory exam and a practical test. Every certification involves

approving the welder under the supervision of Vinçotte, the authorised inspection and certification organisation. Every week welders can take the approval test at VCL in accordance with the prevailing standards for gas and water distribution companies. The test welds must be examined by an authorised third-party laboratory.

Stringent guidelines apply to the test welds: all tests, peel tests for welds on sleeves and tensile tests for mirror welding must be carried out in an ISO 17025-accredited laboratory which has the appropriate equipment and which can deliver an in-depth and

substantiated report with the test results. This is all done within a short period of just 10 working days. The Sirris lab in Seraing complies with all of these requirements.

Short turnaround, clear results

Leen Dezillie, Director of VCL, explains: *"It is important that the results are issued quickly and that the certificates are available to our customers within a short period of time. Without a valid certificate their welders cannot be deployed on sites. If the results are negative, then they must be thoroughly substantiated, so that there can be no debate or doubt, and so the*

welder receives appropriate feedback on his or her mistakes." Here too the plastics test lab in Seraing performs brilliantly: the reports are correct and exhaustive. For welds that fail, images are provided to explain the possible causes of faults more clearly, along with any necessary explanations of how and why the fault arose.

VCL has found in Sirris a reliable partner with the right expertise and rapid response for ensuring that their intense cooperation runs efficiently and smoothly. Accordingly, it signed a multi-year contract with the lab.

INSPIRATION FOR TECHNOLOGY AND INNOVATION

OUR EXPERTS CLOSELY MONITOR THE LATEST TRENDS AND DEVELOPMENTS ON THE BASIS OF THEIR PRACTICAL EXPERIENCE. THEY SHARE THE MOST RELEVANT DEVELOPMENTS, IDEAS AND BUSINESS CASES IN BLOG MESSAGES AND NEWSLETTERS DURING TRAINING COURSES AND THEMATIC WORKSHOPS OR SEMINARS.

► KEEPING INFORMED



We blog daily (blog.sirris.be) on the most relevant news in the area of technology, industry and key trends and success stories from industry. This information is presented in short articles.



Every week, subscribers to our **InterAction** newsletter are e-mailed an overview of all recently published articles in the area of greatest interest to them, as well as an overview of all upcoming events.



We are even more responsive via **Twitter and LinkedIn**, two multimedia channels through which we inform you immediately about important and current events relevant to you and your sector. Follow us so that you are always the first to know what's going on!



► More than

300

posts published
in 2014

► More than

1.000

InterAction readers
per week

► More than

10.000

sirris.be visitors
per month

▶ More than

300

Techniline articles
published in 2014

▶ Average of

900

unique Techniline
readers per month

▶ Almost

500

read Techniline
at least once per
month

▶ GOING DEEPER

Our online technology library, Techniline, is the benchmark for industrial technology intelligence in Belgium. On this members-only website we publish in-depth scientifically relevant articles on new and future technologies. The structure gives an overview of the areas in which SIRRIS is active. Here, you can read easily digestible news about the latest technological trends, research and developments for industry, from Belgium and the rest of the world. Every week you will receive the Techniline newsletter with a selection of the most recent articles most relevant to you.

► ACQUIRING KNOWLEDGE

Anyone wishing to find out more about a specific technology or application can opt to take part in a seminar, workshop or masterclass. Participants at such training courses and events get a better overview and go home with immediately actionable information about current and future topics relevant to them.

The main goal of all these events is to actively share knowledge.

In 2014 companies from various sectors had the opportunity to broaden their knowledge and network in a targeted fashion during 45 seminars held by Sirris. Accounting for some 1,300 participants. This is how we deploy in practice our mission as a collective research centre: actively sharing knowledge with Belgian industry. The sessions are offered either free of charge or on a fee-paying basis, depending on the content and speaker. They offer a general overview or go deeper into a specific technology or topic.

Sirris experts are highly sought-after speakers at events focusing on the newest technology. In 2014 there were many meetings where a lecture by one of our technology specialists was on the programme.

#events

/ customized technological innovation / ITM Awards

TEN YEARS OF ITM AWARDS, SIRRIS A TEN-TIME TECHNOLOGY SPONSOR

The tenth Industry Awards (formerly known as the ITM Awards) were held on 15 May 2014. In addition to the categories of 'Best Practice in Manufacturing', 'Best Practice in Logistics' and 'Best Practice in Process', there was also a 'Best of 10 Years of Industry Awards' specifically for this gala edition of the Awards. As per annual tradition, Sirris designed and produced the trophies, each of which was a model of innovative technology.

For this tenth anniversary event, Sirris opted for automatic incremental sheet forming. This rapid manufacturing method enables a draft CAD

file to be immediately translated into a product. This is combined with laser and water jet cutting, engraving and wire-cut electrical discharge machining on less conventional materials such as titanium and zinc. A creation was made from two half-spheres, one made of zinc and the other aluminium alloy, held between rising strips made of both titanium and aluminium. The entire assembly is affixed to a stainless steel base.



OPEN BEDRIJVENDAG FULLY IN LINE WITH THE FACTORY OF THE FUTURE

On Sunday, 5 October two Sirris sites took part in Open Bedrijvendag ('Open Day') to present its operations and new machines to a broader public. There was a big turnout at Diepenbeek and Seraing. This is a great sign that the Factory of the Future can count on a lot of interest!

The Sirris site in Diepenbeek – where the production facility of the future houses some unique robots – welcomed 300 visitors. The main stars were, as expected, the Baxter cobot and the precision manufacturing cell, as well as the demonstration of augmented reality glasses.

The Sirris site in Seraing had more than 530 curious visitors. The event marked the kick-off for Miniaturisation Week. The most popular items were miniaturisation, 3D printing technologies and the test labs.

People came from all around the region to get a glimpse of the latest acquisitions, but existing infrastructure also received plenty of attention. The response was very positive and there was a great deal of interest. Our staff at both sites were delighted to answer the many questions people asked, and were delighted to show what they typically spend their days doing.

Our colleagues in Seraing created a whole story about the birth of a product using the little character found on the Open Bedrijvendag poster. This showed visitors how an idea grows into a product, how a prototype is created, how a mould is made, how a part is injection moulded and then how that part is measured and tested.



MIT EUROPE CONFERENCE SHOWS BLUEPRINT FOR THE FUTURE

On 21 and 22 May, at the invitation of Agoria and Sirris, professors and leading scientists from the Massachusetts Institute of Technology (MIT) came to present their research and vision during the biannual MIT Europe Conference 2014 in Brussels.

This time around too, the congress – whose theme was Advanced Manufacturing & New Urbanism – A Blueprint for the Future - was a meeting place for policymakers and representatives from innovative companies across Europe wishing to expand their horizons and forge international contacts.

Attendees had an opportunity to learn more about the Advanced Manufacturing Partnership, the Production in the Innovation Economy project, the Senseable City Lab, the Center for Advanced Urbanism and many other projects related to urban innovation and manufacturing in which MIT is involved.

In parallel with the MIT Europe Conference, the annual general meeting of Agoria and Sirris was held on 21 May and took place at SQUARE – Brussels Meeting Centre. The theme was 'From Blueprint to Reality'. The programme included the official farewell of Paul Soete as CEO of

Agoria and the welcome of his successor Marc Lambotte, followed by a lively debate with Ronnie Leten (CEO Atlas Copco), Eric Van Zele (CEO Barco) and other captains of Belgian industry about Belgium's industrial future.



/ customized technological innovation / in the media

SIRRIS IN THE MEDIA

A great many initiatives which Sirris takes or in which it takes part grow into attention-getters due to their technological, industrial, ecological or social relevance. So it makes sense that they often attract attention and end up in the spotlight. In 2014, thanks to the success of our member companies or our own accomplishments, we had the honour to be reported on more than 70 times in the national and even international press.

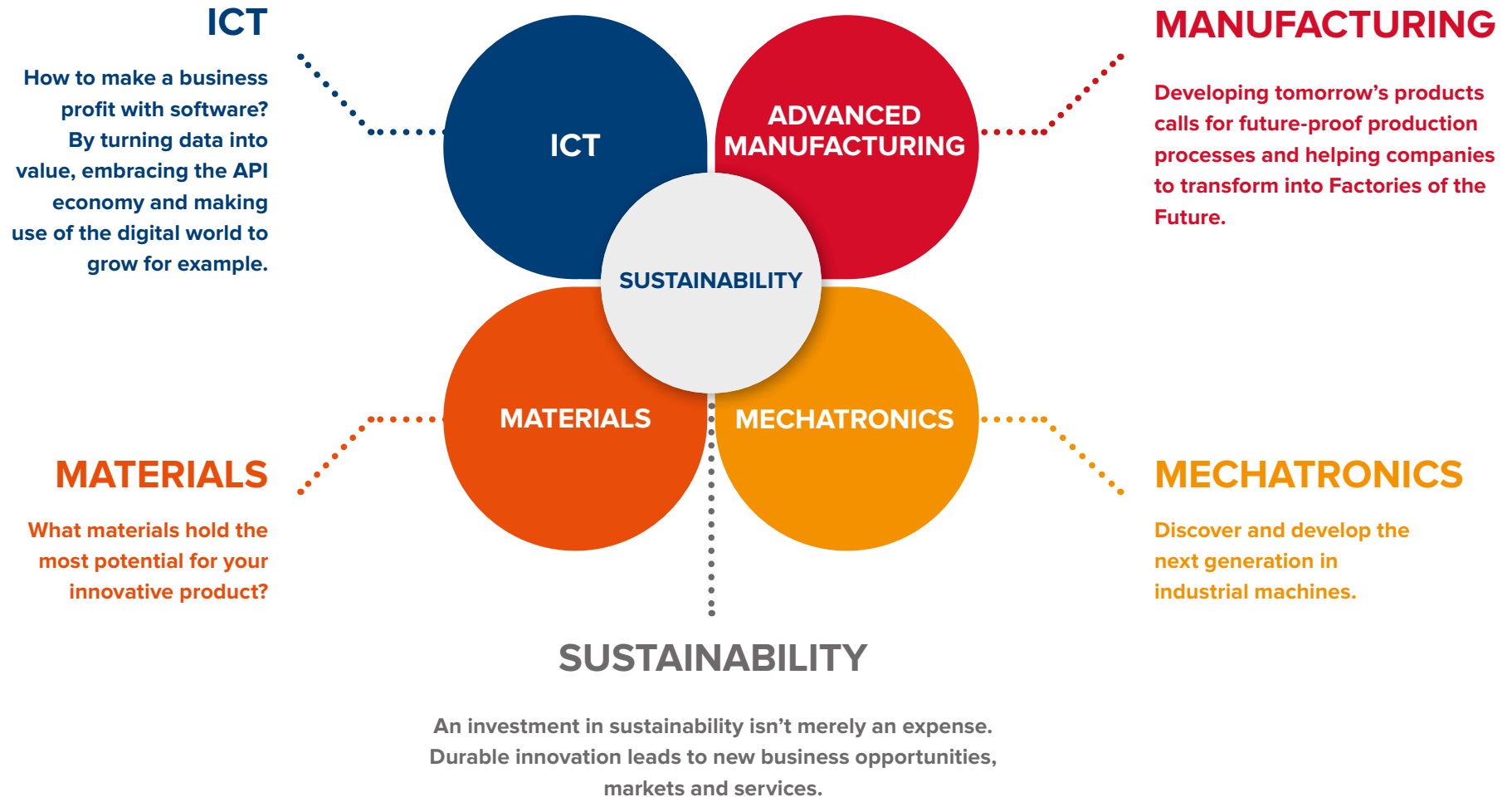


<http://www.engineeringnet.be/belgie/printvriendelijk.asp?id=121107&titel=IT-speciali...> 31/03/2014

SUPPORT & EXPERTISE IN 5 TECHNOLOGY DOMAINS

WITHIN EACH OF OUR FIVE DOMAINS THE COMBINATION OF THE RIGHT EXPERTS, HIGH-TECH RESEARCH AND DEMONSTRATION INFRASTRUCTURE AND AN EXTENSIVE NETWORK OF PARTNERS PAVES THE WAY FOR INNOVATION FOR COMPANIES.

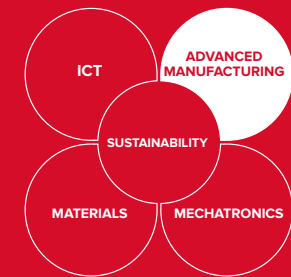
Companies that are keen to innovate can count on Sirris to provide broad expertise and extensive infrastructure in five core technological domains.



ADVANCED MANUFACTURING

FUTURE-ORIENTED PRODUCTION FACILITIES

Keeping up with the latest industrial developments and developing into a forward-looking company mean companies must keep their production processes up-to-date. They can harness Sirris's network of engineers and our high-tech infrastructure to explore the tremendous potential and even become a 'factory of the future'.



#event

/ advanced manufacturing / industry 4.0



INDUSTRY 4.0 LIVE DEMONSTRATOR OF THE SMART FACTORY

To show companies the properties and benefits of a smart factory, Sirris organised a seminar on 7 November with a presentation by Professor Detlef Zühlke, a German authority on smart factories. The programme also included the introduction of a unique demonstrator: SmartFactory is a demonstration and research platform, unique in Europe, for producing small series in a smart, digitised context.

The demonstrator showed innovative information and communication technologies

and their applications, tested and developed in a realistic industrial production environment. Within the platform an innovative production line was developed in cooperation with the SmartFactory partners in order to deploy the practical applications of the crucial aspects of Industry 4.0. The aim is to integrate new technologies, such as tablets and smartphones, into this traditional production environment, so that the operator has the right information at the right time. The components or products

to be developed help to direct the production process, rather than it is being done via a top-down approach. Accordingly, the current working methods in industry can be enhanced and pave the way for more flexible and efficient components in the operation of the factory of the future.

**ADVANCED
MANUFACTURING
THEMES**

36>37
MADE
DIFFERENT

38>43
SMART
PRODUCTION

44>47
PRECISION

48>55
ADDITIVE
MANUFACTURING

MADE DIFFERENT

MADE DIFFERENT HELPS COMPANIES TRANSFORM INTO FACTORIES OF THE FUTURE 4.0.

Transforming our manufacturing industry is necessary in the Western world, as a response to the high cost of doing business and competition from cheaper, emerging countries. These countries do not just manufacture products, but also develop and export them worldwide. This means we must follow an offensive strategy of differentiation, productivity and high added value. Neighbouring countries have also set up programmes focusing on sustainable local production: PIE in the United States, Industrie 4.0 in Germany, L'usine du futur in France, Smart Industries in the Netherlands, Catapult/Together in Growth in the UK, etc.

That is why Agoria and Sirris have been working together since 2010 to develop an ambitious future plan for industry: 'Made Different'. In 2014 the vision was refined and updated with inspiration from Germany's Industrie 4.0, a **cross-sector**, multi-year programme. Domestic and foreign specialists help companies via raising awareness, scans, individual support and collective support to improve their production activities as they move towards the Factories of the Future. With the support of the **Flemish** and **Walloon** governments Sirris and Agoria want to position our industrial internationally and prepare it quickly for the fourth industrial revolution.



7 transformations leading to 'Factory of the Future' 4.0

Developing into a factory of the future does not happen overnight. The Made Different programme requires an intense, sustained focus lasting from three to up to five years. A total of seven transformation topics were defined. The following characteristics are part of the vision on the factory of the future: they consume the absolute minimum of energy and resources and are

extremely environmentally friendly. Accordingly, they deliver a major contribution to the greening of the economy. They have state-of-the-art production facilities. They make high-value-added products and their production can quickly and flexibly anticipate changing demand. Last but not least: knowledge content and the involvement of employees are very high.



4 FACTORIES OF THE FUTURE, 200 ON THE WAY



Continental, Dentsply Implants, Newtec and Provan are the first companies to receive the Factory of the Future label in Belgium. In recent years, these technology companies have invested so much in, inter alia, the modernisation of their machines, digitisation, social innovation and ecology that today they are world leaders in production.

Nearly 200 companies have undergone one or more transformations. These are companies in a broad range of sectors: technology industry, food, textiles, paper, pharmaceuticals, transport, chemicals, furniture, medicine,

construction, etc. This involves large companies (30%) and SMEs (70%), distributed across all regions of the country. Agoria and Sirris are confident that by 2018 no fewer than 50 companies will obtain the Factory of the Future label. By that time they want to have prepared 500 companies who will be in the process of transforming.



Smaller series and a shortage of qualified personnel: these are challenges the manufacturing industry is facing, where the answer is 'smart factories' that produce flexibly, safely and for the most part autonomously. To reach this ideal situation, we help companies to convert their conventional production systems into smart production processes.

