



Gurit

# shape

The Gurit Magazine  
Issue 03, September 2008

Reaching for the higher-hanging fruit. Wind turbine technology.  
Innovating hand-in-hand. Hello, Gurit! High-speed trains in China.  
An interview with SSP's Flemming Sørensen.

Dear Reader,

Gurit saw a lot of changes happen during the first half of 2008: After having encountered a troubling combination of internal, operational and growth-related issues at the end of 2007, we defined an action plan to rebuild Gurit's long-term profitability. The half-year results show that Gurit has its bearings right and is moving in the targeted direction.

Profitable growth is the target. Gurit today is exclusively focused on global growth markets in the Wind Energy, the Transportation and the Marine industries. We exited the traditional winter sports materials production during the first eight months of the year – a business that does not offer the same kind of growth perspectives as our core businesses. We all would like to thank our former colleagues in Winter Sport for their contributions to Gurit over the past decades. It is in Winter Sports that the Group's specialisation on advanced composites had started in the early seventies.

The scope of activities at Gurit today shows that we are a new, young, and globally positioned company. None of our current production sites were part of Gurit before the year 2000. In the context of the action plan for profitable growth announced in early January, Management is aligning the production sites as much as possible to our three target market areas, each now headed by a dedicated General Manager. Read more about the program's goals and achievements in the interview with David Schofield, Director Corporate Development.

Besides the internal changes at Gurit, our main focus lies on our markets and our customers' needs. This edition of **shape** again puts the spotlight on innovation, technology and products, including a story on China's growing fleet of high-speed trains, fascinating yachts, and meeting Gurit's friendly voices at the other end of the phone line, and more.

We welcome your comments and feedback at [shape@gurit.com](mailto:shape@gurit.com).

Sincerely,

Rudolf Hadorn, CEO



## Contents

**Corporate News** <sup>04</sup> New corporate headquarters. <sup>04</sup> Meeting the financial community. <sup>05</sup> Four-year contract with Airbus. <sup>07</sup> Interview with David Schofield, Director of Corporate Development.

**Being Gurit** <sup>06</sup> Turning waste into a product. <sup>08</sup> Who answers our phones? <sup>23</sup> Recognizing excellence.

**Markets** <sup>10</sup> **Innovating hand-in-hand.** <sup>12</sup> High-speed trains in China. <sup>14</sup> An interview with SSP's Flemming Sørensen. <sup>18</sup> **SP help Puma create a real monster.**

**TechTalk** <sup>16</sup> Wind turbine blade technology. <sup>20</sup> Cost of quality drives innovation.

## Corporate News



### NEW CORPORATE HEADQUARTERS IN ZÜRICH/OERLIKON

The new corporate headquarters in Zürich/Oerlikon are ideally located for an international company like Gurit. They are only minutes away from Zürich International Airport and just over a stone's throw away from the Zürich/Oerlikon train station. Over the summer, Rudolf Hadorn, CEO, and Markus Knuesli Amacker, CFO, together with their staff as well as the General Management of Gurit's Wind Energy Business packed their bags and boxes and moved to Zürich/Oerlikon. Corporate Communications and IT/Infrastructure can now also be found on Schaffhauserstrasse 339. The legal domicile of Gurit Holding AG, however, remains in Wattwil.

### NEW GENERAL MANAGER WIND ENERGY



Rudolf Gerber has joined Gurit as new General Manager Wind Energy at the beginning of August. Rudolf Gerber holds a degree in engineering and brings successful, multi-company and internationally proven leadership experience to Gurit. Since 2002, he served as CEO and Delegate of the Board of Directors at Armstrong Metal Ceilings Group, St. Gall/Switzerland. From 1995 to end 2001, he was Divisional Manager at Alcan Airex AG, Sins. He has a strong background in composite technologies from his time with Alcan Airex and valuable international management and sales experience having served as Managing Director at Schlatter Ltd, Harrogate/UK from 1988 to 1995 and as Area Sales Manager at Varian AG, Zug, where he established distribution channels in the Middle East and Asia for capital equipment goods in the years 1986 till 1988. Rudolf Gerber works from the new Corporate Offices in Zürich.



