

# We help Sweden's lightweight technologies take off.

International collaboration in focus



## New PhD positions

During the year, LIGHTer Academy prepared new initiatives for PhD positions in radical and sustainable lightweight solutions. The positions will be advertised in 2022.

sid 4–5



## Braver ideas

The testing of radical ideas in groups that possess a wide range of skills increases the chances of achieving greater results. Feasibility studies make it possible to take greater risks in research.

sid 6–7

## Quick funding for SMEs

Lightweight technology for encapsulating batteries and recycling of fibreglass were funded within the framework of the LIGHTer SME series of calls.

sid 9

## More international speakers

When the LIGHTer PhD Network held their online seminars, speakers from Spain, Switzerland and China were featured.

sid 10–11

## Strong international interest

Sweden has a strong standing in the area of lightweighting. LIGHTer will host the third European Lightweighting Network meeting.

sid 12

# Making dreams come true with an enhanced budget

**L**IGHTer Summit – the new industry days focusing on lightweight technologies are up and running. In April 2021, about 60 speakers from various parts of LIGHTer's network participated. They shared new, exciting results, experiences and challenges, all digitally. It was extremely inspiring to see the network flourish together.

During the spring, our budget was increased by 45 million kronor. Not only did it provide motivation, but also confidence. It gave us the chance to make many of our dreams become reality. During the year, we put a lot of effort into preparing LIGHTer Academy Postdocs and the Infra LIGHTer Awards competition. We have even reinforced our market and business intelligence for updating the 2022 Lightweight Agenda and accepted the invitation to host the third meeting of the European Lightweighting Network. We have established a task group to develop training for SMEs in sustainable lightweight technologies as well as doubled our call budget in the 2021 calls for R&I projects and feasibility studies.

## International breakthrough

LIGHTer is getting a lot of attention internationally. We have now updated our international strategy and it contains nine tangible items to be achieved in the coming five years. Based on the strategy, we have then planned several activities to be launched as soon as it is possible to travel again. 2022 will be filled with exciting international meetings and collaborations, which is exhilarating after two years of relative seclusion.

## A long-term perspective leads to success

LIGHTer has been a huge asset in challenging times such as the one posed by the pandemic. The long-term strategic perspective of funders has been of great value to Swedish industry and research. It creates security, community, creativity and innovation.

### Cecilia Ramberg

Director  
 SIP LIGHTer



Read more about SIP LIGHTer and all our ongoing projects on [lighter.nu](https://lighter.nu)

## This is SIP LIGHTer

SIP stands for 'strategic innovation programme' and is funded by Vinnova, the Swedish Energy Agency and Formas. SIP LIGHTer was one of the first five strategic innovation programmes to receive funding. In total, 17 programmes have been awarded funding.

Lightweight technologies are one of Sweden's industrial strong points. We are now in phase three of four, running between 2020 and 2022. The roadmap is indicated in the Lightweight Agenda, which aims for 2039. For more information, see [lighter.nu/lva](https://lighter.nu/lva)

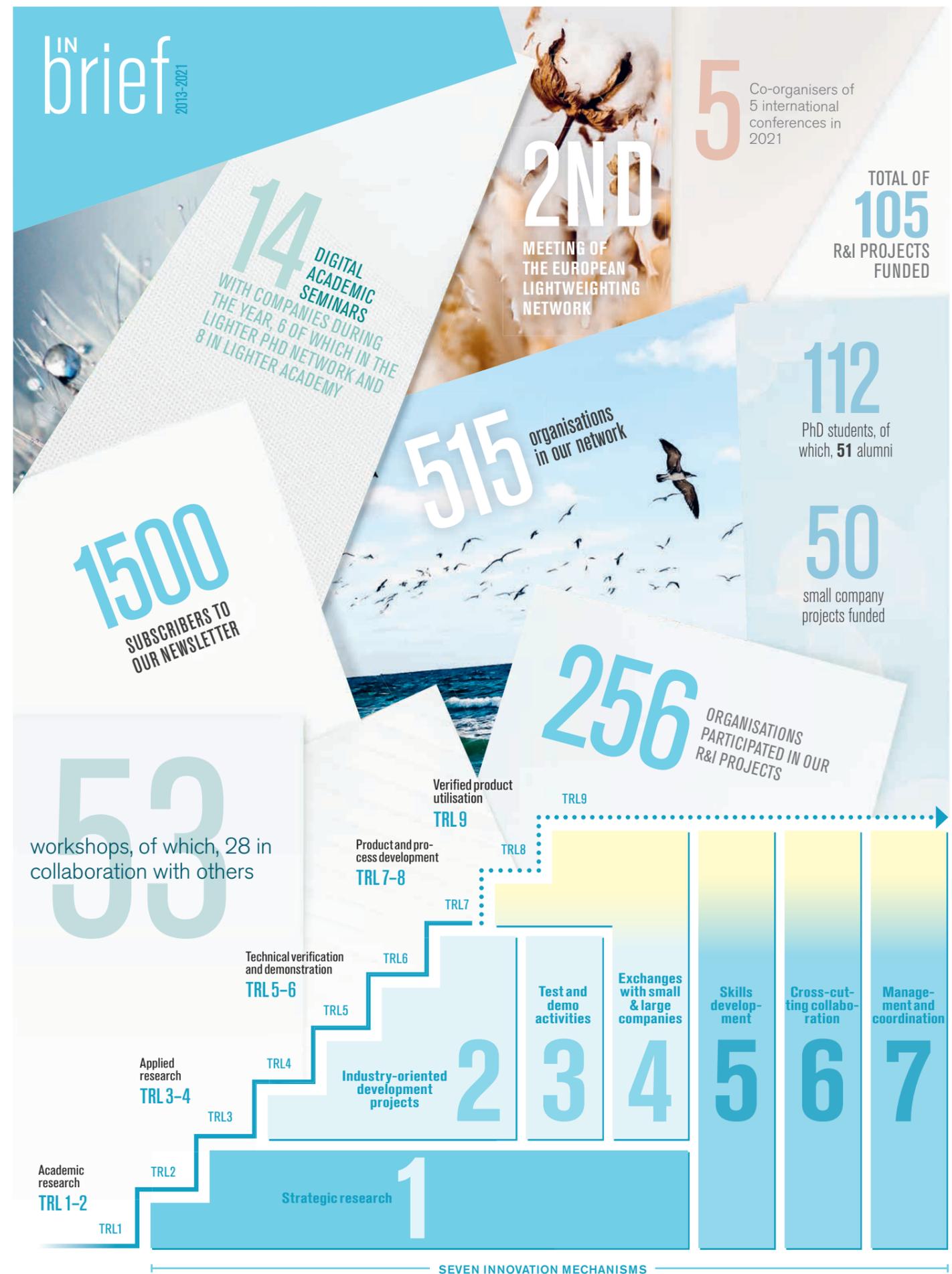
In this 2021 annual report, we want to show how SIP LIGHTer has evolved and look towards the future. We will showcase a few great examples and meet some of the people driving lightweight technology forward. Our seven innovation mechanisms are the basis for our common Lightweight Agenda.