P38 > P43 ▶ SMART PRODUCTION

#case

/ advanced manufacturing / smart production / fomeco

FOMECO HALVES LEAD TIME THANKS TO QUICK RESPONSE MANUFACTURING

At Fomeco, based in Zwevegem, pipes and plates are produced on a just-in-time basis. Customers can change their order very late. Long lead times make planning and quality control much harder. Working with Sirris, the company gradually introduced QRM, halving the lead time for a production line.

Fomeco has long sought to produce more efficiently without compromising flexibility. To that end, the company adopted more efficient planning tools and took Sirris' QRM training. The next step was to review its production process.

Positive reactions

"Fomeco's approach involving large production runs for each production stage, large intermediate stocks and the need for flexible customer delivery has its disadvantages", says Mark Van Pee (Senior Engineer Smart Production at Sirris). "Capacity is lost on non-urgent orders, lead times are long and quality problems are not spotted until late in the process. The principles of QRM and Toyota Kata seemed ideal for helping it to overcome these shortcomings."

The company, an expert in plates and pipes, decided to implement a step-by-step process for shortening lead times. A team of committed staff members started

off with small experimental steps in line with the continuous improvement method. For instance the production order release time was changed in the schedule. Fomeco then gradually reduced the production run size starting with the sawing process. At the same time, the project team sought extra capacity at workstations via more efficient working methods. All this led to shorter lead times, meaning that Fomeco can start working on an order much later. The first phase was a success: the internal lead time of one of the production lines dropped from 50 to 25 days. The company has received many positive reactions from customers and will continue down the same path.

FEASIBILITY STUDY AND MASSIVE UPGRADE PROJECT AT HULSMANS

Houhandel Hulsmans, based in Heusden-Zolder, sells wood and associated products to professional customers. 2014 was a key year for the company in its process of gradual modernisation. Sirris helped Hulsmans through the process with a thorough production audit and a feasibility study for a new environmentally friendly product.

Hulsmans specialises in planing wood. Until recently, it would sell off the woodchips that are an inevitable byproduct of this process. Until it came up with the idea of compressing the chips into an environmentally friendly

'brick', ideal for use in a wide range of garden structures. Sirris performed the feasibility study and tests on the suitably named 'Recycled Wood Ecoblock'.

“Together with the Woodlab at UGent we mapped out the technical requirements and possible production processes”, explains **Tom Jacobs**, Senior Engineer Precision Manufacturing. *“We performed tests and made prototypes using various coatings, glues and compression techniques. We came to the conclusion that, with the right additives, there is potential to compress woodchips into a stable*

base product capable of withstanding weather and wind and strong enough to be used in structures. This can now be further developed into a fully-fledged, high-added-value construction block. However, there are still some challenges to overcome in terms of assembly and optimising production.”

From insight to training

In the meantime, the large-scale optimisation exercise continues. **Mark Van Pee** (Senior Engineer Smart Production Sirris): *“By deploying a job registration system Hulsmans obtained on overview of production, workforce efficiency and*

capacity. We also looked for the most appropriate planning tool. And with a view to shorter lead times, we deployed methods for visualisation and distribution on the shop floor based on the quick response manufacturing philosophy. For both the existing location and for the new greenfield production site.”

Sirris also organised intensive training: the project was implemented in close cooperation with four new members of staff. They currently support the modernisation process and are guiding the key company processes towards the desired end.



PANIMPEX DRASTICALLY SHORTENS LEAD TIMES BY IMPROVING PRODUCTION CONTROL

Panimpex designs and manufactures manometers. The complexity of the various order flows required a change to how production was controlled, so that production could be managed with less effort.

The production department at Panimpex in Veurne assembles manometers for refrigeration and air conditioning applications. There are many stages in the process of manufacturing a manometer. The setup times and work involved in these stages vary dramatically. To cope with these differences, it used to work with five large intermediate stocks, creating

a disconnect between the various stages of production. However, the intermediate stocks led to quite long lead times. The diversity of products and the complex order flows in the factory also meant a lot of planning and coordination activities. In addition, the inefficient layout of the workplace caused a lot of unnecessary moving around. Panimpex consulted Sirris with a view to improving production flow and optimising the workplace layout.

New layout and smaller intermediate stock

Multiple improvements were made in order to improve

the existing situation. The starting point for the new production flow was to reorganise production. At the same time the batch sizes were reduced from 50 units to no more than 10, so as to reduce intermediate stocks and shorten lead times. Other interventions included setting up a kanban system, introducing the self-organising principle of bucket brigades and the Toyota Kata approach. By applying this method, Panimpex was able to quickly find customised solutions to its problems and employees were empowered to themselves approach problems systematically and resolve them.



For production flow, the direct results of the interventions were improved workstation layout and a balanced distribution of work. Thanks to the new layout and the deployment of bucket brigades, the production department can process incoming orders more quickly and changes in priorities can be dealt with much more simply. The new way of working led to a smaller stock on the shop floor, freeing up quite a bit of space. The lead time for a complete manometer is now just two to four hours, instead of the four days it used to be.



PAUMELLES LIÉGEOISES EXAMINES AVENUES FOR PRODUCT INNOVATION AND AUTOMATION

Paumelles Liégeoises, based in Liège, manufactures a wide range of metal hinges in relatively small production runs. It uses a multitude of older, conventional PLCs in its processes. In an effort to continue innovating, Paumelles wanted to explore possibilities for automation. The company opted to harness Sirris's expertise to support the innovation process.

Even in the world of hinges, new forms and functions arise. But Paumelles's existing machines, with their limited possibilities and high cost, could not anticipate or capitalise on these

developments. That is why Paumelles initially sought out an appropriate NC machine capable of completely finishing hinges with a more complex geometry.

This meant a huge technological step forward for the company. It could not afford to make any wrong decisions. So Paumelles asked Sirris which new machines could meet its requirements. However, Sirris demonstrated that automating the entire hinge production process was impossible due to technological limitations. Which begs the next question: How can part of

the process – loading and unloading hinge parts – be automated?

Informed decision

To test whether such automation was technically feasible, Sirris deployed a survey procedure developed in-house. **Rik Belien** (Senior Engineer Smart Production at Sirris), explains: *“We mapped out the sizes of production runs and the production processes. With respect to automation, we also made a number of estimates: cycle time and changeover time, flexibility, possible disruption factors and more.”*

Thank to tests run by Sirris on cycle times, changeover times and machining methods, Paumelles Liégeoises was able to make an informed decision: an NC machine was not the solution for improving the production process. That saved the company not only a lot of money, but paved the way for new innovations

FIRST-TIME-RIGHT PRODUCTION STRATEGY: CRUCIAL FOR SMALL SERIES

Avoiding systematic production faults in order to reduce scrap costs and implement a first-time-right strategy was the focus of the practical workshop led by Ives De Saeger (P41) on 21 March. The workshop provided an answer to the question of preventing and drastically curtailing faults, such as painting, welding or bending faults, a major challenge for many companies.

The various aspects were discussed and clarified via discussions and examples. Attention was paid to practical aspects, possible stumbling blocks and requirements for the successful implementation

of a first-time-right strategy. A testimonial about this approach at Industrial Gears Watteeuw demonstrated how this is implemented in practice. The companies present can leverage the knowledge acquired to achieve benefits, such as lower scrap costs, fewer customer complaints, a smoother and timely production ramp-up, less lost time due to rework, including for small series and unique parts, and better insight into the possibilities of their processes with, among other things, an ensuing shorter implementation period.





/ advanced manufacturing / smart production / smart factory

ARSENAL OF PRODUCTION AUTOMATION FOR THE SMART FACTORY FURTHER EXPANDED

To help production companies evolve towards Factories of the Future, Sirris also invested in new smart production applications in 2014. At the production floor in Diepenbeek, Belgian companies can thoroughly explore and test out the potential of smart production technologies.

The Turn-Assist loading and unloading system, the Ko-ga-me compact 3D CNC measurement system, the Safety Eye monitoring system and the Baxter cobot already there were joined by a Universal Robots six-axis UR10 robot arm. This industrial robot was designed for the

automation of tasks where precision and reliability are still very important. It is easy to program and can be deployed for packing, palleting, assembly and pick-and-placing of parts weighing up to 10 kg. Thanks to the large range of up to 1,300 mm time can be saved on production lines where distance is a factor.

A second new acquisition is the Robotiq 2-Finger 85 adaptive robot gripper, developed for use with Universal Robots and compatible with those machines in terms of load, flexibility and user-friendliness. The two-finger gripper was also designed to keep the

installation and programming of these robots accessible to everyone.

The latest newcomer to the 'Robolab' is a compact 3D scanner from the LMI Technologies HDI 100 series, intended for OEM, embedded applications or production automation. This scanner - one of the smallest 3D systems currently available on the market - uses blue LED project technology. The scanner is intended for exacting industrial applications where accurate and repeatable scan results are crucial, from reverse engineering to 3D inspection, measurements and visualisation.

Jan Kempeneers, Senior Engineer Smart Production & Factory of the Future: *"All this must put Sirris in a position to perform further research into the state of the art in flexible automation. Accordingly, new tasks can be easily learned, information from sensors can be used to determine the position and orientation of workpieces and multiple workpieces can be gripped with the same gripper solution."*

The growing number of automated processes in production is also increasing the need for integration between the various robot units and between robot units and the overarching

software. Remote monitoring of the automatic units and inter-unit processes, such as internal logistics via an AGV system, are two examples of applications where such integration is required. In the upcoming period Sirris wants to do research on these topics with its demonstration production floor. After all, nearly all topics within Industry 4.0 require this kind of integration between physical and virtual processes.



Growing interest in precision processing. Innovative production properties and strict performance criteria require increasingly accurate components. At the same time, production costs cannot run up. With our expertise and infrastructure we help companies to maintain balance in this area. Our labs can provide you with the high-tech equipment you need to process relatively large components quickly in a single pass (with precision up to a few microns). Our services also include designing new production processes.

P44 > P47 ► PRECISION

#case

/ advanced manufacturing / precision / vcst



VCST PROTOTYPES SHIFT INTO HIGH GEAR

VCST, a company based in Sint-Truiden that manufactures gears and braking systems for cars, is increasingly being asked to produce prototypes of gear sets. But to meet that demand, it must be able to manufacture more quickly. Thanks to Sirris's precision milling machine VCST can deliver prototypes to its customers more quickly than before.

Things are moving faster and more intensively in the automotive business. Car manufacturers such as VW, Audi and Ford are making ever increasing demands on their suppliers. VCST, a company that makes braking systems and engine timing gears for

OEMs in the automotive industry, was asked to quickly produce prototypes for gear sets. **Peter ten Haaf**, Principal Engineer Advanced Manufacturing at Sirris, describes how Sirris was able to contribute its expertise: "VCST used to spend 12 weeks producing a prototype. We deployed our precision milling machine in order to significantly shorten that production time." In its World Class Manufacturing department, Sirris's milling machine can mill prototype gears in just 24 hours. At a precision of up to 5 µm.

Flexible

This advanced manufacturing method gives VCST an unbelievable time advantage: the gears are now produced 84 times faster than before. Ten Haaf: "Another benefit is flexibility. VCST can now offer its customers multiple prototypes at the same time. Variables include the dimensions and the number of teeth." Cooperation with Sirris has shifted VCST into high gear all at once. To speed prototyping up even further, VCST wants to harness even more of Sirris' expertise.

/ advanced manufacturing / precision / integrated laser hardening

FLANDERS MAKE WORKS ON PRECISION MANUFACTURING TECHNIQUES

Even though a precision milling machine can be used to make rapid prototypes, you still often find yourself faced with a long hardening time. To reduce hardening times, Sirris launched - via Flanders Make - an innovation project on integrated laser hardening. This is just one of the projects launched by Flanders Make.

Manufacturing high-precision components – such as gearboxes for car transmissions – demands more than just high-precision milling machines. You must also ensure that after milling the parts are correctly

hardened, so that they maintain their precision. That is precisely one of the goals of "Manufacturing for High Precision Products", one of the eight research domains at Flanders Make (the Flemish strategic research centre for the manufacturing industry). This research domain focuses on hybrid processing techniques for precision components and surface treatments. No fewer than 15 companies (including ETAP Lighting, SABCA Limburg and VCST) worked together to develop an innovative vision for precision machining. The consortium is led by Sirris, at the behest of Flanders Make.

Gears

VCST is a member of the consortium. It consulted Flanders Make for support on the rapid prototyping of gears. Because the ultra-rapidly milled gears must retain their precision during the hardening process. In connection with Flanders Make, efforts were made to integrate the hardening process in the precision milling machine.



RENEWED TESTING AND DEVELOPMENT SPACE IN DIEPENBEEK

Anyone wishing to transform into a Factory of the Future is opting for new production technologies. The manufacturing industry is definitely showing increasing interest in precision processing and smart production is also an important step forward. But what to focus on? What are the benefits and to what extent do they fit into existing production?

That is why Sirris has made a few significant investments in high-tech production technologies, which are fully in line with the evolution of our manufacturing

industry towards Factories of the Future and in smart production. A total of no less than €850,000 was invested in this state-of-the-art production facility, which has not yet appeared or has only sporadically appeared in Europe. At its production floor in Diepenbeek, Sirris has built a precision manufacturing lab with a climate chamber equipped with a precision milling machine and a 3D CMM measuring machine. The first prototype of a precision processing unit, for processing operations up to micro level in Belgium, is now operating.

On 26 February manufacturing companies obtained the opportunity to get up close, learn about and test out these innovations in precise, smart production. During the event they also had the opportunity - under media attention - to become familiar with the infrastructure for smart, flexible production, including the Baxter robot and the Ko-ga-me 3D CNC measuring system.





PROCESSING UP TO MICRO PRECISION IN THE PRECISION MANUFACTURING LAB

One of the major challenges the manufacturing industry faces in the years ahead is the ability to continue meeting the demand for ever greater precision. This need encouraged Sirris to set up a totally new Precision Manufacturing Lab at the site in Diepenbeek.

After thorough preliminary studies and preparation an extensive infrastructure for microlevel precision processing was installed. The new machines will support our manufacturing industry in its transformation to factories of the future, a situation into which state-of-the-art production facilities slot perfectly. The Lab consists of a precision

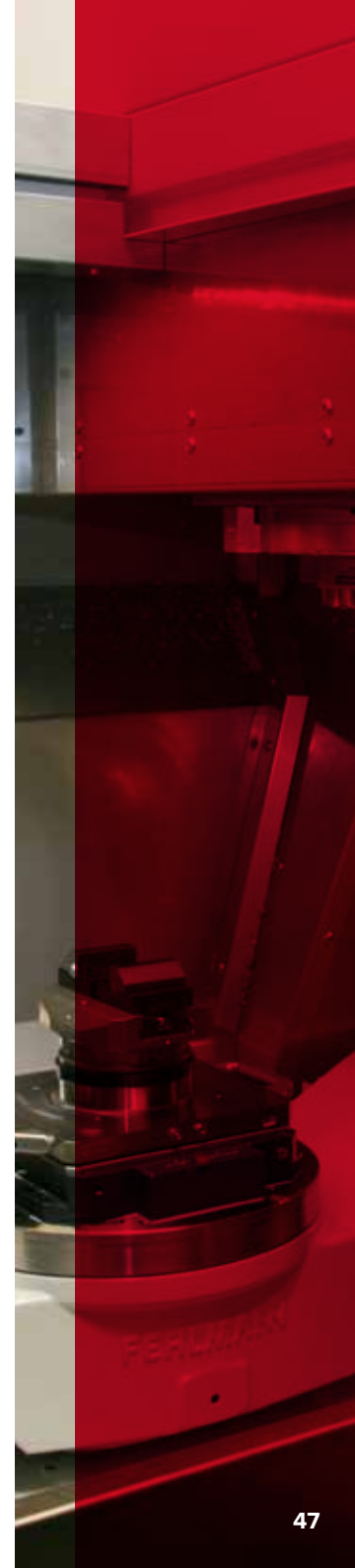
production cell with a climate chamber. It includes a Fehlmann Picomax 825 Versa: a five-axis milling machine which processes parts up to 300 mm³ to micrometre precision, without final processing. Together with a Mitutoyo Crysta Apex 3D CMM measuring machine, companies can find a totally operational prototype of a precision production unit.

In addition, the precision infrastructure was expanded in 2014 to include the QASS Optimizer 4D, a new measurement method for assessing processes and thus optimising production. This system makes it possible to carry out radio frequency

(with a sample frequency of 100 MHz and processing of 3 Gb/min) acoustic emission measurements and to process them in real time. **Tom Jacobs**, Senior Engineer Precision Manufacturing at Sirris, explains what is possible: *"During production processes the acoustic waves in the material reflect something about the process itself. These kinds of measurements make it possible in practice to check that not too many cracks are appearing in, say, induction hobs and sheetmetal work. Our aim is, during precision processing, to monitor the occurrence of tool wear and check the extent to which there is a direct link to measurements. The impact*

of roughness on the product can also be determined in this manner. Ultimately, the system can also be used for many applications, such as the quality of grinding."