### MEETING THE FINANCIAL COMMUNITY AND SHAREHOLDERS

Some 50 people joined Gurit at its year-end analyst and media conference in spring. The media and financial community have shown great interest in the latest developments at Gurit and will continue to follow closely what we do. We also had record high interest from journalists and financial analysts at the industry's most important trade show JEC in Paris where Gurit was proud to feature an Aston Martin DBS on the stand as a true eye-catcher. We had 2418 visitors on our stand at JEC which represents an increase of 49% over 2007 – a high benchmark for next year.



122 individual shareholders and shareholder proxies came to Gurit's Annual General Meeting this year. They represented 51.5% of all outstanding voting rights. The shareholders approved all motions proposed by the Board of Directors.

---

Nach der Neuausrichtung des gruppenweiten Verkaufs, stehen nun ein aktiveres Produktmanagement sowie laufende Effizienzsteigerungen im Vordergrund.

采购结构调整后，固瑞特现在致力于产品管理和生产的可持续性改进。

---



### GURIT (TIANJIN) WITH ISO 9001:2000 CERTIFICATION

Well prepared, Gurit (Tianjin) succeeded in achieving its ISO 9001:2000 qualification on its first attempt in May 2008. Like the other group sites all over the world, the youngest Gurit production site is now also certified according to the international management system standard. Congratulations to everyone involved!

### GURIT EXITS WINTER SPORTS MATERIAL BUSINESS

In July 2008, Gurit has fully exited its traditional winter sports business with the sale of the running base materials production, mainly based in Vreden, Germany, to the Austrian CPS Group. CPS also acquired certain equipment formerly based in Switzerland to produce extruded running bases. The top-sheet business was sold in spring already to the French Socrep Group. Ski and snowboard manufacturers will seamlessly be supplied with their material needs from the two companies that continue this business. Gurit would like to thank all former colleagues for their many contributions and wishes them all the best.

### FAREWELL TO DR. WALTER KÄNEL

Dr. Walter Känel, Member of the Board of Directors, stepped down from his position at this year's Annual General Meeting. He looks back on over three decades with Gurit: He joined the Group in 1972 as CFO, and assumed the position of CEO in 1975 which he held until the year 2000.



### FOUR-YEAR CONTRACT WITH AIRBUS/EADS

In June 2008, Gurit announced the signing of a new long-term supply contract with Airbus/EADS running until 2011 and worth some CHF 200 million. Gurit will supply these materials from its production sites in Switzerland and Germany. Airbus uses Gurit materials in all its existing plane models, including the world's biggest passenger aircraft A380.

Gurit's prospects are bright thanks to long-term contracts such as these, the continuous strength of the Wind Energy business as well as the full order books at the world's leading boat builders and wharfs.

### BEIJING OLYMPICS – A QUESTION OF EVEN OR ODD

The Beijing Olympics were designed to be «green» games, not least to provide athletes with fresh air and the least possible pollution in the metropolitan Beijing area. Gurit (Tianjin) is only an hour and half away from Beijing. Some of the special traffic and shipment rules introduced during the Games did require additional and detailed supply chain management planning. Certain product categories met severe shipping restrictions as trucks were shunned from express ways, or required additional containerizing. Also the daily alternate use of all road vehicles according to their even or odd registration plate numbers, prompted special measures, ranging from additional shuttle bus contracts to booking rooms at nearby hotels for some of the staff and management. Clean air comes at a price! Gurit (Tianjin) is happy to have contributed where possible to the success of the wonderful Beijing Games.

Being Gurit: Turning waste into a new product

---

Bei Gurit (Tianjin) anfallender Corecell-Abfall dient neu als Füllstoff für Sportplatzbeläge.

在固瑞特（天津）发泡芯料废料现在作为跑道的填充物使用。

---

# GURIT(TIANJIN) RECYCLES CORECELL DUST AND OFF-CUTS



**Running track material may contain as much as 10% Corecell dust as filler**

The production of Corecell structural foam kits involves the cutting and sanding of the expanded foam blocks to tailor the foam parts to the customers' requirements. The tailoring and kitting creates dust and small off cuts. Traditionally, these waste materials have gone to land fill sites or to incineration. Now, Gurit has found much better use for them.