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The seven innovation mechanisms of the Lightweight Agenda can be connected to the Technology Readiness Level (TRL) ladder. It illustrates the need for collaboration on all levels. SIP LIGHTer's operational function extends to TRL 6 with a focus on creating an effective structure for developing technologies, test environments, materials and people. In this annual report, we follow up on some of the concrete results we have already achieved.

**Strategic research**

Creating new structures for strategic Swedish research strengthens industry, academia and cross-cutting research collaboration.

**LIGHTer ACADEMY**

# Postdoctoral positions for radical, sustainable, lightweight solutions

Despite the pandemic and its restrictions, LIGHTer Academy's investments have accelerated with postdoc positions and well-attended seminars.

In 2021, LIGHTer Academy made a new investment in postdoctoral positions. In the autumn, we proposed fields of technology for these new positions.

**Meeting societal challenges**

In the fields of technology, we have focused on industrial needs that tackle the challenges of society and create radical, sustainable lightweight solutions for the future.

Our postdoc positions are open to academics and researchers in the industry who wish to conduct part-time research at a university. LIGHTer Academy is thereby growing stronger and contributing to increased domestic and international lightweight collaborations.

**Great interest in seminars**

There was great interest in the seminar series we continued to run in 2021. Each seminar revolved

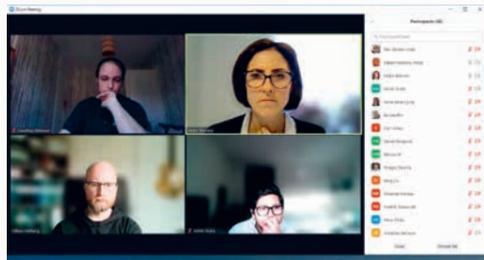
around a researcher and a national or international colleague, who presented their research. During the year, all LIGHTer Academy technical seminars were held online. They reached a wide audience with somewhere between 25 and 60 people participating each time. In 2022, the seminars will continue to be held online once a month, this time in collaboration with the LIGHTer PhD Network.



*"Companies are constantly striving to develop their products and LIGHTer Academy provides the necessary expertise and resources for achieving sustainable, lightweight products," says Ramin Moshfegh, Manager of Technology at Lamera and developer of advanced lightweight material in the micro-sandwich design.*

**"LIGHTer Academy is to companies what nutrient-rich water is to plants."**

**Ramin Moshfegh,**  
Manager of Technology, Lamera



The eight international seminars organised by LIGHTer Academy drew a great number of participants

**MANAGEMENT TEAM**

**LIGHTer Academy's 12 part-time funded researchers**



**Malin Åkermo**  
Lightweight constructions  
Royal Institute of Technology



**Dan Zenkert**  
Lightweight constructions  
Royal Institute of Technology



**Leif Asp**  
Material and computational mechanics  
Chalmers University of Technology



**Anna-Lena Ljung**  
Fluid mechanics and experimental mechanics  
Luleå University of Technology

**Andreas Borg,** GKN Aerospace Engine Systems, also part of the management team

Please contact one of our academic researchers if you have an idea or want to talk about technology and the future: [lighter.nu/la](http://lighter.nu/la)



**Fang Liu**  
Materials and manufacturing  
Chalmers University of Technology



**Martin Fisk**  
Materials science & applied mathematics  
Malmö University



**Lars-Erik Lindgren**  
Materials and solid mechanics  
Luleå University of Technology



**Martin Fagerström**  
Materials and computational mechanics  
Chalmers University of Technology



**Lars Nyborg**  
Industrial and Materials Science  
Chalmers University of Technology



**Greta Lindwall**  
Materials Science  
Royal Institute of Technology



**Eduard Hryha**  
Materials and manufacturing  
Chalmers University of Technology



**Håkan Hallberg**  
Solid Mechanics  
Lund University

**Five results**  
from new research within LIGHTer Academy

**More functionality from composites**

Electrochemical actuation can provide carbon fibre composites with more functions. Electric currents can alter the shape of composites, turn into tensile sensors and convert mechanical deformation to electrical energy, as shown by PhD students Ross Harnden (Royal Institute of Technology), Wilhelm Johannisson (Royal Institute of Technology), David Carlstedt (Chalmers) and Dan Zenkert (Royal Institute of Technology). Carbon fibre composites have high stiffness and high strength in relation to their weight. It has previously been proven that carbon fibre composites can store energy similarly to lithium-ion batteries. If materials can also have additional functions, it can further reduce weight. A material that is simultaneously stiff and strong, has low weight, can store energy, function as a sensor, change shape and generate electrical power enables new, sustainable and energy-efficient solutions in the field of lightweighting.