The system is currently deployed for two research projects on precision processing: 'Precision manufacturing for new and better products' and 'DYNA-TOOL Efficiency improvement in the machining of complex parts by optimising tool system dynamics'.



Additive Manufacturing (AM), or 3D printing, is currently considered a future production technology. For prototyping, the technology has in the meantime become the standard; for applications in mechanical engineering, a redesign is important first. The aerospace industry is currently taking its first steps, while in the biomedical sector the printing of bio-ceramic materials ensures extra opportunities. Sirris helps companies from all these sectors to discover opportunities via AM scans and practical masterclasses for designers. Together we develop cases for design/redesign for AM and make a 3D print in-house.

#case

/ advanced manufacturing / additive manufacturing / Atlas Copco



ATLAS COPCO AIRPOWER ACQUIRES EXPERTISE AND KNOW-HOW IN ADDITIVE MANUFACTURING

To successfully apply additive manufacturing (AM) it is critically important to have in-house knowledge of the various technologies involved. Atlas Copco Airpower, a manufacturer of compressors, generators and other industrial equipment, is one of the pioneers in using AM to manufacture their products. In its view, the possibilities - and therefore its expertise - will only continue to expand.

That is why in 2014 a project was launched bringing together experts from various divisions to learn as much as possible from each other and explore every facet of the issue. Atlas Copco also joined forces with

Sirris and a number of other companies on a project to explore the possibilities of 3D printing. It reviewed the entire list of parts and considered which parts would be suitable for 3D printing.

In addition, a masterclass was organised in cooperation with Sirris at which designers from each division worked together intensively on 3D printing. **Simon Vermeir**, a designer on the AM team at Sirris, explains more about this practical masterclass: *"During the masterclass the experts from Sirris explained the various techniques. We provided practical design rules and tools and, together*

with the designers from Atlas Copco, we reviewed the entire design process. At each stage we looked at which knowledge was needed in order to successfully implement AM."

The attendees brought in their own cases, components which were redesigned during the masterclass for production with AM.

3D printing can already deliver added value in various areas, such as prototypes, tooling, one-off parts and compressor components.

SERIES OF MASTERCLASSES ON DESIGN/REDESIGN FOR ADDITIVE MANUFACTURING

Successfully switching to AM for the production of tools and functional components begins with an appropriate design. As a company, how do you get started? In 2014 Sirris organised a number of in-depth masterclasses for designers at which they learned everything they needed to know in order to design components specifically for AM. They can now harness the benefits offered by AM.

What makes these masterclasses so different from other initiatives? The answer is the practical, step-by-step approach for and by designers! They go through a

conventional design process and, at each step, checks are performed to find out what knowledge is needed to successfully implement AM. They look at more than 10 different technologies, with a focus on the advantages and disadvantages of each. The broader framework within which AM fits is also examined and a range of practical design rules, design tools and other tips & tricks were applied. In order to immediately test out this applied know-how in practice, each attendee can contribute a specific user case which, during the masterclass, is adapted to additive manufacturing-based production. This made it

possible for people to literally take their acquired knowledge home.

Benjamin Denayer, Senior Business Developer Additive Manufacturing at Sirris, sums it up: *"With Sirris, we help companies on the path towards using 3D printing as a production technology. Our 'Design for 3D Printing' masterclass is part of the total approach we've designed. We keep an eye out for opportunities, implement cases together with companies and give hands-on training to engineers and designers. We noticed that - through the masterclass and its highly*

practical approach - we are triggering in-house change at companies. Employees are starting to work together around 3D printing, exchange new ideas and come up with new products. This is part of the deployment of a dynamic process around 3D printing in companies, which is why we offer the masterclass internally at companies, as well as in a public version accessible to everyone."



BONE THERAPEUTICS USES 3D PRINTING TO WORK ON CELL THERAPY FOR BONE DEFECTS

Bone Therapeutics, based in Gosselies, develops innovative – and above all minimally invasive – cell therapies for repairing and preventing bone fractures. To treat certain bone defects, the biotech company decided to seek out a solution focusing on tissue generation. Together with Image Analysis, a UK company specialising in medical imaging, Sirris is making that quest possible with 3D printing.

In 2014 Bone Therapeutics launched Ceracell, a two-year project within the European M-ERA.NET research programme. The key question of this research project is the

following: How feasible is a new product for repairing bone injuries in a patient by injecting healthy bone cells and 3D matrices? To initially test this in vitro, Sirris provided 3D-printed, biocompatible matrices that reconstruct specific bone defects.

Customised biocompatible 3D parts

*“Using CT scan images and analyses from Image Analysis, we are developing complex bone matrices made of bioceramics”, explains **Grégory Nolens**, Senior Engineer Additive Manufacturing at Sirris. “Mineral matrices are the biological structures that give*

bone its strength. With 3D printing we faithfully reproduce this matrix, specifically designed for individual bone defects.”

“Using this technique, Bone Therapeutics can rigorously test the properties of bone-forming cells in vitro and combine them with 3D-printed matrices”, says Grégory.

“The extent to which the cells bond to the bone tissue can also be studied, as can the possible impact of the type of cell therapy on the physical, mechanical and porosity-related properties of the bone.” This will be followed by in vivo tests to thoroughly assess the efficiency and

biocompatibility of the new Bone Therapeutics product.

#event

/ advanced manufacturing / additive manufacturing / Thales Alenia Space

WORKSHOP IN ADDITIVE MANUFACTURING PRESENTS BIOPRINTING TECHNOLOGIES OF THE FUTURE

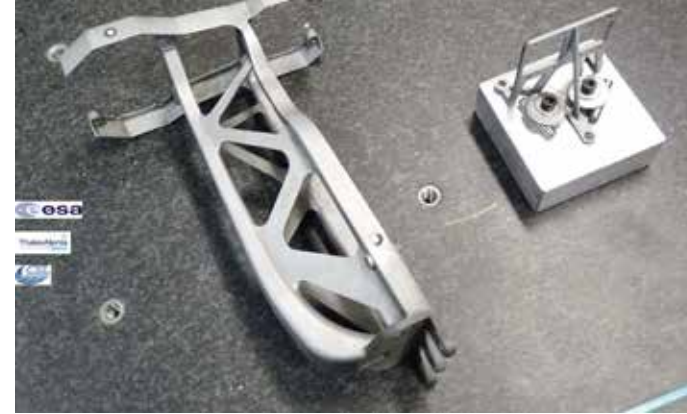
One of the most promising niches in additive manufacturing is biomedical applications, with hot topics being bioprinting and scaffolds. Many companies are very interested in this technology and its applications, but they still have a lot of questions. At an industry-oriented workshop with interactive periods held on 23 January, Sirris presented the state of the art and the future, with the support of leading players.

For bioprinting - the 3D printing of biomaterial for living tissue - Sirris wants

to help Belgian industry to position itself more firmly. The technology has usable applications in the development and testing of new medicines, the treatment of illnesses where transplants are necessary, the production of biomolecules, scientific research, food production and more. But the many possibilities offered by bioprinting are not always correctly investigated. Nevertheless, some players from the academic, medical and research worlds have developed better methods that start from an existing material and can be

implemented in industrial projects. In parallel with these recent activities, Sirris tracks developments in this domain and has bolstered its own activities. All of this came up during the workshop.





/ advanced manufacturing / additive manufacturing / Thales Alenia Space

THALES USES ADVANCED PRODUCTION TECHNIQUES FOR SATELLITE ANTENNAS

Advanced production techniques have reached a level mature enough to be used in space travel. Thales Alenia Space, an aerospace manufacturer, sees the benefits and is working together with Sirris. A test project for antenna systems looks encouraging.

In aerospace there is no room for half-finished products. Production precision requirements are extremely high. At the same time, the parts and components to be produced are nearly always unique. The advanced manufacturing

methods emerging today are encouraging. Thales Alenia Space, which actively develops and produces a range of space systems, realises this too. Three phases are distinguished in its new project on 'advanced manufacturing methods'. First, existing components are copied using an advanced manufacturing method. Second, the parts are manufactured in accordance with the requirements for the application in question. Third, within the project the focus is shifted to developing components at subsystem level.

Antenna

A concrete example in this project is the development of a system to mount antennas on satellites. The aim is to design a support on which two antennas can be mounted. In addition, it must also be light and very rigid. Topology optimisation (weight and rigidity) and production via laser beam melting are two of the advanced manufacturing techniques which – thanks to the advisory role played by Sirris – have been applied in this pilot project. The initial results are encouraging.

#CASE

/ advanced manufacturing / additive manufacturing / Thales Alenia Space

THALES DESIGNS TITANIUM PEDESTALS USING ADDITIVE MANUFACTURING

One key problem with additive manufacturing techniques are the support structures involved in production. Thales Alenia Space, a company which designs and manufactures aerospace systems, is using the latest 3D manufacturing techniques to overcome that shortcoming. Sirris provided the relevant technological support.

3D printing has earned a place in the production of metal components. But one problem remains: the support structures used to hold the components. They slow down

production times, cost a lot of money and must be removable at a later stage.

Thales Alenia Space was wrestling with this problem and called on the expertise of Sirris' Additive Manufacturing group. **Olivier Rigo**, Senior Engineer Additive Manufacturing, explains: *"The best way to deal with this issue is with laser beam melting (LBM)."*

Triangle

The part is made of TiAl6V4 – a very strong titanium alloy – and is shaped like a three-legged pedestal. The

project has been completed and resulted in eight titanium pedestals. The results are very positive in terms of durability, weight, responsiveness and finishing. For the mass production of these pedestals Thales Alenia will now look for a partner specialising in additive manufacturing.



SIRRIS INVESTS IN ADDITIVE MANUFACTURING WITH METAL POWDER AND BIOCERAMICS

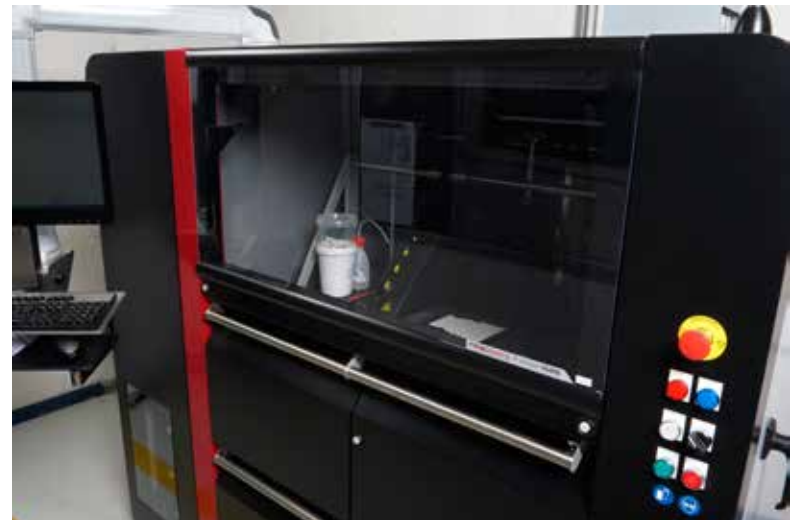
3D technology is really coming into its own, which translates into smart applications for the biomedical sector and the manufacturing industry. Accordingly, 3D printing - or 'additive manufacturing' (AM) - offers a host of advantages, including the efficient use of raw materials, compact strength and almost unlimited design possibilities. Sirris is a European R&D leader in AM, with over 25 years of experience and the very latest equipment at its sites in Seraing and Gosselies. It closely monitors the industry and regularly invests in expansion.

The most requested technologies in 2014 were, without a doubt, based on melting metal powders with a laser (laser beam melting or LBM) and an electron beam (electron beam melting or EBM). This has everything to do with the demand for a validation technique for specific applications in aerospace. Multiple industrial companies in Belgium that have already tested out these AM techniques with metal via Sirris are opting to invest in this domain.

The Optoform technology with which Sirris developed new bioceramic materials is evolving into a new generation

of Prodways machines, which are also developed in cooperation with Sirris for high-viscosity materials. A beta machine was installed at Kasios at the new production site created near Sirris in Gosselies which was set up to bolster cooperation between Kasios and Sirris, and to start the mass production of intervertebral disc prostheses.

Sirris planned to acquire a new similar machine in early 2015 in order to be able to advance in the development of multiple other materials that are not yet available for additive manufacturing today.



SIGHTS INTO 3D PRINTING FOR THE AEROSPACE INDUSTRY

On 13 May, Sirris educated the industry with a workshop on the most recent developments in and current potential offered by additive manufacturing. Experts spoke on 3D applications in the aerospace industry.

The event gave a clear picture of applications, trends and future developments in additive manufacturing (AM), focusing on metal production. In addition to Sirris's own AM experts, there were speakers from EADS, Airbus and Thales – three key players in the aerospace industry. They explained how high-tech 3D production is already being applied in their sectors. They

took an in-depth look at what is possible in the aerospace sector, what the challenges are, what the added value of additive manufacturing is for the manufacture of components (including metal components), and so on. The attendees had their questions answered via presentations and cases.

KRIS PEETERS VISITS THE 3D PRINTING FACILITIES IN SERAING

Highlighting the importance of additive manufacturing and interregional cooperation in the manufacturing industry, Flemish Minister-President Kris Peeters visited the Sirris site in Seraing on 20 May. Unsurprisingly, Seraing is home to the largest such additive manufacturing facility. Flemish AM companies such as Materialise, Melotte and Layerwise are also working closely together with the Sirris technology centre in testing and innovations.

During his meeting with major industrial AM players, the Minister-President announced the development of a European 3D cluster platform. The cluster policy aims, among other things, to listen more closely to the needs expressed in the AM value chain. Kris Peeters: *"We must bring all forces in the development of the 3D printing industry in Europe together in a world-class European cluster platform. We are combining strengths via the Vanguard Initiative. The Flemish government started this and Wallonia was a co-founder."*

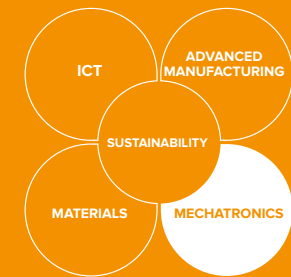
At the end of his visit, Mr Peeters was presented with a 3D-printed cockerel, the symbol of the leading-edge innovation that Flanders and Wallonia are developing together.



MECHATRONICS

MORE EFFICIENT. QUIETER. MORE FLEXIBLE.

Products, machinery and production equipment all have to meet increasingly stringent requirements. They must be more efficient, quieter, more energy efficient and more flexible. Manufacturers consult our mechatronics experts to help them keep their production equipment up-to-date and efficient, while at the same time keeping the cost of innovation down. They help optimise existing systems, manage complexity and develop the products of the future.



TOWARDS MACHINES WITH LOWER TOTAL OPERATING COSTS

Industry not only wants more efficient machines, but machine manufacturers are also being forced by regulations and their customers to build systems which consume less energy and are more user-friendly - quieter, fewer vibrations - without negatively impacting performance. Sirris and the former FMTC (now part of Flanders Make) launched the EcoMechatronics project in order to support these firms

in the transition to a new generation of ecomechatronic products. Leading-edge industrial research is applied to specific applications in companies. They can leverage this support when integrating innovative mechatronic technology in their machines.

MECHATRONICS
THEMES

57>61
ECOMECHATRONICS

62>63
MECHATRONICS 4.0

MORE ENERGY-EFFICIENT AND HIGHER PERFORMANCE MACHINES THANKS TO ECOMECHATRONICS

EcoMechatronics was the first project in the form of a Flemish Innovation Cooperation Agreement (VIS project), that was approved and successfully completed in late 2014. Over the last four years, Sirris and FMTC have supported 65 small and medium-sized companies in developing a new generation of machines.

EcoMechatronics Audit

In 18 industrial research projects the EcoMechatronics team applied methods for model-based design, smart control and optimisation to make machines more energy efficient, more user-friendly and more performant. The

experts also developed a generic tool to map out the potential for improving the energy efficiency of machines. This was done on the basis of measurements taken on these machines. The audit gives a company insight into the energy efficiency of its products and the causes of energy losses. It is used as a basis for giving the company recommendations for improvement. **Pieter Beyl**, Senior Engineer Mechatronics at Sirris: *"The EcoMechatronics Audit is the logical first step in the process of systematically improving a machine. The measurement results are always an eye-opener."*

The final results of the EcoMechatronics project were presented at the closing event in the spring of 2015. The know-how acquired during the project can be subsequently deployed in the services provided for companies. One of the main themes of the project – the application of advanced control techniques using industrial control hardware – is also continued in the Mechatronics 4.0 project.