For several months, Gurit (Tianjin) has been working with Tianjin University Beidou Company to investigate options to recycle Corecell waste and has now successfully produced a running track material that utilises the Corecell dust as a filler. The finished product features about a 10% content of Corecell dust which amounts to 15 tons per complete track.

The Beidou Company will not stop here, they are already researching the use of Corecell as the filler for a lubricant to be used in the oil drilling industry – something that is very prominent in the Tianjin and Bohai Bay area.

This innovative way to recycle waste has only been possible through close cooperation between the two companies and Wuxing Customs who monitor the importation of the unexpanded structural foam blocks from Gurit (Canada). As well as helping the environment, the project will save money for Gurit (Tianjin), too. The factory will produce approximately 500 tons of waste in one year, which would cost 750,000 RMB or 100,000 USD to incinerate.

# REACHING FOR THE HIGHER-HANGING FRUIT

**The action plan announced at the beginning of this year included immediate measures, but also a thorough Business Re-Engineering Programme. shape spoke with David Schofield, Director Corporate Development, about the programme.**

**shape:** What's the main scope of Gurit's Business Re-Engineering Programme?

David Schofield: It's all about invigorating our strengths, improving and hopefully eliminating weaknesses and reducing potential risks inherent to our business. At the end of last year, Gurit faced a series of difficulties – mostly associated with our rapid expansion during the previous two years, but also stemming from operational shortfalls. Looking at our financials, we understood that purchasing is a key factor to improving the overall situation of the Group. Materials and services bought are clearly the biggest cost block at Gurit. So we decided to focus on purchasing first.

How did you improve sourcing across the whole Group?

Through pooling sourcing activities within a globally coordinated purchasing team, allocating the necessary manpower and introducing a new suite of professional tools, we are on the one hand able to achieve a much leaner organisation for our external buying activities and, on the other hand, we can now

better structure our supplies, warehousing and also sales.

In what respect?

Our orchestrated buying activities centre on the three main product categories, which are chemicals, reinforcements and production consumables. We clearly understand where we need how much of what materials in our global production base. This knowledge allows us to better synchronise raw material prices with the prices of our materials sold. Then our purchasing team in some cases even identified alternative sources or alternative materials. Our overall goal is to eliminate as much as possible any negative impact on our results from higher sourcing prices by improving the mix and structure of our products and services bought.

What are the next steps to improve Gurit's performance?

With the immediate measures, such as the more flexible alignment of staff at some production sites or the decision to part with our Winter Sport activities, and with our new approach in purchasing, we're harvesting some of the low-hanging fruit. Now we're after the higher-hanging ones. In a second phase, we focus on product management.

What changes in terms of product management?

Innovation and product differentiation are key in a fast moving industry like advanced composites. A new generation of materials arises and Gurit wants to play a leading and active role here. At the same time, certain material classes become less important. The point I want to make is that products have specific life cycles. At Gurit, we want to manage these life cycles more closely in the future. From our daily contacts with our customers we learn what their crucial needs are and we want to turn this understanding into products, material packages and solutions that offer our customers new ways to differentiate themselves in their market places. To give you an example: If we manage to reduce the complexity of the manufacturing process e.g. at a wind turbine blade producer by introducing a next generation material package, we certainly have a winning offer.

Do we have such products?

Yes, of course. Gurit has a long tradition of being a key innovator driving technology, ahead. And we believe that Gurit will continue to develop new interesting solutions for all of our target market areas.

What's the next focus?

Operational Excellence – in all respects and at all levels.

## Being Gurit

# «HELLO GURIT» – «Nǐ Hǎo GURIT» – «GURIT, BUENOS TARDES» – – –



Zhou, China

### ZHOU

«My Chinese name is Zhou; but at Gurit I am Susan, that's easier for the international people. I have now been with Gurit – my first job ever! – for over a year. Here at Gurit Tianjin, I know probably 70% of all people and I know a handful of the international Gurit staff around the world. Speaking English is important in my job, as probably half of the 120 or so daily calls are in English. But it is not always obvious, which language is really appropriate: I remember an internal call: Someone started off in Chinese and I immediately answered in Chinese, too. Only after a couple of sentences in Chinese I realized I had lost him. – It was one of the English engineers who came to support our new plant.»