**Metal foam studied through X-ray**

Metal foam is a class of material that combines the unique attributes of being very lightweight and highly stiff. It is highly useful in applications such as crash energy absorption, vibration reduction and sandwich material cores. Its porous cell structure also makes metal foam beneficial in radiators and heat exchangers, in medical implants and in fuel cells. Within the Swedish-German research programme "Röntgen-Ångström Cluster", LIGHTer Academy researcher Håkan Hallberg will lead a four-year project for researching metal foam in collaboration with Professor Carl Krill of Ulm University and Johan Hektor of Malmö University. The

project will use the Petra III Synchrotron Radiation Source in Hamburg to, via X-radiation, study how the microstructure of metal foam changes when subjected to loads as well as how the microstructure impacts the characteristics of the foam.

**Great breakthrough for structural batteries**

Researchers at Chalmers and the Royal Institute of Technology have produced and demonstrated a structural battery that is ten times better than earlier versions. The structural battery contains carbon fibres that function as a reinforcement material, electrical conductor and electrode, all at the same time. With this breakthrough, the Swedish researchers are showing the way towards reaching weightless batteries such as for electrical vehicles and aircraft in the future. The structural battery proved to have an elastic modulus of 25 GPa and an energy density of 24 Wh/kg. LIGHTer Academy researchers Leif Asp and Fang Liu (Chalmers) and Dan Zenkert (Royal Institute of Technology) are collaborating on the project. A substantial number of PhD students from Chalmers and the Royal Institute from the LIGHTer PhD Network are also participating in the team.

**Composite materials that 'feel'**

Researchers from the Royal Institute of Technology and SAAB have proven that it is possible to create structural composites whose electrical resistance is impacted in a predictable way by temperature changes and mechanical loads. They did this by combining composite materials and carbon nanotubes. The goal is to create composite components that can report e.g., the load they are

being subjected to. This would reduce the need of over-dimensioning and result in lighter components. It looks as if the technology can also be used for process monitoring as the measured signals during manufacture reflect the curing process of the composite matrix. The technology was developed in parallel with research on integrated fibre optic systems run by RISE. As it looks now, the different technologies may complement one another.

LIGHTer Academy researchers Per Hallander (SAAB) and Malin Åkermo (Royal Institute of Technology) are running these efforts together with Tobias Karlsson, PhD student at the Royal Institute of Technology.

**New lightweight material with additive manufacturing**

Additive manufacturing offers unique opportunities for material design. The process itself entails that a metal is rapidly solidified locally. It can be used to develop materials with much higher alloy content and increased strength. The challenge is an increased risk of hot cracking. Basic material design and thermodynamic calculations have resolved this problem for a new family of aluminium alloys in which the alloys were developed specially for laser metal fusion. A PhD project from Chalmers has shown printability to a nominal full density for produced powder materials, and has achieved attractive properties through subsequent ageing. The PhD project was led by LIGHTer Academy researchers Professor Lars Nyborg (Chalmers), adjunct Professor Karin Frisk (Höganäs) and adjunct Professor Sven Bengtsson (Höganäs). The project led to a patent application and a recently presented licentiate thesis by Bharat Mehta. The PhD work is part of the CAM2 competence centre, but has also been a central part of the LIGHTer project ALLIGHT.

**12 RESEARCHERS** from five Swedish universities receive part-time funding from SIP LIGHTer, and 23 active researchers from research institutes and the industry interact with LIGHTer Academy. The aim is to jointly formulate the right research questions in order to meet the future needs of companies. This strengthens Swedish industry through both incremental development and radical innovative solutions within lightweighting.

**BROAD EXPERTISE** in metals, composites, modelling, simulation, manufacturing processes, multimaterial solutions, additive manufacturing, multifunctional materials and advanced characterisation methods is represented. This creates an effective transfer of knowledge to industry and promotes lifelong learning.

**Industry-oriented development projects**

Through innovation projects with implementation within five years and more visionary projects at lower technology readiness levels, we are strengthening several industries and supplier levels at the same time.

**LIGHTer INDUSTRY PROJECTS**

# Construction lift and electrical vehicle lighter with composite

A 40 per cent lighter construction lift and high performance of an electrical vehicle battery box at a lower cost. The MakeCapLighter project combined carbon and fibreglass composites with metal designs to reduce weight and maintain performance.

"The idea is for carrying structures, such as cars or construction lifts, to gain greater capacity by becoming lighter, while being strong and performing well," says Yvonne Aitomäki, senior researcher in composites, process simulation and manufacturing at RISE. The MakeCapLighter project has specifically worked with battery boxes for electrical cars through Gestamp HardTech and lift cages from Alimak. "What they have in common is being able to carry a lot of weight while remaining strong.



They are also mobile, so you don't want them carrying extra weight unnecessarily," says Aitomäki. The idea was that the solutions for construction lifts and battery boxes would be similar, but the requirements for the lift did not allow for modification of weight-bearing parts. The project was then divided into two different tracks, both of which were to create light, robust load-bearing structures by combining lightweight materials.

**Strong at a lower cost**

Carbon fibre is a good material for battery boxes. It is lightweight and inexpensive. Mixing in glass provides a much more cost-effective solution. "We put carbon fibre on the outside and glass inside. Then we got higher performance on the outside and thus many of the carbon fibre properties, a light strong box, at a lower cost." That combination could be used in many car components, harnessing carbon fibre properties at a lower cost, for example in load-bearing parts such as pillars. Another success was simplified measurement of fibre orientation, a crucial parameter for fibreglass in both design and quality, but not easy to measure. "We developed a quick method to measure the direction of fibre and give it a value. It is a way of making evaluations without expensive equipment and enables more durable materials to be developed."

**40 per cent lower weight**

For the construction lift, the solution entailed using more composite and aluminium and less steel. Thanks to the reduction in weight of the cage, Alimak was able to remove one of the three motors and lighten the load even further. "In total, we brought the weight down by 40 per cent. Not only is more energy saved when running the construction lift, but it is also lighter to transport and manage and can handle heavier loads," says Aitomäki.