#CASE

/ mechatronics / ecomechatronics / duco

DUCO RESEARCHES ENERGY EXTRACTION FROM AIRFLOWS

Veurne-based company Duco specialises in ventilation systems and solar control for homes and commercial buildings. One of their products is a ventilation unit for homes. To ensure optimal use of the system, the ventilation flow can be adjusted on the basis of measurements in the room.

The system is controlled via valves in the central ventilation unit itself. One disadvantage of this is that there must be a separate air channel to the central unit for each air conditioned room. This can be improved by using a flow control valve in each of the exhaust points.

To avoid having to run power supply and signal cables to each valve, the unit should be able to power itself. The required energy could be drawn from the airflow via a small turbine and stored in a battery. Communication between the unit and valve should also be wireless.

Feasibility of local power generation

Together with Sirris and FMTC (now part of Flanders Make), Duco wanted to find out if such a system was feasible. It wanted to answer the question: *"Can the energy for the valve be drawn economically from the airflow without compromising the capacity of the central unit?"*

Designing this kind of autonomous application powered by local energy generation requires an integrated approach encompassing energy generation, storage and use.

To assess the feasibility of such a system, its preferred architecture needs to be found out first. Account had to be taken of the anticipated flows, since they have an influence on available energy. They were compared with the estimated consumption of the valve and electronics. A systematic approach was taken to estimate the energy output from the turbine. The potential concepts were assessed using off-the-shelf components and proof-of-concept testing rigs.



The feasibility study revealed that generating energy in an air channel as per the requirements is feasible, provided a specific component design is used. Further validation will reveal what that is. With these results, Duco can build and evaluate a turbine prototype.



PUNCH POWERTRAIN MAKES HYBRID POWERTRAIN UP TO 17% MORE ENERGY EFFICIENT

During the EcoMechatronics project, Sirris and Flanders Make provided support for Sint-Truiden-based company Punch Powertrain in developing a more energy-efficient control strategy for hybrid vehicle powertrains.

In addition to an internal combustion engine, many hybrid vehicles have an electric motor and a battery in order to reduce fuel consumption and emissions. A smart powertrain controller should ensure that the right energy source is used at all times. In its quest for an optimum control strategy – i.e. one that minimises fuel consumption while being easy

to apply to their hardware – Punch Powertrain sought advice from Sirris and Flanders Make.

Smart selection of control techniques

Based on a self-designed method for control selection, the EcoMechatronics experts from Sirris and Flanders Make recommended two control techniques: global optimal and real-time applicable powertrain control. With global optimal control the theoretical minimal fuel consumption is determined without limitations on computing power. Using dynamic programming techniques the controller assesses possible control

actions at all times and selects the most efficient. This determines the optimal path for a pre-defined speed curve – in this case the *New European Driving Cycle* (NEDC).

The selected real-time applicable control – *the equivalent consumption minimisation strategy (ECMS)* – strikes a balance at all times between power from fuel and power from the battery, in order to minimise fuel consumption.

For the NEDC, the global optimal powertrain control resulted in a 17.2% fuel consumption reduction compared to Punch

Powertrain's original, rules-based control strategy. The real-time applicable control had nearly the same performance, with a 16.5% reduction.

#CASE

/ mechatronics / ecomechatronics / alliance



ALLIANCE OPTIMISES WASHING MACHINE SUSPENSION WITH MULTI-BODY MODELLING

The first simulation tools for multi-body modelling hit the market decades ago. But a high barrier to entry prevents many companies from actually applying these techniques. Alliance, a leading manufacturer of laundry solutions, called on Sirris and Flanders Make to help it across that barrier.

Industrial washing machines have a suspension mechanism to reduce drum vibrations while it is spinning. Less drum vibration paves the way for more compact housings that take up less space. Limited dynamic downward reactive forces ensure that the washing machine will not

move around while spinning at full speed.

System level modelling

Unlike the better known finite element method, multi-body modelling is used to approach a machine as a system consisting of rigid bodies and connections (springs, dampers, sliders, etc.). This approach makes it possible to simulate forces and movements by applying a number of deliberate simplifications, which in turn entails a high barrier to entry. Convinced of the potential added value of multi-body modelling, Alliance sought advice from Sirris and Flanders Make.

Simulation and practice hand in hand

Flanders Make developed a method for building a multi-body model in a short period of time. By performing systematic measurements on an existing machine in parallel with the construction process, the research team came up with usable simulation results relatively quickly.

For Alliance, comparing simulations and measurements showed that multi-body modelling is ideal for predicting the impact changes will have on the suspension mechanism. With the help of experts from Sirris and Flanders Make, Alliance

optimised the position and orientation of dampers and springs in the suspension. As a result, the team succeeded in significantly reducing drum movement and reactive forces.

#project

/ mechatronics / mechatronics 4.0 / industrial revolution

MECHATRONICS 4.0 PREPARES MECHATRONICS INDUSTRY FOR FOURTH INDUSTRIAL REVOLUTION

The fourth industrial revolution - dubbed Industry 4.0 - is gradually arriving. This revolution stands for the far-reaching integration of the virtual and physical worlds: digital technologies applied on an industrial scale are already optimising the entire production process and will, in the future, form the foundation of cyber-physical systems – systems of cooperating computer elements that drive physical processes.

For the manufacturing industry, the result is a demand for intelligent machines featuring a high level of autonomy, intelligence

and connectivity by integrating low-cost technology, such as MEMS sensors, ICT applications, open-source controller platforms, etc. This evolution is also linked to the rising demand for customised production and the required flexibility. This will lead to far-reaching integration and interaction between machines, products and their environment.

The Mechatronics 4.0 project aims to support this far-reaching integration of the virtual and physical worlds for Flemish SMEs active in the manufacturing industry. Sirris, Flanders Make and iMinds have the expertise and

infrastructure to collectively support SMEs in implementing innovations and bridging technological needs, on the one hand, and technological offerings on the other. Via masterclasses, demonstrations and accessibility research projects, SMEs will receive the support they need to integrate innovations at the right time for the right price.



BENES APPLIES RAPID PROTOTYPING PRINCIPLES TO DEVELOP PRINTER FEEDER TABLE

In conjunction with the Mechatronics 4.0 project team, Benes was able to effectively apply rapid prototyping to the development of a high-accuracy printer feeder table and associated software. This technique makes it possible to test and optimise concepts in a short period of time.

Sirris and Flanders Make used rapid prototyping techniques to develop a feeder table compatible with an existing printer system. They were commissioned by Benes, a company in Haasrode that distributes printing systems and accessories. **Anje Van Vlierberghe**, Mechatronics

Programme Manager at Sirris, explains: *"Techniques that go by the name of 'rapid prototyping' (RP) enable the rapid, inexpensive and efficient creation of a product prototype that is very close to the individually defined specifications of the end product. From there, it is a small step to scaling up to a fully-fledged industrial product."*

Extended functionality

The existing printer configuration was only suitable for printing on light materials on a roll, such as paper, textiles and films. Expanding the configuration to include an external, powered feeder

table would open up new possibilities for printing on heavier materials such as flat panels.

Sirris and Flanders Make took a systematic approach in order to generate and optimise concepts on the basis of the design specifications. The final concept for the feeder table uses a spindle drive. For a complex connecting part 3D printing was used as a rapid prototyping technique. Rapid-control prototyping, in conjunction with an open source dsPic hardware platform designed by Sirris and Flanders Make, was used for the control hardware. This approach has two benefits.

Firstly, the control code is automatically generated from a control programme developed in Matlab/Simulink. Secondly, the control can be tested on a full feeder table prior to experimental evaluation. In addition, the performance of the low-cost dsPic processor is representative of the electronics that will be implemented in the final product.

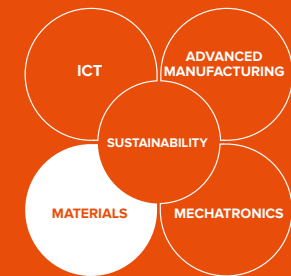
In the Mechatronics 4.0 project, the project team will continue developing the generic dsPic hardware platform and will also evaluate other rapid-control prototyping hardware.

MATERIALS

WHERE APPLICATION, PRODUCT DESIGN AND
PRODUCTION PROCESS COME TOGETHER

Many products consist of materials; materials make a product. The most important challenges are incorporating the right materials during product design, while taking account of the subsequent production process. Materials are increasingly combined with other functionalities, such as electronics, mechatronics and functional coatings.

In our state-of-the-art laboratories and services we have developed know-how in the possibilities (and limitations) of composites, coatings, metals, nanomaterials, plastics and hybrid materials for specific products and applications. In each case we seek out the best possible match between the right material, the most appropriate production technology and the desired design.



#project

/ materials / composites / biocomposites

SELF-REINFORCED BIOCOMPOSITES: NATURALLY STRONGER

Bio-based composites are well-established. As part of a European research project Sirris developed an enhanced biocomposite based on PLA (polylactic acid). The research findings are definitely positive. Stronger than expected: literally.

Products based on polylactic acid are nothing new per se: we've already seen them in applications such as disposable cups. This is a bio-based polymer, on its own already very good news. Up till now, the downside of PLA was its strength. **Linde De Vriese**, Project Engineer Composites at Sirris Leuven-Gent Composites Application Lab, explains: "Traditional PLA

products are very brittle and don't last long. By making them 'self-reinforced', we wanted to make PLA tougher, stronger and therefore more sustainable. We opted for a matrix material which contains the same material as reinforcing fibres."

Suitcase and helmet

The project was quite ambitious: the research team wanted to see whether self-reinforced PLA achieved the same quality as, say, the polypropylene that Samsonite uses in some of its suitcases. **Linde De Vriese:** "That material is also self-reinforced. We wanted to achieve the same properties with our SR-PLA. The results are very

positive. We achieved a higher degree of rigidity than self-reinforced polypropylene and we were able to make PLA itself much tougher."

Thanks to this research Sirris can offer applications in a range of sectors. Examples include the automotive industry and the production of machine parts. According to Linde, implementation on a wide industrial scale will happen in the near future: "Sirris will support companies via joint R&D projects."

MATERIALS
THEMES

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COMPOSITES

72>75
COATINGS

76>79
PLASTICS
SMART AND SMALL

80>84
METAL MOULDING

86>87
NANOTECHNOLOGY

Composite materials are an important element of light-weight solutions, but are also deployed in order to make products more energy efficient, to improve their performance and to provide better design flexibility. The Sirris Leuven-Gent Composites Application Lab (SLC-Lab) was set up in Heverlee in 2012 to encourage the industrial application of composites. Various companies count on our research and expertise in the development of composite materials and applications. Research is performed in close cooperation with KU Leuven and UGent.

#case

/ materials / composites / aggéres

AGGÉRES STEMS THE TIDE WITH EFFICIENT FLOOD BARRIERS

When brothers Anthony and Oliver Fémont launched Aggères in 2010, they had one goal: prevent the problems of flooding through innovative and customised ‘flood solutions’. Their recent achievement is the development of a flood defence gate that can cope with tides of up to four metres. Sirris provided support in selecting materials, production techniques and suppliers.

With the flood barrier Aggères also wants to protect underground sites, such as car parks, metro entrances and valuable public buildings. The gate comprises separate

sections measuring 50 cm high and 7 cm thick that can retract into the ceiling. Right from the start it was apparent that choosing the right material would be essential to the success of the project. The gate must be able to withstand enormous water pressure, yet the components cannot weigh more than 60 kg so as not to overload the retraction system.

Smooth cooperation

“Composites were an obvious choice due to the combination of conditions”, explains Bart Waeyenbergh (Engineer at SLC Lab). “Since Aggères itself had no experience here, we provided training. That

way we were on the same wavelength right from the start.”

Aggères and Sirris jointly developed a prototype of the gate in order to test the retraction system. It was successful. Aggères now has a – literally – watertight solution. But Sirris's involvement did not end there: Aggères could also count on extensive support in its search for the right mould, materials and parts suppliers. As a result, new prototypes are developed for testing in a specially designed test tank under full water pressure.





NEW MOULD TECHNOLOGIES: FASTER AND CHEAPER

Moulds for composite production can be expensive. New technologies are now making it possible to develop moulds faster and, above all, more cost-efficient. Sirris is examining the latest technologies in order to make such prototype moulds.

Companies that use moulds for the mass production of composites (e.g. tennis rackets, bicycle frames and lightweight suitcases) can easily spread the cost of moulds over their entire production run. But what do you do if you need a mould to make just five pieces of something? **Markus Kaufmann**, Manager of the Sirris Leuven-Gent Composites Application

Lab, has the answer: *“Then you use prototype moulds. To keep the price down, we help companies with new technologies that make development faster and cheaper.”*

Prototype moulds from tooling blocks made of polyurethane and epoxy are the best known way of making prototype moulds. Markus: *“We made the rear wall of our caravan demonstrator in just such a mould. If you were to do that with a conventional polyester mould, then it would be significantly more expensive. Milling aluminium is definitely not an option due to the price and high weight.”*

Eye-opener

SPIF (single point incremental forming), a technology developed by KU Leuven and others that is now available at Sirris, also enables rapid mould creation. **Markus Kaufmann:** *“We brought this technology to the composite market. A vintage table provides clear proof of its success. You can even view the piece at the Design Museum in Ghent!”*

3D printing is another way of quick mould fabrication. The biggest advantage is its short leadtime: a new mould can be ready in just one week instead of four to six weeks.

Through demonstrations and masterclasses Sirris was familiarising its industrial audience with new mould technologies. And successfully, it seems: fast and cheap prototype moulds are attracting growing interest from industry.

OPTIM AND SIRRIS DEVELOP INNOVATIVE PRODUCTION PROCESS

Two years ago Sirris and Optim Test Center (Ans) worked closely together on a production process that combines the hot forming of thermoplastic composites and injection moulding in a casting mould in a single step.

The aim of this industrial research project was to develop a new technology for the production of structural components in thermoplastic composites on the basis of textile continuous glass fibres, carbon fibres or natural fibres with complex geometries which are specific to the injection process. To this end, Sirris and Optim Test Center

combined their materials knowledge and expertise in product development and applications.

High-quality, strong and recyclable thermoplastic composites

Traditionally, a thermoplastic composite plate is warmed up before it is placed into the casting mould of an injection machine. Sirris researched the optimal conditions for combining both steps in one and the same process. In comparison with a two-stage approach, this yielded not only a better distribution of used materials, but also a more efficient end product. The result? An innovative

production process that ensures high-quality, sturdy and fully recyclable parts, fully customised to the production of large runs of light structures, such as backrests for seats, brake pedals for cars, etc.

With this project, Sirris and Optim Test Center delivered a fine sample of innovative thinking that can already count on a lot of international support, especially in the automotive industry and in some high-tech industrial sectors.





INTERREG +COMPOSITES: FOCUS ON COMPOSITES

During three years Sirris participated in the 'Interreg +Composites' project. The aim of this European initiative? To promote the use of composites via information campaigns, training courses and support for innovative projects in northeastern Europe.

The Interreg programme is an EU initiative that encourages interregional economic and social exchange. Interreg +Composites was part of this and promotes the use of new materials in an industrial context. Large parts of the industry are still strongly focused on metals. Nevertheless, increasing

attention is being paid to composites as an alternative material for innovative products. After all, the properties of composites can be fully adapted to the production process and the product in question.

Triple mission

In connection with this project, Sirris proposed three objectives. **Jacky Lecomte**, Programme Manager Nanomaterials at Sirris: *"Based on our technical expertise in composites, we initiated a dialogue with a number of companies. Working with them, we explored how their products could look in the future and gave suggestions on how they*

could integrate composites into day-to-day processes. We also organised various events and wrote a series of articles focused on composites and possible applications."

Sirris was involved in the launch of around 60 new development projects, of which 20 have since been completed. *"Thanks to cooperation with other research centres under the aegis of Interreg +Composites we were able to expand our network of partners significantly. In the meantime, several highly promising projects are on the way. Not to mention the enhanced reputation of Sirris at European level!"*

Over the last three years member companies could approach Sirris for a free strategic analysis on using composites in new products. But even after the end of these projects companies could continue to count on Sirris's strong network of partners to support them with feasibility studies for new projects.

#event



/ materials / composites / slc-lab

SLC LAB SUCCESSFULLY TAKES PART IN JEC 2014

In 2014, JEC Composites - Europe's leading composites trade fair and conference - had its largest edition ever. SLC-Lab was also present. The Lab shared a 100 m² booth with Kulab, Samsonite, Econcore and Noumenon Design, attending its first international JEC show with both partners, KU Leuven and UGent.