**"Thanks to the project, we are on the right track as the sales of electric vehicles increases and we are contributing to reduced emissions."**

**Hana Zrida**

*PhD, Research Engineer BIWR&D*

*– Research, Simulation & Testing, Gestamp R&D Luleå*

**FEASIBILITY STUDIES**

# Funding that results in braver ideas

The new "feasibility studies" form of funding makes it possible to increase risk-taking in research based on industry needs. The testing of radical ideas in groups that possess a wide range of skills increases the chances of achieving greater results in the long term. LIGHTer's network is the core for developing ideas into industrial performance.

Here are six examples of projects showing how collective ownership of risks and the creation process are paving the way for future industrial lightweight solutions. All our projects can be found in the lighter.nu project database.

**COSINGS** / *Graphene and composites*

**With integrated graphene sensors that measure temperature, pressure and tensile strain, we can create composite materials that monitor their own manufacturing process and report deviations.**

It provides continuous quality control and longer service life. By incorporating temperature and strain sensors, the properties of the composite material were improved. The project showed that Vertical Aligned Carbon Nanotubes (VACNT) worked well for strain and temperature measurements in hardened composite laminate and partly also to monitor the hardening process. Graphene oxide could be used for temperature measurements in hardened composite. Strain and temperature sensors in combination with pressure sensors can be used both for flights as well as for sail and boat hulls and for components for the energy sector. The results create competitiveness for Swedish companies that develop and manufacture composite structure. One example is composite hydrogen tanks for future green aviation. The project involved Saab Aeronautics, Saab Dynamics, SeaTwirl, the Royal Institute of Technology, Linköping University, Danubia.

**LIGHTex** / *Electrically conductive textiles*

**After a successful feasibility study, the HEATEX fabric has now been commercialised. Twelve pilot projects are developing a product based on LIGHTex's electric heating fabric.**

LIGHTex is an ultra-light coating for electrically conductive textiles. It is a commercial product that has already been sold to generate revenue. The study confirmed that the idea is working and also involves the identification of the market segments, operators and potential products for the LIGHTex fabric. LIGHTex has defined the market, developed a go-to-market strategy and named the solution

G-HEATEX. The technology can be used in, e.g., sports and outdoor products and electric vehicle climate control. Nanotextile Solutions and Saab Barracuda participated in the project.

**ReCKA** / *Aluminium*

**The ReCKA project has increased knowledge of the rheocasting process for aluminium chassis components for vehicles, especially in terms of strength, productivity and costs.**

Several companies around the world and in Sweden have purchased this equipment during the years that the project has run. Much of the lessons and results of the project have been collected in a design manual that will be used in education and for businesses. This gives companies the opportunity to replace exhausted steel parts with rheocast aluminium components, which are often much lighter. In order for the components to go into serial production, further testing and development are required. Volvo Cars, Scania CV, Comptech, KTH and Jönköping University of Technology participated in the project.

**PRECIP** / *Precision casting*

**Process design simulation improves the properties of cast components. Thus, costly experiments can be avoided in foundries.**

The PRECIP project has led to new ideas for manufacturing complex components. With a simulation-based methodology, the properties of cast components are controlled and improved. It also reduces lead time in manufacturing and improves the quality of cast components. All in all, this will make it possible to produce advanced turbine engines that are more efficient and give off fewer emissions. In the project GKN Aerospace Sweden, TPC Components, RISE Swecast and NovaCAST Systems participated.

**LIGHTform** / *VHot forming*

**The LIGHTform project has demonstrated the advantage of simulating hot forming of lightweight parts with variable plate thickness for bimetallic structures.**

The test press was done uneventfully, it turned out the first time. The project showed a new way of manufacturing that has great potential to succeed in terms of quality, energy consumption and weight. Lightweight design attracts a lot of interest from the manufacturing industry. Global environmental challenges, objectives and legislation make lighter and more sustainable products necessary to remain competitive. The project has generated a new project for further sustainability improvements. GKN Aerospace Sweden, MagComp, Lasertool, Rydverken and RISE IVF participated in the project.

**NexT-Light** / *Cutting tools*

**NexT-Light has been working on the next generation of cutting tools for manufacturing lightweight materials. The project shows that it is possible to accurately determine the structure of the cutting tools for processing Metal Matrix Composites (MMC).**

The technology can also be used for other material manufacturing in the aerospace and automotive industries. The structure of cutting tools can improve chip breakability when machining MMCs. To some extent, the life of the tool is also affected. The material characteristics of the workpiece were different depending on the casting process. The project was able to identify a need to improve the workpiece's manufacturing process. Air Liquide and Fortiva Tools participated in the project. Czech Technical University contributed input.

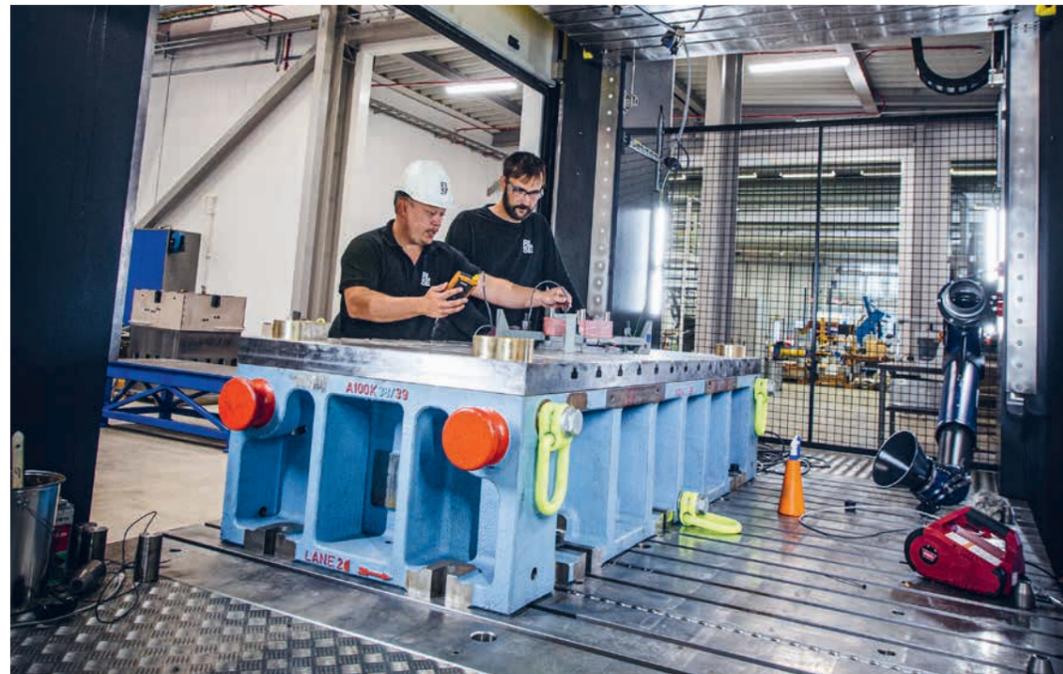
**Test and demo activities**

We must continue to increase availability, minimise business risks and create synergies along the entire value chain and across industries.

**TALENT ATTRACTION**

# Lightweight test beds attract international companies

In the talent attraction project, the regions of Västra Götaland, Blekinge and Norrbotten are investing in increasing the international use of test beds in the forming and additive manufacturing of lightweight products.



The test bed for sustainable composite manufacturing in Piteå offers opportunities for conducting large-scale tests in near-real production conditions, opening for quicker industrialisation

In the talent attraction project, the regions of Västra Götaland, Blekinge and Norrbotten are investing in increasing the international use of test beds in the forming and additive manufacturing of lightweight products.

The project participants want to increase investments in the field of lightweighting in their regions, which offer good conditions and strong research and innovation infrastructure. They do this by increasing cooperation with international companies that complement the Swedish innovation system.

"We direct our efforts to companies that want to use the test beds for their own products and materials, and to startups that want to be part of the industrial test

bed network. They can test their innovations in production-like environments," says Boel Wadman, project manager.

**The test beds included are:**

- The application centre for additive manufacturing in the Mölndal, Västra Götaland region
- Stamping Center in Olofström, Blekinge region
- Test bed for sustainable composite manufacturing in Piteå, Norrbotten region

The project will run throughout 2022 and collaborates with investment managers in Business Sweden's regions.

**Digi Demo Day Event** is a collaboration between seven strategic innovation programmes. In September, for the fifth year in a row, we held a test bed inspiration day where we showed industrial digitalisation.

This year's theme was how to take the next step in product development and production by using a test bed.

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010-228 48 42**Exchanges with small & large companies**

We need to find the optimal interaction between small tech-oriented companies and Sweden's major global manufacturing industries.

**LIGHTer SME**

## How new value chains are built

LIGHTer SME is a series of calls for proposals to develop Swedish small and medium-sized enterprises (SMEs). Since autumn 2017, two calls for proposals have been issued every year. Here you can read about two projects that received funding in 2021.

**STRUCTURAL BATTERY MODULES IN LIGHTWEIGHT MATERIALS**

Swedfoam has demonstrated a further development of technology where structural reinforcements of fibre composite have been integrated into battery modules.

The aim of the project has been to demonstrate new lightweight technology for encapsulating batteries. It takes the form of battery modules cast in lightweight materials that have the physical properties required to encapsulate battery cells. The mechanical performance has been tested and constitutes data for dimensioning battery pack encapsulation. Tests have been done with units both with and without structural reinforcement.

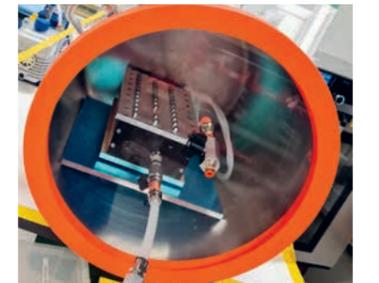
The project has its origins in the technology and preliminary material mixes that were developed on a lab scale in LIGHTest.

**Notification of Invention**

A direct consequence of the process development made in the project is that Swedfoam and RISE together submitted a notification of invention, "Shrink-compensating formwork tools for thermoset moulding". It applies to tool design when casting both reinforced and non-reinforced battery modules. A number of contacts, both with potential customers and partners, have been established during the project period.

**25 per cent can be recycled**

To exploit the technology, the project sees a need to offer a complete



product in the form of lightweight battery packs, together with partners. In the EU project VACTM2, a case study has been conducted that investigates the concepts for recycling the material. The study showed that a 25% recycled fraction could be added while maintaining mechanical properties. Partners in the project are Automotive Interior Parts Sweden and RISE SICOMP.

**NEW TECHNOLOGY OPENS THE WAY FOR CIRCULAR USE OF FIBRE AND POLYMERS FROM FIBRE COMPOSITES**

LibriXer's technology has the potential to recycle fibreglass from composite materials. With low energy consumption and without chemicals, composite materials are broken down into their constituent parts.

Efficient recycling methods are an important area for future volume production of lightweight materials. But it is both difficult and resource-intensive to separate fibre from matrices and produce clean, well-specified fractions, with good performance. This is an important reason why so little fibre from fibre composites is recycled today.

The technology from LibriXer is based on mild multi-directional forces and it has been successfully used in a number of applications. Among these are the breaking down of peas into shells, protein and starch, and of wiring into insulation and copper conductors. In 2021, the possibility of using the technology to recycle

fibre composites was investigated. This was done in collaboration with RISE and funded by LIGHTer Small Business. The results suggest that LibriXer's technology can recycle fibreglass from this material stream if the technology is combined with an energy-efficient cleaning step. There are many types of cleaning technologies. The next step is to look into them. LibriXer has initiated the evaluation of a very energy-efficient drying technique that will make it energy efficient to separate released fibres from the matrix through cleaning.

The liberated, washed fibres have great potential to be used in new products in, for example, the furniture and automotive industries, while the matrix can be used as raw material for new matrices or chemicals.