Lab manager **Markus Kaufmann** recalls: *"Our prototypes aroused a lot of interest. In fact, the prototype for an automotive suspension arm yielded around 10 requests for more information, from Europe to Japan. The fact that this was the first time we co-exhibited with the University of Ghent was definitely a plus."*



#event

/ materials / composites / masterclasses

SLC-LAB HELD A SERIES OF FUTURE-ORIENTED MASTERCLASSES

In a series of masterclasses on leading-edge technologies in composite production, over the course of the year SLC-Lab focused on various processing methods under the overarching concept of 'composite production of the future'. The topics covered were 'closed-mould technologies', 'the production of prototypes in composite material', 'press forming of thermoplastic composites' and 'resin transfer moulding (RTM) and RTM light'.

This series of masterclasses is part of the Generation Composite project, in which SLC-Lab enables companies to learn about key technologies

for the fast, green and flexible production of composites. More specifically, the experts showed these companies technologies which enable faster production than conventional hand lay-up and greener, environmentally friendly production using closed-mould technologies. The project also paved the way for a flexible production environment thanks to reconfigurable moulds and cheaper prototypes.

#event

/ materials / composites / CFK Valley

COMPOSITES COMPANIES GAIN ACCESS TO THE STATE OF THE ART THANKS TO CFK VALLEY BELGIUM



CFK Valley, the largest composites industry network in Europe, joined forces with Sirris and Agoria to set up CFK Valley Belgium. This initiative gives Belgian companies access to a European network of composite companies and researchers. Demand to set up a Belgian satellite came from the business community, supported by UGent and SIM. In cooperation with Sirris, Agoria took the initiative to set up a cluster for Belgian companies active in composites.

The economic centre of the European composites sector is in the German city of Stade, near Hamburg, where

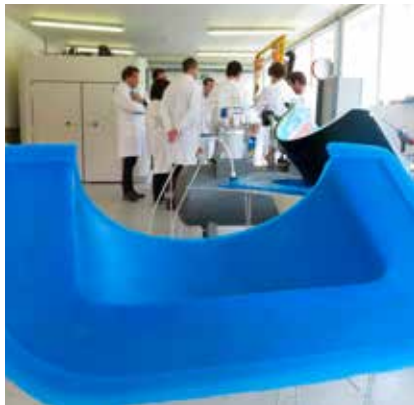
around a hundred large composites companies and research institutes - including Airbus, Fraunhofer-Institut and Volkswagen - have joined forces under the name CFK Valley to promote research, business development and networking.

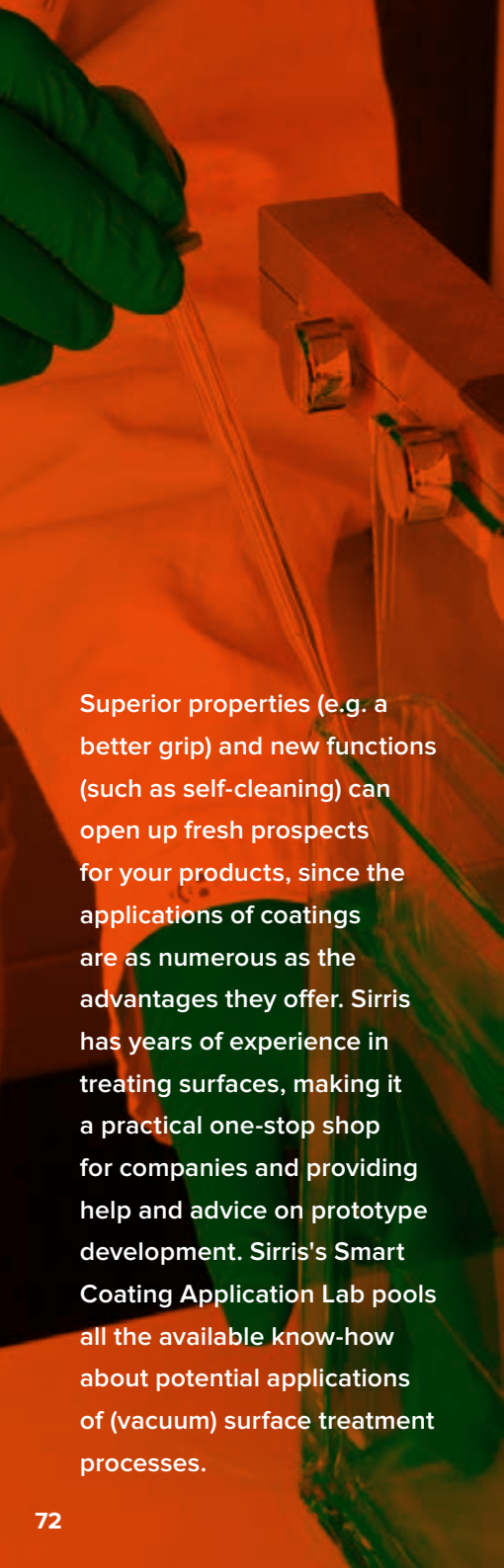
Through the communication channels of CFK Valley Belgium, Belgian companies can establish contacts with other composites companies and research institutes, often global players. It is also an opportunity to take part in international and European research projects and improve our potential for innovation.

Herman Derache, General

Manager of Sirris: *"The CFK Valley Belgium partnership gives our composites industry access to leading-edge knowledge and leading infrastructure developed in Stade. It also strengthens and unifies national and regional R&D initiatives such as SLC-Lab, which serves as a central pivot between industry and universities."*

Following various contacts and visits between Sirris and Agoria and CFK Valley in Germany in 2014, the formation was completed in early 2015. The start of CFK Valley Belgium was confirmed at the JEC 2015 show in Paris.

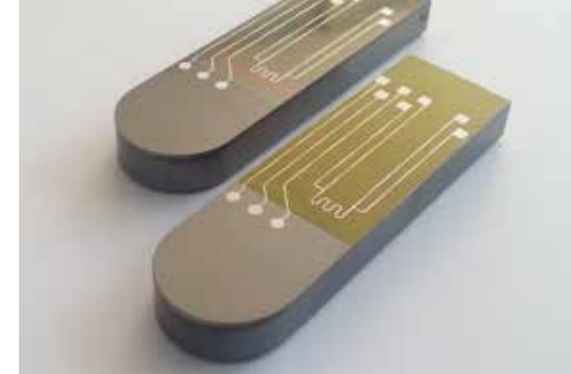




Superior properties (e.g. a better grip) and new functions (such as self-cleaning) can open up fresh prospects for your products, since the applications of coatings are as numerous as the advantages they offer. Sirris has years of experience in treating surfaces, making it a practical one-stop shop for companies and providing help and advice on prototype development. Sirris's Smart Coating Application Lab pools all the available know-how about potential applications of (vacuum) surface treatment processes.

#project

/ materials / coatings / smart sensors



PROTECTIVE COATINGS WITH BUILT-IN SENSOR FUNCTIONS THANKS TO SMART SENSORS PROJECT

Under a European cooperation agreement Sirris researches and develops ceramic coating based sensors. In addition to being wear resistant, these coatings can give information about pressure and temperature on the surface of the system to which they are applied.

Now more than ever people want to be able to measure as many parameters as possible in a production system in order to be able to form a good image of process conditions. Due to the miniaturisation and growing complexity of machines it is not always

possible to place sensors on the desired measurement location.

By using coatings as sensors, measurements can in many cases be taken at the exact location desired, since the coatings do not take up any space. After all, they are just a few micrometres thick and therefore have no impact on the process. In addition, many industrial systems already have a surface coating: a thin, hard layer designed to prevent wear. A sensor function can now be added to these coatings. The passive wear-resistant coating thus

becomes an active component in the system. This research project involves coating sensors that measure pressure or temperature.

While the Fraunhofer-Institut has developed sensors for a low temperature range, Sirris develops and researches ceramic sensors that can be active in a high temperature range (500 °C). The final phase of industrial testing is currently in progress. If these tests prove positive, then concrete applications will be developed by partner companies.

LOTTE MARTENS MAKES IMPRESSION WITH INNOVATIVE TILE COATING

Leuven-based fashion designer Lotte Martens has been successfully building up her own label since 2007. Companies and private individuals can come to her for colourful, playful and sustainable prints. But she does not work just on textiles: she also decorates glazed tiles and cups. She decided to enlist the help of Sirris so she could offer her customers customised solutions.

Prints are transferred to hard materials like ceramics using a process called sublimation. At the right temperature and pressure the print on a sheet of paper is transferred to a tile finished with a special coating.

This process is done in-house. Until recently, the tiles to be sublimated were supplied ready-coated.

Tough tiles

When Martens was asked to work with non-standard size tiles she decided to apply the necessary coatings to the tiles herself. Together with the Sirris Smart Coating Application Lab she went looking for the right coating and the optimal process for applying the coating. Various factors had to be taken into account: thickness of the coating, adhesion and quality of the print. The initial tests have been promising.

But the story does not end there: faithful to her spirit of innovation, Lotte is taking it a step further. Recently, she was asked to decorate a school cafeteria with customised wall tiles. And of course these tiles have to be able to withstand some abuse. She also wants the ability to print on outdoor tiles. Which is why, together with Sirris, Lotte is continuing her quest for the optimal, scratch-resistant, anti-bacterial coating.



VAN DEN WEGHE PUSHES THE BOUNDARIES OF NATURAL STONE WITH INNOVATIVE COATING

Van Den Weghe – The Stonecompany (based in East Flanders) has more than 30 years of experience in working with natural stone. To better anticipate its customers' demands, the company decided to look for a way to better protect marble. This is where Sirris's knowledge and expertise are crucial.

When handled improperly marble can end up irreparably damaged. This has a negative impact on ease of use and areas of application. Acids, in particular, react to calcareous stone types, such as marble, and types of marble with an open structure are very sensitive to contamination.

Protective layer

To expand the areas of application for marble, Van Den Weghe joined forces with Sirris to look for an appropriate impregnation or protective layer. The aim was to provide protection and prevent discoloration. Various types of coating were selected and tested on the various types of natural stone. Methodical and objective testing yielded insights into the effects in terms of water repellency, wear resistance, acid resistance, adhesion and condensation. It was found that one specific coating could make the stone water repellent and contaminant repellent.

To achieve acid resistance, however, a slightly glossy sealant coating must be applied. Through further research and testing, Sirris and Van Den Weghe together examined how they could then make the material matt again. Other challenges remain in terms of feel and scratch resistance. Sirris is investigating whether the changes will also achieve the desired result.





'THINGS GO BETTER WITH A COATING' - SMART COATING APPLICATION LAB KICKS OFF SERIES OF ROADSHOWS

At its roadshows - topic-specific workshops organised at various places in Flanders - the Smart Coating Application Lab informs companies about the applications and potential of surface technologies. The Lab aims to bridge the gap between the potential offered by surface technologies and the actual applications. How? By approaching companies in a targeted and proactive manner, and organising regional theme days and innovation events where the focus is on specific innovations and applications.

This approach is new: a live event is linked to the first workshop of each roadshow, at which companies from various sectors can talk about their innovations with coatings or surface treatments and how they yielded added value. A compilation of these testimonials was shown during the other two days of each roadshow. The first roadshow started in October. Topic: "Things go better with a coating". During the workshop Sirris experts and outside specialists provided a general overview of the current possibilities offered by surface treatments on various substrate materials.

The roadshows take place in connection with the "Targeted innovation with functional coatings" project, an initiative of the Sirris Smart Coating Application Lab and Agoria. With this project the Lab aims to make companies aware of the importance of innovating via surface treatments. It wants to show that coatings deliver high added value and that a large number of these technologies is mature and immediately applicable.

Microfabrication and the integration of smart components in products open up a number of interesting new ways for industry to set itself apart and boost its competitiveness. These possibilities include the use of miniaturised components, microstructured surfaces and embedded microsensors. In the Sirris Microfabrication Application Lab (SMALL-Lab) in Seraing-Liège, companies expect all-round expertise and high-tech infrastructure, focusing on miniaturisation in product development, the processing and reproduction of small components, and surface functionalization via microtextures, selective material deposition and embedded microsystems (sensors, light sources, etc.).

#project

/ materials / plastics - smart and small / microfluidics ships

SIRRIS EXCELS IN MICROFLUIDICS

Microfluidics is a technology that makes it possible to manipulate fluids, perform chemical analyses or produce biomedical diagnoses on extremely small chips.

Sirris is currently exploring microfluidics in an extensive range of projects.

Miniaturisation paves way for ever smaller and more powerful components. Thanks to microfluidics extremely small chips can handle complex chemical or biological processes in large volumes of fluids that previously had to be handled in multiple steps. Analyses can be performed more quickly, fewer samples have to be taken and reagent volumes are reduced. This

gives chemists more control over their processes. Additional benefit: for large production runs, the intelligent use of polymers results in significant cost savings.

Control over the entire production process, from A to Z

“Our exhaustive efforts in microfabrication now enable us to take control of the entire production process,” stresses **Denis Vandormael**, Project Manager and the man responsible for the SMALL-Lab at Sirris. With respect to microfluidics chips, Sirris manages the entire process: from design, to the production of prototypes made of polymers, to advanced

functionalisation techniques such as the microprinting of conductors or biological agents.

“Our ambition? Being the reference in microfluidics in Belgium and making end users aware of how this technology can provide answers to the challenges they face. To this end, we wish to deepen cooperation with all stakeholders – end users and manufacturers – and optimise interaction with suppliers.”

#event

/ materials / plastics - smart and small / miniaturisation week

MINIATURISATION WEEK: SMALLER PRODUCTS WITH BIGGER POTENTIAL

The possibilities of miniaturisation for product development appeal to the imagination. From health care to food and logistics, in many industries, smaller devices offer unexpected benefits. Anyone wishing to find out what miniaturisation can mean to their production process would have been well-advised to attend Miniaturisation Week (6-10 October) at the Sirris Microfabrication AppLication Lab (SMALL-Lab) in Seraing.

Smarter and more functional products that are smaller, lighter and thus cheaper to produce, with less waste; that, in a nutshell, is what miniaturisation is all about. This can take

many forms: smart eyeglasses for light- and sound-based therapeutic applications, compact point-of-care devices for bedside diagnostic on patients, minisensors that monitor the freshness of food products, and even the remote tracking of dairy cattle via a collar with a mini-transponder.

During Miniaturisation Week our experts guided visitors – both live and via webinars – through the possibilities of miniaturisation and microfabrication for product development. Inspiration was crucial during this high-tech, five-day workshop: from workshops and virtual guided tours to demo sessions with various

technologies – microinjection, aerosol jet printing, micromachining and microtexturing – and fascinating meetings with innovative product developers.



BASALTE: GROWING QUICKLY IN INNOVATIVE, ENERGY-EFFICIENT HOME AUTOMATION CONCEPTS

Basalte, a young company based in the Ghent region, designs home automation products to make modern homes more comfortable. Their concepts are not only stylish, but also energy-efficient.

For years, Basalte has been working regularly with Sirris via various projects. Which is how its plastic home automation products were first machined. However, demand for Basalte's home automation products has skyrocketed. Aspects such as quality, assembly and disassembly have become increasingly important. Accordingly, it became

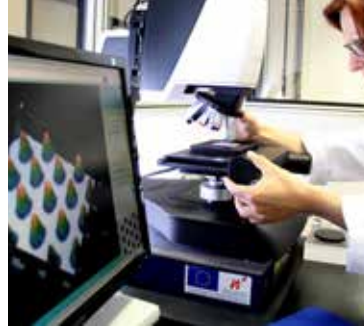
necessary to deploy faster production methods. Injection moulding seemed an attractive option.

Sirris gave advice on the feasibility of plastic injection for the production of home automation components. It also provided the necessary expertise in injection moulds, choice of materials and optimisation of the injection moulding process. This enables production to cope with growing demand using high-end plastic designer products.

On 22 October Basalte won an award in the 'Clean Tech & Energy' category at the Technology Fast50

Competition, organised by Deloitte Belgium, which recognised the 50 fastest-growing Belgian technology companies in the Benelux. Basalte was recognised for its ongoing investment in innovative, energy-efficient designs. It also took third place in the entire competition.





/ materials / plastics - smart and small / microfabrication

THE ENTIRE MICROPRODUCTION PROCESS CHAIN UNDER ONE ROOF

Since 2011 companies can come to learn more about the potential of microfabrication at the Sirris Microfabrication Application Lab (SMALL-Lab). The existing fleet of machines was recently expanded, meaning that the lab's potential can now encompass the entire microprocessing process chain.

A lot is possible with the vertical installation for micro injection moulding: products with microstructures on the surface or in the bulk material (microchannels), thanks to a replication process particularly indicated for mass production, with a precision from 10 mm to 10 µm.

The W-EDM (wire electro discharge machining) unit combines high speed and ultraprecision by using a metal wire with a diameter up to 100 µm as the cutting tool. This enables a surface roughness of 0.4 µm Ra (even less under specific microfinish conditions).