**More efficient drying technology**

LibriXer has initiated the evaluation of a highly energy efficient drying technology, 8-10 times more efficient than traditional technology. It will make it possible to physically separate released fibres from matrices by washing. The liberated, washed fibres

have great potential to be used in new products in, for example, the furniture and automotive industries, while the matrix can be used as raw material for new matrices or chemicals.

**Great business opportunities**

The business opportunities are great both in terms of process waste from manufacturing and end-of-life composite products, such as wind turbine blades and boats, where large volumes are expected to be phased out within the next few years. The project has led to new collaborations with actors in the plastics, furniture and recycling industries and has also attracted interest from the wind power industry. Among other things, LibriXer will start a development project with Globalgateways that will build a new recycling plant in Aken, Germany, where the released matrices can be managed.

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**Skills development**

By continuing to develop forums for skills exchange and training with a multidisciplinary mindset, we complement the industries' own training.

**LIGHTer PHD NETWORK**

# 112 PhD students in sustainable network with industry

LIGHTer's PhD Network provides doctoral students in the field of lightweighting a broad perspective on research and industrial use of lightweight technologies, this year with more international speakers in the online seminars and with Volvo Trucks in the network.

Through the LIGHTer PhD Network, doctoral students gain broad knowledge of challenges and possible lightweight solutions in Swedish industry. This takes place in an annual PhD course offering lectures, five participating industrial companies and

study visits over a total of ten days. The companies also talk about their sustainability efforts. The long-term goal is to create a sustainable network for PhD students, senior researchers in higher education, institutes and actors in lightweight technology

*Toward the end of 2021, much-appreciated physical meetings and company visits were reinstated at Volvo Trucks in Gothenburg.*



industries. The host of the LIGHTer PhD Network is Luleå University of Technology, which together with the Royal Institute of Technology, Chalmers University of Technology and RISE, develops activities for the long-term PhD Network.

**Great value to PhD students**

Exams take place in conjunction with a LIGHTer event.

"It's great that towards the end of the year we have finally started with activities where we meet and can be physically present again; it is of great value to the doctoral students. We have focused on sustainability in the course and workshops and Volvo Cars has provided us with insight into its exciting sustainability work," says Pär Jonsén, project manager at Luleå University of Technology.

**Several international speakers**

New for 2021 is that Volvo Trucks has been involved in the PhD course. Another novelty for the year is the addition of more international speak-

ers in the online seminars given each month by doctoral students, alumni and invited researchers. Speakers include the Eurecat Centre Tecnològic de Catalunya in Spain, Bcomp Ltd., Switzerland and the Shanghai Institute of Technology, China.

**Interaction between academia and industry**

The network facilitates multidisciplinary research collaboration. It opens doors for new radical lightweight solutions and co-publications. At the same time, it strengthens the interaction between academia and industry. "This gave a fantastic opportunity to meet engaged and curious researchers as well as to talk about the substantial, inspiring transformation work that the entire industry is facing to drive development towards sustainable transport and infrastructure solutions," says Sead Canovic, Manager of Cast Materials & New Technologies at Volvo Group Trucks Technology in Gothenburg.



**MANAGEMENT TEAM** LIGHTer PHD NETWORK



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**LIGHTer PhD Network's unique PhD course runs for ten days with five training sessions and offers academia-industry collaboration:**

- |  |  |   |   |  |
|--|--|---|---|--|
| <b>1. Material selection</b><br>Chalmers, AB Volvo Group in Gothenburg | <b>2. Composite materials</b><br>KTH, Saab i Linköping | <b>3. Cellular materials and sandwich constructions</b><br>KTH, DIAB i Laholm | <b>4. Metalliska material</b><br>LTU, RISE, GKN, Brogren Industries i Trollhättan | <b>5. Manufacturing of metal structures</b><br>LTU, Gestamp Hardtech i Luleå |
|--|--|---|---|--|

**LIGHTer INDUSTRY TRAINING**

## Digital course packages for professionals

In collaboration with the Lightweight Member Programme, we offer industrial training on various lightweight technologies designed for the industry, from operators and technicians to engineers.

The basic idea is to introduce topics via short webinars. During the year, we have published two free digital course packages: one on product optimisation and one on casting. The courses have been released in 8 and 15 parts respectively, and participants can control the pace at which they take the course. LIGHTer

Product Optimisation is behind the 8 parts of the optimisation course. Both courses provide a good basic understanding of each area of technology.

**European industrial courses**

In 2021, LIGHTer has been able to offer digital industry courses in collaboration with EIT Raw Materials Academy in the form of a number of free samples from the Lightweighting Professionals course. In the courses, participants learn how to design and manufacture lightweight products with the support of leading European experts.

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**LIGHTer PRODUCT OPTIMISATION**

## Tools for transition

"In industry, we want to develop lighter and better products in less time. With network LIGHTer Product Optimisation, we're developing new methods to achieve this. We offer this in connection with our Lightweight Member Programme," says Mikael Thellner, Technical Expert at Scania.

LIGHTer Product Optimisation is yet another example of how LIGHTer creates networks where industry, academia and research institutes together develop new, smarter work methods for lightweight designs.

"It's about developing employees to enable them to use these new methods," says Harald Hasselblad, analytical engineer at Volvo Car Group and member of LIGHTer's management team. He runs the LIGHTer Product Optimisation network together with Mikael Thellner. In the automotive industry, as in others, it can traditionally be a time-con-

suming process for designers and computation managers to produce relevant results.

More optimisation-driven development minimises time-to-market. Here, there is scope for more ambitious efforts to work in parallel as well as new virtual tools that focus on weight reduction.

"Product optimisation has taken a step into the Lightweight Agenda," Thellner says. During the year, LIGHTer Product Optimisation published an online product optimisation course. It focuses on new ways of thinking and working methods that we need for transitioning to a more

sustainable industry. "Product optimisation creates the conditions for a faster transition, and our course is a tool for doing this," says Mikael Thellner.

LIGHTer Product Optimisation is run by a management team with representatives from Volvo Cars, Scania, Combitec, Saab, Örebro University and the Royal Institute of Technology. Read more about LIGHTer Product Optimisation on our website.



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**Cross-cutting collaboration**

The interaction among regional, national and global stakeholders is a key success factor, and we are always seeking regular collaboration with public-sector funders, industry organisations and other strategic innovation programmes.

**LIGHTer INTERNATIONAL**

# The world comes to Sweden in 2022

With a strong growing international interest in LIGHTer, we have updated our international strategy.

Nine milestones strengthen our international work and we plan, e.g., to:

- host the LIGHTer International Conference in Gothenburg on 6-7 April 2022
- receive industry delegations from Germany and Austria in spring 2022
- participate in the Lightweighting Summit at the Hannover Messe 2022.

## European Lightweight Agenda for Green Transition

Lightweight technology enables reduced consumption of both materials and energy for all industries.

Lightweight technologies play an important role in the transition to sustainable growth in Europe. Lightweighting is needed, among other things, for fossil-free transport and for the transition to renewable energy. Now we are taking the first joint steps to describe the role of lightweighting in the green transition through a European research agenda for lightweighting. Together with other European countries, we can accelerate the transition.

### INTERNATIONAL COLLABORATION

#### LIGHTer HOSTS THE EUROPEAN LIGHTWEIGHTING NETWORK

LIGHTer participated in the second meeting of the European Lightweighting Network in Vienna, Austria during the year. The network was launched by the German Finance and Energy Department in 2020. LIGHTer has been offered to host the third meeting of the European lightweight network.

#### ELCA IS GROWING

LIGHTer is an active member of the European Lightweight Cluster Alliance (ELCA) and leads a working group. This opens up new opportunities for Swedish actors to participate in strong European consortia in research applications.

#### COOPERATION WITH SWITZERLAND

LIGHTer has written the call text for a bilateral call with Switzerland. We have also participated in the Swiss-Swedish Innovative Initiative (SWII) conference in Neuchâtel, Switzerland to create good consortia for the call.

### NATIONAL COLLABORATION

Since its inception in 2013, SIP LIGHTer has arranged 53 workshops and seminars around Sweden, 28 of which were arranged with others. Over the years, SIP LIGHTer has collaborated with eight other strategic innovation programmes.

### REGIONAL COLLABORATION

SIP LIGHTer has three regional nodes: NOD Blekinge, NOD Småland and NOD Västra Götaland.

**Management and coordination**

The ability to coordinate financial resources and the roles of cross-industry partners is an important prerequisite for creating long-term viability and a clear direction in a large portfolio of research and development projects.

**STATEMENT OF THE CHAIRMAN OF THE BOARD**

# An easier way to meet the UN sustainable development goals

The year 2021 will be marked by increased awareness on several levels. We remember the year for its restrictions and recommendations, while green transition efforts became increasingly clear.

We now need to step things up to reduce the negative impact of humans on the environment. Those of us who run operations now have the future in our hands, and we are facing several transformative changes.

As a representative of the Board, I would like to highlight the importance of LIGHTer in achieving the UN's 17 sustainable development goals. Lightweighting makes a crucial contribution to material and energy efficiency. With full force, our management team is connecting Swedish excellence and Swedish innovations in lightweighting with our common global challenges.

Together, we are making the world lighter and Sweden's competitiveness stronger. LIGHTer is largely characterised by personal face-to-face interactions. Over the past two years, these interactions have mainly taken place via digital platforms that we have learned to work with together. I personally believe that our digital

transformation will have a lasting effect over time. We will work more time- and resource-efficiently than before. To my and the entire Board's great pleasure, LIGHTer has seen a substantial search intensity from companies and research publishers in Sweden in the major 2021 call. This is particularly gratifying because we have been entrusted with managing an expanded budget.



**"Lightweighting makes a crucial contribution to material and energy efficiency"**

**Bengt A.G. Nilsson**

*Chairman of LIGHTer's Board of Directors, CEO of Lamera*

SIP LIGHTer BOARD 2022



**Fredrik Edgren**  
*Volvo Car Corporation*



**Ingegerd Annergren**  
*Scania Vice Chair of LIGHTer*



**Johan Lindqvist**  
*AB Volvo*



**Malin Åkermo**  
*Royal Institute of Technology*



**Anders Sjunnesson**  
*GKN Aerospace Engine Systems*



**Eva Lindh-Ulmgren**  
*Sandvik*



**Henrik Blycker**  
*Oxzon*



**Magdalena Sandström**  
*Diab*



**Anna-Karin Jönbrink**  
*AFRY*



**Tomas Ireman**  
*Saab*



**Pernilla Walkenström**  
*RISE*

SIP LIGHTer MANAGEMENT TEAM 2022



**Marie Jonsson**  
*Linköping University*



**Lars Nyborg**  
*Chalmers University of Technology*



**Pär Jonsén**  
*Luleå University of Technology*



**Harald Hasselblad**  
*Volvo Car Group*



**Marie Fredriksson**  
*RISE*



**Eva-Lis Odenberger**  
*RISE*

"We are planning a delegation trip to Sweden for German companies focusing on lightweighting and mobility in May 2022 on behalf of the German Ministry of Economic Affairs (BMWK). We see good cooperation opportunities with Swedish players, and the interest from German companies is great."