With the micromilling unit, surfaces with a roughness of up to 0.1 µm Ra can be achieved in metal and 0.05 µm Ra in polymers.

Thanks to the combination of these new high-tech devices and the technology already available, such as Aerosol Jet Printing (AJP), it is possible to produce metal mould inserts, micropieces from polymers, to replicate them and to add

intelligence and other functionalities into them. **Denis Vandormael**, manager of SMALL, explains: *"We can mill features to accuracies of just a few microns, reproduce them by injection-moulding, and add material or functionalities by microprinting. This makes it possible to build internal channels into a plastic workpiece, and to fit them with electronics, but also to add functionalities to the surface, such as printed sensors, microchips or LEDs."*

This combination of all the machines and technologies impacting the entire microproduction process chain - and all in one place, to boot - is unique in Belgium. Moving forward, SMALL-Lab will remain open to R&D and companies focusing

on microlevel developments. Denis: *"We are already involved in multiple projects in microfluidics for the bio-industry, and microprocessing of mechanical and optical parts with various technologies. We are also active in 'plastronics', a new domain which adds ever increasing functionalities and more electronics to polymer components. This dovetails fully with the current trend of the Internet of Things, which requires the ability to mass produce multifunctional micro-products. By leveraging our infrastructure, companies can see these requirements met in full."*



SOLUTION SERVICE PROVIDER FOR METAL

An almost unlimited number of metal alloys are used in the technology industry. Sirris has developed extensive expertise in ferrous and non-ferrous metals and their applications, and helps companies choose the most suitable metal for their product or application. The experts provide support not only in choosing the right material, but also during the entire process, from product development and processing to the characterisation of properties and testing the workpiece

P80 > P84 ▲ METAL MOULDING

#infrastructure

/ materials / metal moulding / semisolid metal

PIONEER IN THREE AREAS OF EXPERTISE WITH METAL

For three specific metal processing technologies - all of which fall under the heading of metal moulding - Sirris can call itself a pioneer thanks to its years of experience and extensive research and experimentation - together with companies, supported by the most recent equipment: cast-moulding technology, thixomoulding and metal injection moulding (MIM).

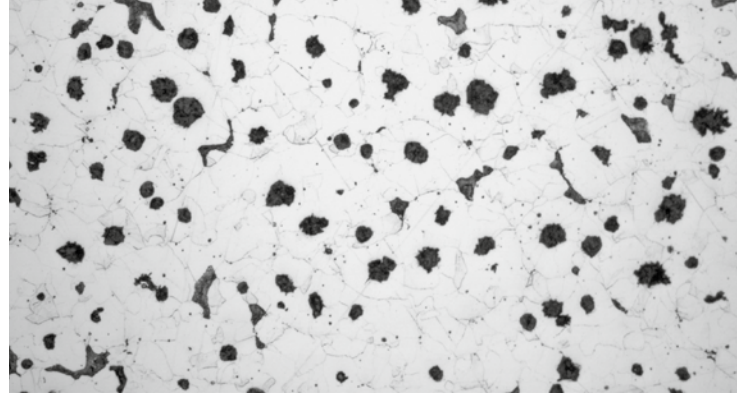
Our know-how in **casting technology** is broad and encompasses support in developing new cast alloys (such as Si-alloyed cast iron), optimising casting processes, process development and

control, deploying first time right and redesigning welding structures into cast pieces. We have the state-of-the-art infrastructure we need to perform these services: our pilot foundry with two high-tech furnaces for 300 kg and 80 kg. For measuring and testing we have an extensive laboratory for metallographic, chemical and mechanical characterisation.

Sirris has already performed a great deal of research in **thixomoulding** and, for some time now, has had a machine for processing magnesium in a semi-solid state. The thixo-testing machine at the Seraing site is used to demonstrate

the full cycle, from choosing the alloy to recycling the magnesium.

Metal injection moulding (MIM) is a near net shape technology that is very similar to the injection moulding of plastic. The technology offers many possibilities for the mass production of complex and small products. And its area of application is vast. Sirris has been actively involved in this technology for more than 10 years.



SI-STRENGTHENED DUCTILE IRON, A MATERIAL WITH UNIQUE PROPERTIES

As part of a research project Sirris was able to transfer the casting of a new variant of silicon-alloyed ductile iron from lab to practice. The reliability and reproducibility of the casting process were optimised and tested out at a few foundries.

Benjamin Vandeputte, Program Manager Metals at Sirris, explains the benefit of the new variant of ductile iron: *“Ductile iron offers a good combination of strength and toughness. Now we are going a step further by improving*

the fatigue and machining properties of this alloy by adding extra silicon (Si) to it. We are aiming to achieve a pure ferritic matrix, which, compared to the conventional ferrite-pearlite matrix, offers major advantages for machining (turning, milling) as well as better resistance under cyclical loads. As a result, wall thickness can be reduced, which in turn means lower weights and lower material costs.”

Developing know-how

The R&D for Si-strengthened iron took place in Sweden. Since this material has a lot of potential for foundries and their customers, and it can be made without more expensive processing, Sirris put it into practice.

Sirris systematically built up its know-how at the pilot foundry in Zwijnaarde. **Benjamin Vandeputte** continues: *“Using this know-how, DSPC and Fonderie et Mécanique de la Sambre (FMS), two foundries, were the first in Belgium to*

produce casts from this alloy. We expect that ultimately around 20 to 25% of the foundries in Belgium will be able to offer Si-strengthened ductile iron.” Sirris helps companies to quickly take on board this know-how

3D SAND PRINTING, AN INTERESTING ADDITION TO CONVENTIONAL CASTING TECHNIQUES

3D sand printing is useful for quickly producing complex castings. Sirris researched the economic feasibility and some of the technological aspects of the process, enabling it to prove its potential as an addition to confirmed casting technologies.

A conventional casting environment uses models made of wood, plastic, wax, expanded polystyrene and other materials. For large production runs this remains an appropriate and cost-efficient process. For smaller runs, however, the costs of models quickly skyrocket, making alternatives desirable. **Benjamin Vandeputte** is Program Manager Metals

at Sirris. He coordinated the '3D sand printing' project and explains the possibilities: *"3D printing is the emerging production method for small runs and complex parts."* Printing forms in sand enables you to quickly and flexibly anticipate customer requirements. The turnaround time of this process is very short since no models have to be produced.

Lower cost

3D sand printing is especially valuable for castings produced in very small runs. Benjamin Vandeputte: *"With conventional techniques metal casting would be too expensive."* 3D sand printing is, he says, usable across an entire

range of applications. In the meantime, the research has shown that it is economically feasible. Complexity, volume and production run size were examined to determine where the new technology has a future. Sirris also researched the technical feasibility of the process, including dimensional aspects and surface roughness. The research enabled Benjamin Vandeputte to conclude that *"3D sand printing is an attractive and promising addition to existing techniques."*



BRAND NEW FACILITY SUPPORTS THE FOUNDRY OF THE FUTURE

For years now, Sirris has been offering technological support to the foundry industry, its customers and other companies active in the processing of such materials. It wants to continue developing this in the future. That is why it invested in two new induction furnaces that can be used to further expand the services offered by the pilot foundry.

After a thorough and extensive preliminary study based on current trends and the current and future needs of the foundry

sector, two new induction furnaces (300 kg and 80 kg) were acquired and installed in the Metallurgy shop floor on the Zwijnaarde site. This was done via a cooperative effort within MRC, the Ghent-based metal cluster Sirris is a partner of. The units were installed quickly thanks to solid preparation and smooth cooperation. The initial preliminary and acceptance tests also went perfectly. The new pilot foundry will be officially inaugurated in the spring of 2015.



SIRRIS DEVELOPS COATING TO MAKE CALCIUM INJECTION IN STEEL MORE EFFICIENT



To improve the efficiency of calcium as an additive in the metallurgical process, under the European Hotwire project new products and equipment were developed that are capable of improving the efficiency of the calcium treatment of liquid steel. Sirris developed a special coating.

Metallic calcium is an important additive in the metallurgical process for converting insoluble inclusions of mainly aluminium oxides to soluble oxides with a lower melting point, so as not to block openings in castings. It is added as the core of a steel injection wire. But calcium's low density, its limited solubility in steel

and the fact that it is gaseous at the temperature of liquid steel mean that only a small part of the injected calcium does what it is supposed to do. To increase efficiency, the injection wire must penetrate deeper into the liquid steel bath before the calcium is released.

Consequently, Hotwire aimed to develop an injection wire with a special coating that ensures that the steel casing remains intact longer, thus taking longer before the calcium is released. In addition, a new, moving feed system for the injection wire was developed, so that the calcium is distributed better when it is released.

This helps to further increase efficiency.

A consortium of European companies - Injection Alloys, Altek, Indestructible Paints, Welding Alloys and Nanolayer Coating Technologies - and research partners ISRI and Sirris carried out the two-year project. Sirris deployed a multidisciplinary team led by **Walter Lauwerens** from the Smart Coating Application Lab: *"Our most important task was to develop a special coating. That required the cooperation of experts in functional coatings, metallurgical processes and virtual engineering in order to link the results of specific laboratory tests to the*

industrial injection process. Sirris succeeded in developing an appropriate, heat-resistant, insulating coating, and showed that the depth at which calcium is released increased by at least a factor of two."

Injection Alloys is currently working on the manufacturing process and once the new, high-efficiency injection wire is launched on the market, the steel industry will be able to lower costs due to lower use of raw materials and energy.

JTEKT PERFORMS HEAT TREATMENT ON STEEL GEARS IN-HOUSE

JTEKT Europe, based in Strépy-Bracquegnies, produces slip differentials for four-wheel drive cars. These differentials distribute the power from the engine between the front and rear wheels or between the left and right wheels in order to improve the car's driving dynamics. They are fully mechanical in nature and consist of a series of small, complex steel gears with internal and external teeth.

The company is aiming for the high-end range and wanted to continue delivering top-end products at an acceptable price. For strategic reasons, JTEKT decided to perform

some of the heat treatment on components in-house, since it had previously outsourced all heat treatments. Since it had no knowledge in this area, Sirris was called in due to its years of experience in heat treatment and its extensive network. Sirris ensured that the right expertise was found.

Retrofitting furnaces

It was a major challenge because JTEKT not only wanted to upgrade a few existing furnaces from another site, but also wanted the furnaces to be ready within just a few months.

Sirris provided support throughout the entire process

and gave advice on choices made during the retrofit operation. First, a facility map was produced with the full layout of the new heat treatment department in the existing factory. Sirris also provided the appropriate support for operators by delivering targeted training for engineers and operators. Quality assurance in the lab was also thoroughly audited and changes suggested so as to comply with the parent company's stringent requirements.

Thanks to this smooth cooperation and intensive support the necessary know-how was soon available

in-house and the company quickly started getting results. After just 12 months, it passed an audit performed on behalf of one of its customers and in-house heat treatment operations could officially begin.



Nanotechnology is a generic term used to describe applications in various scientific domains, but it also applies generally to the design, manufacture and characterisation of - as well as research into - existing principles and technical properties on a nanometric scale. Sirris developed its activities in the design and characterisation of nanomaterials. Nanomaterials change the physicochemical properties of the base material. There are numerous industrial applications in many industries, including electronics, aviation, sustainable energy, chemicals, polymer processing, automotive, construction, foods, cosmetics and more.

#project

/ materials / nanotechnology / nanoparticles

NANOPARTICLES IN METALS

How can nanoparticles be integrated into metal matrices in a uniform and controlled manner? Sirris examined the question and developed an innovative method for which it has in the meantime applied for a patent.

Producing metal nanocomposites is extremely delicate work. Nano-objects have an unfortunate tendency to form aggregates and agglomerates, or to rise to the surface when they are mixed with liquid metals. To counter this, Sirris developed an integration method that makes it possible to produce

master batches made of nanocomposites. They then simply need to be added to the unloaded composite metals. This smart approach makes it possible to produce homogeneous composites, while preventing a situation where the end user has to deal only with nanomaterials in powder form. In short: a pioneering method for which Sirris immediately applied for a patent.

Information cell

This new development by Sirris illustrates the major developments being made in the production

of nanocomposites. But nanomaterials are also used in other domains. To ensure smooth implementation and processing, it is important for standards and regulations to continue evolving appropriately. Which is why we joined forces with the Belgian Ceramic Industry Scientific Research Centre (CWOBKN) to set up a 'standards cell'. Industrial players who want to keep abreast of the latest news in this domain can contact the unit for more information.

#project

[/ materials / nanotechnology / nanoregister](#)

STANDARDS, REGULATIONS AND NANOREGISTER

Nanomaterials are taking our industry by storm. That makes keeping up with the regulations and news in this domain a real challenge. Which is why Sirris set up a unit that collates and disseminates all relevant information.

Sirris is coordinating a 'standards cell' for nanomaterials. The goal? Centralise information so that it can then be more efficiently distributed to industrial professionals. To that end we are developing a knowledge database containing not only regulations applicable to

nanotechnology, but also all documentation pertaining to the prevailing standards.

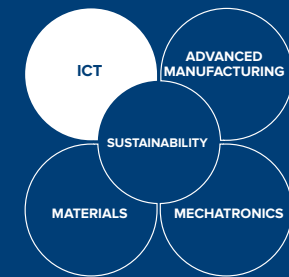
To set up the cell, Sirris joined forces with the Belgian Ceramic Industry Scientific Research Centre (CWOBKN). We share our experience in safety and environmental protection with respect to nanomaterials, while the CWOBKN advises the industry on current and future standards.

Target: 1 January 2016

The unit focuses on the nanomaterials register, the implementation of which

was set out in the Royal Decree of February 2014. Under the Royal Decree, as of 1 January 2016 producers will be required to register any materials and blends containing nano-objects.

ICT



SOFTWARE IS EATING THE WORLD

Many companies are reinventing themselves under the influence of global digitisation (SaaS, cloud, mobile, data).

But anticipating the latest ICT trends requires a well-considered approach. Via research, masterclasses and consultancy, Sirris's ICT group makes the Belgian technology industry fully familiar with the innovative potential of ICT in various products and services. Our experts can help companies make the transformation towards SaaS, the cloud and mobile, focusing on their specific products, their business model, go-to-market strategy and organisation.

#project

/ ICT / software engineering & go-to-market / katalICT

KATALICT SUPPORTS SOFTWARE DEVELOPERS

Sirris joined forces with Agoria to set up KATALICT, a project to support software developers on many levels. How do you drive innovation and product development to a higher level? How do you prepare your company to develop a broader portfolio of software products? And how do you ensure that your company continues to grow and that the time between product design and market launch is as short as possible? These are just a few examples of the questions which KATALICT can answer through individual coaching and consultancy.

More than 1,100 Belgian companies have signed up for the initiative. This puts KATALICT in third place globally, right after similar organisations in Paris and San Francisco, each of which has around 2,000 members.

Nice figures

All in all, 19 KATALICT experts – including driving forces Ingrid Reynaert (Agoria) and Omar Mohout (Sirris) – carried out no fewer than 80 company visits in 2014. Together they delivered 160 customised advisory reports and guided 10 software developers through a personally designed in-depth audit. There

were also plenty of events in 2014. These included events on growth hacking (read more on page 90), lean manufacturing and price strategies for start-ups.

ICT
THEMES

90>91
SOFTWARE
ENGINEERING
& GO-TO MARKET

92>95
CLOUD COMPUTING
& SAAS

96>99
DATA INNOVATION

With software built into more and more products and ICT playing a crucial role in countless industries, software companies are facing new challenges. The days when bringing ICT innovations to market was solely an 'engineering problem' are long gone. To be successful, companies today have to pay extra attention to their go-to-market processes: how can they best bring their products to market and earn money from them? Sirris is anticipating this development by working closely with companies to thoroughly examine the engineering component while working on an optimal go-to-market approach.

#event

/ ICT / software engineering & go-to-market / growth hacking



KATALICT'S HIGHLY APPRECIATED GROWTH HACKING SESSIONS

The KATALICT project had a busy schedule of events in 2014. From information sessions on lean manufacturing to workshops on pricing: experienced software players and ambitious start-ups alike found plenty of interest in the extensive list of topics covered. Did anything in particular stand out? The workshops and information sessions on growth hacking organised by Omar Mohout, Growth Engineer at Sirris.

Last year nearly 1,100 software developers attended dozens of Growth Hacking Meetups in Antwerp, Brussels, Ghent, Leuven, Geel, Hasselt and Kortrijk. Three experts talked about important aspects of growth hacking, the art of using minimum resources to get businesses – especially start-ups – growing.

Lots of tips

The advice all focused on the key factors in growth hacking: looking for growth drivers via APIs, virality and crowdsourcing. By building a community around the product or service, young companies

can scale up more quickly. Deploying a combination of technology and communities makes businesses hyper-scalable, which means small teams can have a global impact.