**Katrin Kraus-Wikholm**  
Project Manager at the German-Swedish Chamber of Commerce (AHK Schweden)



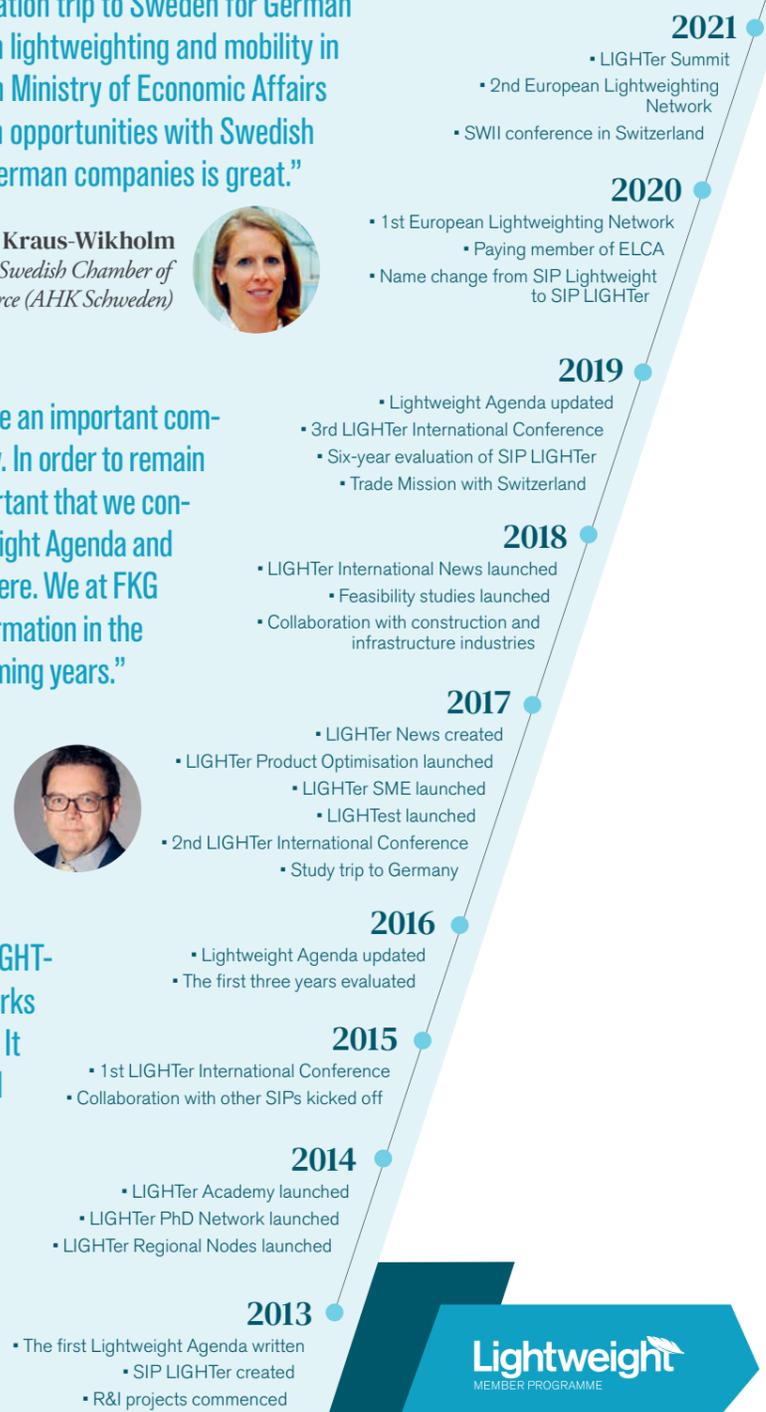
"Lightweight solutions are and will be an important competitive factor for Swedish industry. In order to remain competitive in the future, it is important that we continuously work to update the Lightweight Agenda and LIGHTer plays an important role there. We at FKG see an incredible change and transformation in the automotive industry in the coming years."

**Peter Bryntesson**  
Senior Advisor, The Scandinavian Association for Suppliers to the Automotive Industry



"Thanks to a feasibility study we did through LIGHTer, we have been able to show that graphene works and provides advanced functions for textiles. It will have a significant impact in lightweight and multifunctional composites that can be used in many different industries."

**Erik Khranosvskyy**  
CEO at Grafren

The Lightweight Member Programme is independent of SIP LIGHTer and is run by its own board. However, the member programme and SIP LIGHTer share the management team.

Key strategic events over the years

**LIGHTer**

## Strong personal networks

*The Lightweight Member Programme provides the 64 member organisations with a unique network of companies, universities and institutes – all active in lightweight technology. Here, personal contacts are made, and excellence comes together.*

In the Lightweight Member Programme, you are involved in taking joint responsibility for developing world-leading lightweight technology in Sweden. The network includes major export companies, SMEs, industry associations, research clusters, higher education institutions and research institutes. Linköping University is a new member as of 2021. As a member you get access to the latest networks, news in lightweighting, strategic investments, business intelligence and skill development. The programme offers exciting discussions about future projects, study visits to industry colleagues, and technology group meetings with plenty of opportunities to build strong personal networks. Last year's strategic investment in how companies can increase the degree of recycled aluminium in their production has attracted a lot of interest.

Members of the Lightweight Member Programme have access to digital education, such as the new course on fibre winding of composites. You also get good discounts on various courses in the lightweighting field, such as Lightweighting Professionals. In the courses, participants learn how to design and manufacture lightweight products with the support of leading European experts. More information can be found on our website. Any organisation that has a Swedish company registration number can apply for membership. Lightweight Member Programme is independent of SIP LIGHTer and is run by its own board though they share operational management. Many discussions in the Lightweight Member Programme later become suggestions for updates to the Lightweight Agenda.

"I myself have experience from the industry, research institutes and universities, and know that this type of network benefits everyone."



**Marie Jonsson**  
Senior Lecturer, Linköping University

### Quick facts 2013-2021

- 64** MEMBER COMPANIES
- 15** MEMBER CHECKS
- 11** MEMBER PROJECTS
- 8** STRATEGIC INITIATIVES

### Happenings in the Lightweight Member Program in 2022

- Co-organiser of the LIGHTer International Conference
- Updating of the Lightweight Agenda
- Participating in IAA
- Physical network meetings with member companies
- Results of our Strategic Initiatives



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See more at [lighter.nu/mpl](https://lighter.nu/mpl)

PLEASE GET  
IN TOUCH!

## LIGHTer Management Team

Want to get involved in strengthening Sweden's competitiveness in lightweighting by developing new skills and testing new initiatives and ideas? SIP LIGHTer has a lot to offer thanks to its cross-industry approach. We on the management team are always eager to explore new initiatives. We look forward to hearing from you!



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