MOVILITAS CREATES 200 SALES OPPORTUNITIES PER DAY VIA GROWTH HACKING

In Perk, located in the 'green belt' around Brussels, 200 experienced SAP consultants work at the Belgian division of Movilitas. These experts in logistics management, manufacturing and traceability support companies in such industries as pharmaceuticals, food and aviation. Their mission? Help companies to monitor their supply chains optimally, efficiently and transparently, for example to limit knock-offs. In an effort to support its ongoing growth, the company consulted Sirris.

Last year Movilitas entered into a partnership with Sirris and technology federation Agoria.

The aim was ambitious indeed: promote ongoing growth through growth hacking. This recent, alternative marketing technique enables companies to grow with almost no budget. Conventional marketing concepts give way to creativity, analytical thinking and metrics. Traditional techniques are supplemented with specially designed data models, extensive A/B market research testing and social media platforms.

Immense reach for little money

"Together with Sirris we developed a new growth hacking concept and software

platform", says Dieter Laevers, Managing Partner at Movilitas. "We also use our employees' social media network for our own marketing communication. They have around 900 contacts in their network on average, and that soon expands into a reach of 90,000 people."

"During the initial project Movilitas racked up 200 business opportunities in just one day", says Omar Mohout, Software Engineering & ICT Advisor at Sirris. "Via traditional channels the company would have needed 50 to 100 campaigns to achieve that, at a cost rapidly approaching €1

million". In short, in addition to a marketable growth-hacking platform Movilitas was also able to create a lot of online visibility with a minimum of resources.

Storing data online 'in the cloud' has many benefits for companies: all data are available, no more need to invest in back-ups and servers. Even updates are a thing of the past. The situation is different for developers and software applications. Whereas in the past they simply developed and sold software, now they have to deliver their software 'as a service'. Customers want access to their data from anywhere and at any time. This means that today software developers not only need to challenge their technology, but their entire business model. Thanks to years of experience and close cooperation with international partners, Sirris helps both existing companies and start-ups make the transition to the cloud.

#case

/ ICT / cloud computing & saas / inventive designers

ADVISORY BOARD GUIDES INVENTIVE DESIGNERS TOWARDS THE CLOUD

Many contracts, e-mails and invoices from banks and government authorities are generated with software developed by Antwerp-based Inventive Designers. So far, the company has only offered the software on-site. But if it is to continue growing, then it will have to transition to Software as a Service (SaaS). To facilitate the process, the company entered into a long-term relationship with Sirris. This involved setting up an advisory board of experts, among other things.

Transitioning from a system with software licences to a SaaS application requires not just a different way of

developing software, but also a different way of doing business. Which is why Inventive Designers made full use of Sirris's insights and advice and signed up for the My Software as a Service bootcamp. There it learned the fundamentals, but it soon became clear that this kind of transition has an impact on the company's entire business model, not just on the software.

Head in the clouds

This presented two challenges for Inventive Designers.

Nick Boucart, Senior Advisor Software Engineering & ICT at Sirris: *"Firstly, the existing software suite was not developed with a SaaS model in mind.*

Secondly, the type of customer targeted by cloud services is not necessarily the same as for an on-site product. In addition, there is still some reluctance in Belgium."

To ensure a smooth transition, Inventive Designers set up an advisory board with Sirris and Agoria's 'My Advisory Board' service. The board comprises a group of experts, including entrepreneur and Sirris advisor Omar Mohout. Boucart: *"Three to five experts sit on an advisory board, each with a specific function."* The advisory board meets four times a year to discuss progress made and the next steps to take.

LEAN STARTUP AS A GUIDELINE FOR SAAS AT ACSONE

As a software integrator Acsone focuses on developing customised business software applications. This is a highly labour-intensive business model that is hard to scale, a situation that encouraged the Brussels-based company to change direction. Sirris helped it make the transition from custom software to a standard Software as a Service (SaaS) product in the construction market. Via a series of Sirris workshops Acsone mastered lean startup methodology.

There is a world of difference between developing custom software and a standard SaaS application. The former requires not only the relevant

IT skills, but also significant project and account management expertise. On the other hand, selling an IT application requires a totally different business model. So Acsone had to start from scratch by accurately defining the actual product, market segment and price.

Rollout in stages

“Shifting from a service to a product entails a lot of risks”, says Nick Boucart (Senior Advisor Software Engineering & ICT at Sirris). “To minimise those risks, we organised workshops to familiarise Acsone with lean startup principles. We showed them how to effectively define their target

group and product specifications so that they could then market the application in a step-by-step fashion.”

Sirris also organised a test session with potential customers and provided training in lean pricing, a hot topic in new product development. As a result, Acsone was able to roll out its first version of a scalable application quite quickly. In line with the lean startup philosophy the company asked for a lot of feedback from its 'early adopters' and regularly updated the application. In the meantime, these lean strategies have already led to attractive new customers in the construction industry.

NEBUCOM SHOWS DEVELOPERS THE WAY TO THE CLOUD

Cloud computing is not just an unstoppable trend, but it is bringing SaaS (Software as a Service) along in its wake. Realising that they cannot afford to fall behind, Belgian software developers are increasingly opting for a SaaS business model. In 2014 Sirris launched a series of bootcamps to help them take their first steps in this area.

SaaS requires a totally new approach. Development, implementation, support and marketing have their own logic. The traditional model, where each customer installs his own copy of a software package, is giving way to a single centrally managed application in the cloud. A sales strategy based on licences is transitioning to monthly or yearly subscriptions, or volume-based billing. That means software developers need to revamp not only

their product, but all of the associated processes too.

Holistic approach

Sirris joined forces with Agoria, iMinds and LSEC to support Belgian software companies in this challenging transition. Together we set up NebuCom, a competence centre. Companies can consult NebuCom for practical bootcamps that give them a solid foundation on which they can build their business model.

NebuCom swears by a holistic approach which, in addition to purely technological challenges, also looks at organisational and operational aspects of a streamlined SaaS business. Experts in pricing, legal issues and product development share their expertise and experience at specialised bootcamps.



A DIGITAL PLATFORM FOR COOPERATION IN URBAN DEVELOPMENT

By 2020 around five billion people worldwide will be living in urban areas. Efficient ICT tools will be more crucial than ever for sustainable urban development, with input coming from all stakeholders. The C³PO platform aims to provide an answer.

The C³PO platform studies the creation of urban development projects. It does this through close cooperation with all stakeholders, such as citizens, regional and urban authorities, architects and property developers. C³PO will be a forum for information (on current and future urban build-up, road networks, utilities,

etc.) and support for the various processes associated with urban development. The platform will make it possible to not only visualise projects, but will also enable users to simulate and evaluate the impact of various scenarios in terms of costs, mobility, pollution, etc..

A win-win for all stakeholders

Sirris has been involved in this European project right from the start. **Philippe Thiran**, Cloud Computing Coordinator, explains more about the role played by Sirris: “From defining innovation goals, to mapping out the necessary technology and expertise, to seeking out industrial and municipal

partners: Sirris was one of the most important drivers behind this project, in close cooperation with the other participating countries (Turkey and Finland). In Belgium, our contribution included supporting our consortium partners in developing various infrastructure aspects. At European level Sirris handled technical coordination and consulted, where necessary, with W3C on standardisation.”

Ultimately, this project can make the urban development decision-making process faster and cheaper. Better planning will make the risks involved in large projects more manageable. Citizens

will play a more active role in the decision-making process, which in turn will increase involvement in the city where they live.

IAAS BREAKFAST SESSIONS: 'FOCUS ON YOUR BUSINESS, LEAVE YOUR IT INFRASTRUCTURE TO THE CLOUD'

In connection with the **Nebucom project, in late 2013 Sirris and Agoria launched a series of breakfast sessions on IaaS (Infrastructure as a Service, a cloud computing service model), where major international service providers provide relevant information on IaaS and answer questions – including technical questions – raised by the attendees. The international companies in question are major players: Amazon, Rackspace, IBM and CSC. Key players from Belgium also presented their solutions.**

Two independent Belgian cloud computing

experts – Frederik Dekens (Skyscrapers) and Daniel Bartz (ComodIT) – informed attendees what IaaS can currently offer them. They gave an overview of the IaaS solutions that came up in the previous four sessions, specifically for the Belgian market. For the sessions, Sirris and Agoria also brought in speakers from leading Belgian cloud service companies, such as Combell, People & Technology and Stone Internet Services. One after the other they shared their vision and ideas about a high-performance cloud infrastructure. They were also supported by independent experts: Toon Vanagt (data.

be), Daniel Bartz (ComodIT & Guardis), Nick Boucart (Sirris) and Bart Meert (Agoria). These independent experts also gave a clear overview of the IaaS solutions mentioned during the previous four sessions.

Nick Boucart, Senior Advisor Software Engineering & ICT, recalls: "*The IaaS breakfast sessions gave me a good idea of the current situation and the roadmap for the leading IaaS players. It's not every day you get the chance to hear first-hand from big names like RackSpace, Amazon and IBM what their view of the cloud market is in general, and IaaS in particular. I was especially*



surprised by the support these players provide for developers who want to work with their solutions."

More and more innovations using software or sensors are based on the efficient exploitation of large quantities of data. Our ICT experts provide companies with information and training, as well as individual support for optimal data use and exploitation. We enable them to examine the potential of using ICT to innovate and help them to concretely deploy data and big data technology.

P96 > P99 ▲ DATA INNOVATION



#project

/ ICT / data innovation / elucidata

ELUCIDATA SHEDS LIGHT ON THE DATA-DRIVEN ECONOMY

Sirris, Agoria, KU Leuven and IWT launched EluciDATA in November. The aim of the project? To encourage data innovation at companies and support them in implementing their projects. How? By bundling know-how and expertise, developing representative demos and offering specialist training.

The potential offered by data is enormous and the technology for exploiting data is advancing continually. Yet most Flemish companies do not fully exploit this potential. Overwhelmed by the data-intensive environment in which they operate, they often do not know what exactly such data

can mean to them.

Clearer goals

To reverse that trend, the EluciDATA project proposed a number of specific innovation goals. **Elena Tsiporkova**, Team Leader Data Innovation at Sirris: “Via feasibility studies and consultancy we help companies to better assess the potential of data within their context and the associated challenges and risks.” By developing concrete proofs of concept, we also make the potential of data-innovation tangible and we show examples that can help companies translate general big data success stories into concrete solutions relevant to them.”

“We also offer a platform for industrial interaction, the aim being to transfer knowledge and expertise via specialised training courses, workshops and symposiums. This is done in cooperation with technology experts from our extensive network.”



#project

/ ICT / data innovation / astute

ASTUTE: ACUTENESS IN DATA-INTENSIVE ENVIRONMENTS

How can we improve the way people deal with complex and gigantic quantities of data? That question was the starting point for ASTUTE, the now completed European research project. From March 2011 to May 2014, Sirris, its international partners and a number of top players from Belgian industry joined forces to successfully answer this question.

Other ASTUTE participants – in addition to Sirris and partners – included the Belgian companies IOS International (specialising in asset management), Luciad

(software components for analysis and visualisation) and Namahn (usability and human-centred design). The focus was on developing advanced, proactive man-machine interfaces and logic algorithms. They support machine operators, dispatchers and other staff in data-intensive environments.

Emergencia

The approach developed by ASTUTE was tested out with end users via various demonstration applications. One is the Emergencia software package, which helps

crisis managers make the right decision at the right time. Even in other researched domains – such as production, aviation and the automotive industry – ASTUTE succeeded in offering better, proactive support for the performance of complex and time-critical tasks.

Crowning glory

ASTUTE's ultimate goal was to create a platform for building smart, embedded applications that respond appropriately to users' needs. This research design garnered a lot of approval at the ITEA-ARTEMIS Co-Summit 2015 (10-11 March).

The project won an award for its successful completion and achievements, forming the basis for a new generation of industrial products and services by the participating partners.



DATA IS THE KEY TO PREVENTIVE MAINTENANCE

Machines, vehicles, renewable energy sources and their environment are monitored continually by smart sensors. The result is a flood of data showing usage history, operational status, movements and various other characteristics. To enable companies to fully harness and benefit from this data, Sirris is currently running two research projects: Mantis and Doctiris.

Clear analyses with Doctiris

Doctiris is a Sirris-run doctoral research project - in conjunction with industrial partner 3E and academic partner Université Libre de Bruxelles - on large-scale preventive analyses. The project focuses on the potential offered by the Internet of Things, which enables companies to monitor machines and infrastructure remotely via sensors. The aim of the Doctiris project is to develop and test data analysis methods for the preventive maintenance of solar panels. This increases the operating time of solar power units, while reducing maintenance costs.

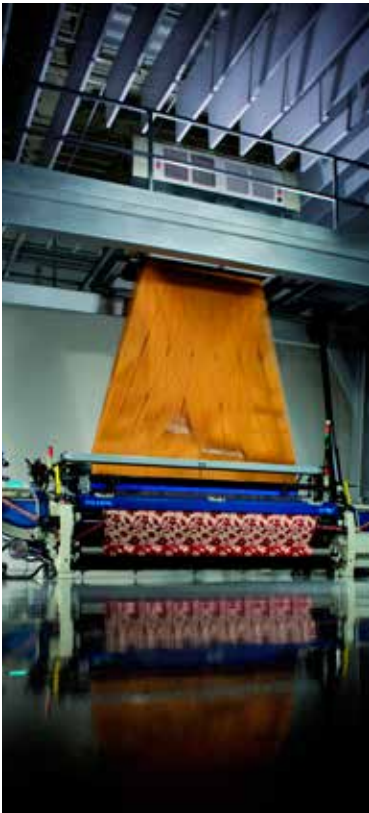
Mantis: huge leaps in data analysis

1 May 2015 marked the start of Mantis: a large-scale European project involving more than 50 partners and set to run until April 2018. The goal? Build a service platform for preventive maintenance for industrial machines based on the concept of 'cyber-physical systems'. The aim is to be able to convert raw data from distributed machines, sensors, planning systems and maintenance systems into knowledge, making it possible to better estimate the future performance of these machines, predict and address operational inefficiencies,

and better plan proactive maintenance.

With both Doctiris and Mantis, Sirris aims to further stimulate companies' availability, competitiveness, growth and sustainability through the targeted and advanced exploitation of data. The findings from both projects will be applicable in a wide range of industrial sectors and maintenance domains.

COLLABORATIVE ANALYTICS PLATFORM OPENS DIGITAL DIALOGUE AT PICANOL



Picanol specialises in the development, production and sale of high-tech weaving machines. Increasingly, these machines are capturing large quantities of operational data and settings that could generate a lot of useful information. How all this data can best be converted into useful data-driven services has been the subject of a two-year intensive dialogue between Picanol and Sirris.

When it comes to digital interaction with machines in the field, Picanol – like many other companies – is finding itself in uncharted territory. How can innovations be embedded in existing production lines and

services? Which technology can be deployed? And how can all this be presented to customers?

Technology Adoption Coaching

Sirris provides Technology Adoption Coaching to help explain how to maximally exploit the opportunities offered by digitisation. The focus is not just on implementation, but mainly on optimally exploiting new technology. *“It is an interactive process, where cooperation and exchange of knowledge and know-how are crucial”*, explains **Steven Van den Berghe** (Senior Advisor Software Engineering & ICT at Sirris). In addition to architectural

studies, it also includes experiments with data interaction and visualisation, among other things.

Collaborative Analytics Platform

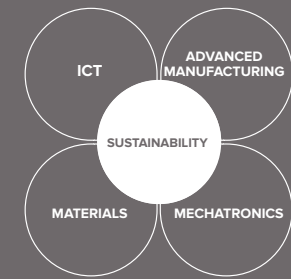
One specific example is the Collaborative Analytics Platform project (CAP). The data from the weaving machines, and the surrounding know-how, are collected in a central ‘data lake’. Thanks to the CAP platform, people with different backgrounds and different kinds of expertise can work more efficiently on the centralised data.

“Machines these days are very complex,” Steven adds.

“Optimising and integrating them requires a lot of detailed knowledge that is often spread out among different experts. CAP enables them to interact with the data, sometimes even remotely. This makes it possible to offer new, high-quality digital services in addition to the machines. The collected data also give valuable insights into the operation and use of features, opening up new opportunities for the future.”

SUSTAINABILITY

Investing in sustainability is not just a cost. Sustainable innovation leads to new opportunities, new markets and new services. Sirris offers companies support in this domain, with both strategic and technological advice, from idea to implementation.



Applying lifecycle thinking and circular models can yield greater sustainability and extra profit. That is why ever more companies are considering ecodesign, sustainable production processes and sustainable business models.

P101 > P102 ▲ SUSTAINABLE MATERIALS

#project

/ sustainability / sustainable materials / baby bottle



SECOND LIFE FOR BABY BOTTLES THANKS TO BABY BOTTLE REBORN

While baby bottles in hospitals used to end up in the incinerator after a single use, they can now be recycled and start a new life. A fine example of cooperation in the value chain that is ready for wider implementation across the entire country.

Every year hospitals throw out huge quantities of single-use baby bottles and breast pump sets. With the help of Sirris, UZ Leuven (Gasthuisberg campus) launched a test project to give these polypropylene bottles from the maternity ward a new life. **Stefan Milis**, Sustainability Coordinator at Sirris: *"Prices of materials are rising, as is the cost of processing hospital waste. Ten million baby bottles*

are incinerated in Belgium every year. Together with UZ Leuven we examined how we could reorganise this harmful and finite cycle into something sustainable by sorting and recycling the used bottles."

From partner to stakeholder

In addition to UZ Leuven, many partners worked together to make the project a success: Febem, Plastic Productions, SuMMa, OVAM, Fost Plus, Indaver, Van Gansewinkel and KRAS Recycling. Thanks to Fost Plus the test project had an opportunity to use the existing logistical flows for plastic, metal and drinking cartons.

In the hospital, the major focus

was on staff. Milis: *"The focus was on changing behaviours and motivation, bearing in mind the very high workload! We introduced new sorting rules, which are now properly monitored."*

"Now that sorting has been introduced in all departments, we are ready to further share to work towards applying this idea across the country." The aim is to collect and recycle up to 80% of all bottles.

SUSTAINABILITY THEMES

101>102
SUSTAINABLE
MATERIALS

101>103
WIND ENERGY

MATERIAL SCANS MAKE THE INVISIBLE VISIBLE AGAIN

Production companies often have major material flows. Unfortunately, they sometimes forget to check whether these flows are efficient, or whether raw materials are wasted and what waste is produced. Sirris uses a materials audit that was commissioned by OVAM and Agentschap Ondernemen (Enterprise Flanders). The audit helps companies to map their material flows. And to make the flow more sustainable and profitable.

It may be surprising, but many production companies do not have a clear overview of their material flows. What is coming in? And what is going out as a

product, emission or waste? This knowledge is not only meaningful because materials account for a large proportion of the price, but also because a clear overview can help optimise flows. **Thomas Vandenhaute**, Sustainability Project Leader at Sirris: *“Producing a material balance helps companies to clearly map out material flows, as well as their direct and indirect costs and environmental impact.”*

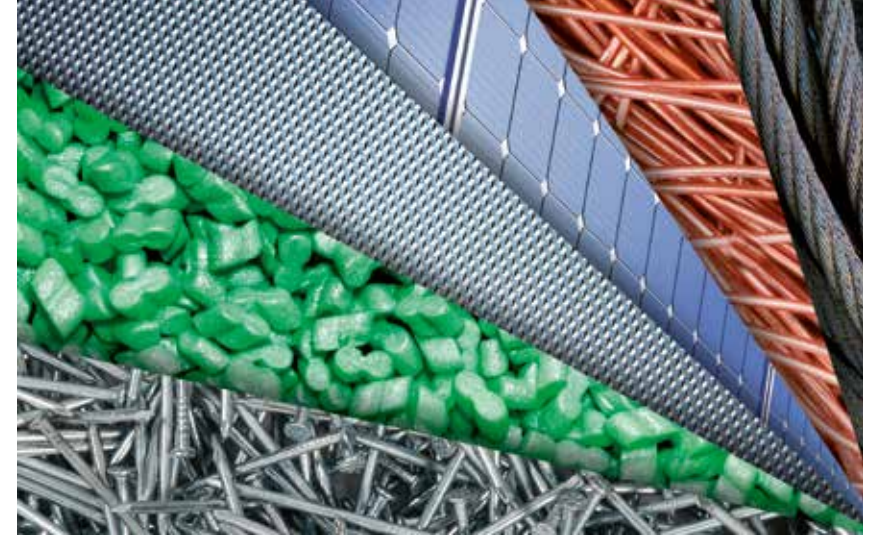
From a sustainability standpoint this kind of audit offers enormous opportunities. Vandenhaute: *“Because they also reveal hidden environmental impacts and*

costs, such as the added value of output that ends up as waste. There is a lot of potential for improving efficiency. Our audits fit perfectly with the circular economy by identifying useful side-flows and helping to find customers for them.”

Time for action

The audit not only analyses, but also helps companies by providing concrete advice: how can you deal with materials more effectively and efficiently? For example, the in-depth analysis zooms in on the options for using recycled raw materials and on the exploitation of waste flows. Vandenhaute: *“Our audits*

really help companies lower their production costs. You could see them as a first step towards the sustainable use of materials.”



Measuring, testing and interpreting/modelling data are important in efforts to make wind power cheaper and more reliable. OWI Lab deploys its versatile measuring systems and advanced data analysis for measuring and monitoring studies in wind farms. It also has the largest climate chamber in Europe for testing wind turbine components under extreme conditions.

P103 > P105 ▲ WIND ENERGY

#case

/ sustainability / wind energy / ZF Wind Power



ZF GEARBOXES RELIABLE EVEN UNDER EXTREME CONDITIONS

Wind power is the energy of the future. But wind turbines must be reliable. Even under extreme weather conditions. To that end, Sirris's OWI Lab tested ZF's 80-tonne gearboxes in its unique climate chamber at the port of Antwerp.

The OWI Lab – focusing on R&D for wind power – is a spearhead within the Sustainability expertise domain. Reliable wind turbines have a direct impact on both energy output and operating costs. That means that testing critical components is very important. ZF Wind

Power Antwerpen delivers gearboxes for more than 2,000 wind turbines per year, 49 GW of wind energy capacity worldwide uses components supplied by this Flemish world player. The company is also a leader in very large gearboxes (> 6 MW) used in offshore wind turbines. A prototype of this gearbox was tested in the OWI Lab climate chamber. **Martijn Roozendaal**, OWI Lab test technician, is proud of this test: *“This was the first test for offshore wind turbines of this size in our climate chamber. Previously, we had only tested onshore gearboxes.”*

80 tonnes

The OWI Lab took up the challenge and tested the absolute state-of-the-art of what will be installed in the North Sea: a gearbox weighing in at nearly 80 tonnes, capable of generating 6.15 MW. The component was tested at temperatures of -30 °C and 0 °C using the OWI Lab test bench and data acquisition system.

For ZF, testing it under extreme weather conditions is absolutely necessary. But the turbines keep getting bigger and so it is increasingly difficult to find appropriate testing facilities.

Roozendaal: *“Our unique climate chamber was the ideal solution for these kinds of tests.”* The Sirris climate chamber can offer temperatures from -60 °C to +60 °C, reproducing the extreme conditions under which the wind turbines have to operate sometimes. The heavy gearboxes are now ready for duty in the North Sea.



CG SIMULTANEOUSLY TESTS TRANSFORMERS UNDER EXTREME CIRCUMSTANCES

CG Power Systems, a manufacturer of transformers for onshore and offshore wind turbines, wanted to test its transformers under extreme weather conditions. And to have these tests performed simultaneously for various versions. An ideal task for Sirris's OWI Lab.

Not only the gearboxes of wind turbines are subject to extreme stresses. Transformers are also a critical component. CG Power Systems, a manufacturer of such transformers, was looking for a partner to test its transformers under extreme

conditions. It found that partner in Sirris. **Pieter Jan Jordaens**, Project Leader at Sirris, explains: “CG Power Systems uses our large climate chamber regularly to test and validate its transformers. The aim is to test reliability at very high temperatures and at cold startup.” The tests are performed at temperatures ranging from -40 °C to +50 °C.

Simultaneous

Sirris's climate chamber offers an extra benefit for CG Power Systems: it is big enough to test multiple transformers simultaneously. Jordaens: “*Simultaneous*

testing is interesting if you want to test multiple product versions under identical conditions.” Tests can be immediately compared. That means a double benefit.



OWI LAB MEASURES VIBRATIONS IN OFFSHORE SUBSTATIONS

Since offshore high-voltage substations (OHVS) are located at sea, they are subject to wind, waves and currents. These excitations create vibrations that can have an impact on the lifetime and dynamic behaviour of various components. These were mapped via a measurement project carried out by the OWI Lab.

Offshore wind turbines transmit their electricity to offshore high-voltage substations that condition the electricity and send it to shore. The substations are built on platforms out at sea. OWI Lab implemented

a project to map the various kinds of vibrations in the components of an OHVS. It is very important to correctly estimate vibration levels under various meteorological and operational conditions.

Vibrations

During the measurement process, OWI Lab used the versatile measurement systems it specifically developed for use at sea. In addition, it deployed advanced analysis methods to determine the dynamic behaviour of structures based on the vibration measurements. Owners of offshore wind farms and their

suppliers can benefit from the findings of the measurement work done by OWI Lab. Not just to be able to optimally maintain the OHVS and its components over the entire lifetime of the facility, but also in relation to the design of future substations.

O&M RESEARCH FOR OFFSHORE WIND FARMS

Operations & Maintenance (O&M) accounts for nearly one third of the costs over the lifetime of an offshore wind farm. This market is growing along with the number of offshore wind farms.

Over the last five years, a growing number of renewable power stations has been built offshore. Belgium is one of the pioneers in this domain. The sharp rise in operational offshore wind farms means that the market for operations and maintenance (O&M) is off to a good start. By 2020 the operators of offshore wind farms will spend an estimated €5 billion on O&M in Europe alone. O&M typically accounts for around 30% of costs over the entire lifetime of an offshore wind farm.

OptiWind ('serviceability optimization of next-generation offshore wind turbines') is a research project that is developing pre-competitive knowledge in multiple areas: improving concepts and designs of offshore wind farms, their components and their maintainability, in addition to developing and validating various techniques for their design and monitoring. Within this

framework, a new project, OWOME (Offshore Wind O&M Excellence) aims to support and make possible the development and validation of smart and cost-effective O&M solutions. The project will give companies access to offshore measurements and real data, design an integrated data platform and support companies in developing smart O&M solutions. Five demonstrators will be set up and will play an important role here.

On 17 December the OptiWind consortium partners organised an open project meeting, together with OWI Lab and Gen4Wave. At the same time, the go-ahead was given for the OWOME user group. During the meeting the emphasis was on practical O&M experience. Three speakers presented their practical experience in operating and maintaining offshore wind farms.

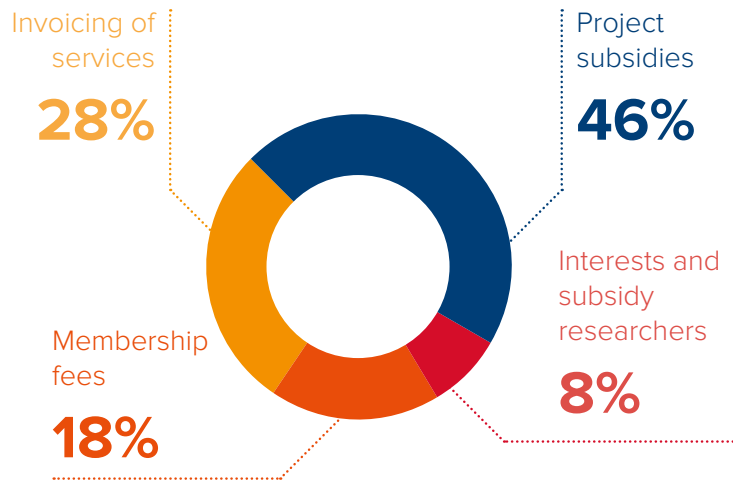


ANNUAL REPORT 2014

FINANCES - REPRESENTATIVES

FINANCES

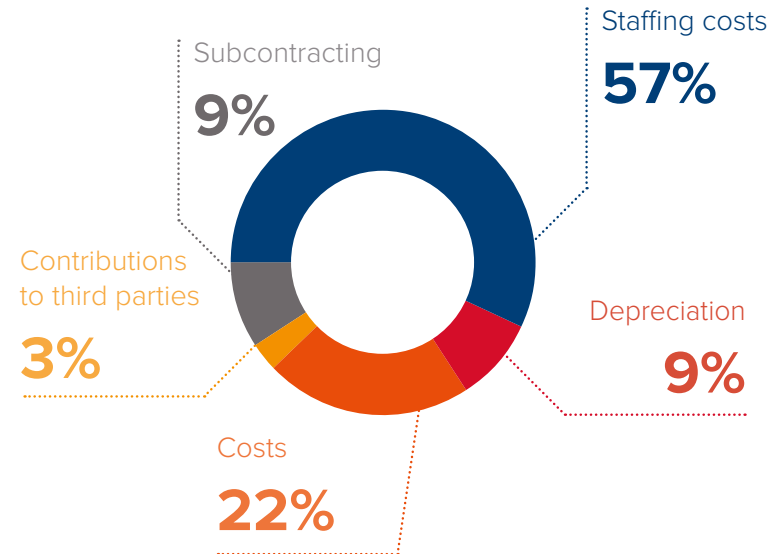
#BREAKDOWN OF INCOME (OPERATING PROFIT)



	% 2014	euro 2014	% 2013	euro 2013
Project subsidies	46%	11.497.248,58	46%	11.528.685,07
Invoicing of services	28%	6.995.890,39	27%	6.674.388,77
Membership fees	18%	4.535.780,17	19%	4.699.203,05
Interests and subsidy researchers	8%	2.069.201,45	8%	2.043.267,51

Total INCOME	100%	25.098.120,59 €	100%	24.945.544,40 €
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#COST BREAKDOWN (OPERATING PROFIT)

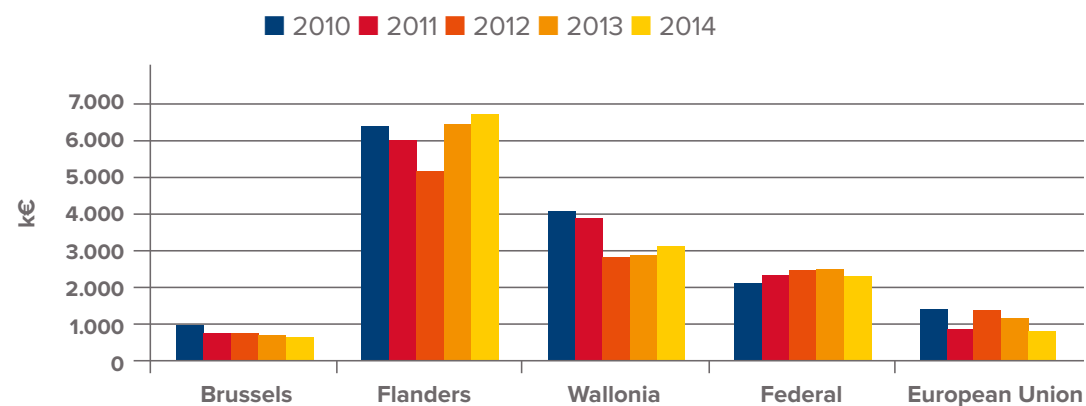


	% 2014	euro 2014	% 2013	euro 2013
Staffing costs	57%	14.009.532,08	59%	14.296.265,60
Costs	22%	5.443.978,31	23%	5.558.792,16
Subcontracting	9%	2.110.507,91	8%	1.954.337,08
Depreciation	9%	2.001.765,95	8%	1.946.057,36
Contributions to third parties	3%	822.770,10	2%	605.939,31

Total COST	100%	24.388.554,35 €	100%	24.361.391,51 €
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#BREAKDOWN OF SUBSIDIES

SUBSIDIES IN INCOME PER GOVERNMENT



In k EUR

Source of subsidies / government / year	2010	2011	2012	2013	2014
Brussels	949,06	756,80	782,25	684,31	652,33
Flanders	6.375,12	6.013,27	5.143,32	6.434,85	6.678,34
Wallonia	4.047,42	3.874,76	2.794,14	2.874,55	3.098,56
Federal	2.070,59	2.310,46	2.446,49	2.458,10	2.286,54
European Union	1.418,82	841,07	1.380,04	1.195,31	813,64
	13.092,79	11.903,27	10.586,91	11.528,69	13.529,41

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Marketing Manager, Oerlikon Balzers Coating Benelux SA-NV, Sint-Truiden

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Marc Lenders

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Study and Training Service, Socio-Economic ACV-CSC-Metea, Brussels

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Roger Legras

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Hendrik Van Brussel

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IWT, Brussels

Pierre Villers,
Inspector General, Ministry of the
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(Namur)

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Director Technology & Operations
Director Sirris Wallonia

Jeroen Deleu,
Director Strategy
& Corporate Development
Director Sirris Brussels

Herman Derache,
Managing Director as of 1/06/2014

Jos Pinte,
Managing Director until 31/05/2014



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