### KATHERINE LLOYD AND BARBARA STEER

«We get some funny calls, too», says Katherine Lloyd of Gurit (UK). «One lady called and as soon as I answered she started explaining why it was not her fault a complaint had been made about the noise level in her flat. I kept trying to say «Can I stop you for a moment?», but she said «Please do not stop me until I have finished» and carried on. Eventually, I managed to explain



Katherine Lloyd and Barbara Steer, UK

she had the wrong number to which she went very quiet and said goodbye. – At reception, you never know what your day brings! My main language is English but I am trying my hand at Chinese as I have a holiday to China later this year, I have been getting some help from the employees from the Tianjin plant currently visiting Newport! When I am not at work I enjoy getting outdoors, walking and swimming and spending time with my family. Most lunch times you can find me in the Gym at the Newport site.»

«I have worked at Gurit (UK) for 22 years now», explains Barbara Steer. «I come in contact with most of the workforce here on a daily basis and with my length of service also know quite a few people from our other Gurit sites around the globe. As well as the reception role I am also the coordinator for our corporate Membership for Gurnard Pines Leisure Club. To my shame I only speak English but I always try to get the correct pronunciation of Gurit employee's and customer's names as I think this is very important.

Outside of work I have many hobbies I like to keep myself busy, I have practiced Yoga for 15 years and use the health club and spa facilities everyday, either swimming or going to the gym. When I'm not busy



Ruth Clarke, Switzerland

keeping fit I love to look after my garden and grow the odd vegetable and enjoy reading a good book.»

### RUTH CLARKE

«It's 20 years ago that I started working for Gurit» remembers Ruth Clarke. «I worked for various CEOs and one of my tasks at our registered office in Wattwil is, of course, to answer the phone – a job that takes you through all the ups and downs and ups again of an international Group such as Gurit. Languages were always important. We lived in Canada for some years, so apart from German, French and Italian I also speak English. One thing for sure is true at Gurit, life was never boring. When Management moved to Zurich this summer, I did not join them as this will coincide with my retirement. I look forward to enjoy our holiday home in Southern Switzerland more often and if you look under my desk, you will see who will keep me more than busy! Come here, Remic, say hello to **shape**! I love retriever dogs and will continue to be very active in training my Labrador as a companion and rescue dog. I take this opportunity to say good-bye to everybody I got to know during the time at Gurit either personally or over the phone.»

Have you ever wondered who answers the phones at Gurit? shape made a couple of calls: Please meet Zhou whose international name is Susan, Katherine who prefers the gym over the café during lunch, Barbara who loves to grow vegetables in her garden, Ruth who is a semi-professional dog trainer, Marian who likes to explore the outdoors with her daughter, Francine who saw Magog grow from 30 to 500 employees and Tarne who enjoys the daily contact with customers down under.

# — — «GURIT HOLDING, GRÜEZI» — — «BONJOUR GURIT» — — — — — — — —



**Marian Gonzalez, Spain**

## MARIAN GONZALEZ

«I just finished my first year as a receptionist at Gurit Spain. It has been a year of good experiences, hard work and a lot of learning», says Marian Gonzalez. «Aside from my tasks as receptionist & facilities I am in charge of some other supporting tasks to the different departments as well as to the Management Team of Gurit in Albacete. I assist them in the organization of their business trips or their visits to other plants.

I believe that I know each and every one of the people who belong to the team of Gurit Spain, about 150 employees, perhaps not all with full name but their faces. All of them go through reception every day towards their jobs!

My native language is Spanish; but I do understand English well enough and I am being trained by the company along with other co-workers to improve my English. A special skill that I needed to develop, was guiding visitors to our facility when they come by car and get lost somewhere nearby. I try to understand where they are and keep guiding them until I see their car coming down the road.

Apart from swimming, walking, reading – especially biographies and historical novels



**Francine Goyer, Canada**

## FRANCINE GOYER

– I like to enjoy nature with my two-year-old daughter, who occupies the most of my free time but it is the best time that I spend in my weeks.»

## FRANCINE GOYER

«I started with Gurit five years ago, when we were 38 employees and now we are more than 550. So I have met those 500 employees when they came for their interviews at three different locations, since Reception moved twice since I am here.

My main responsibility is to answer the phone and welcome visitors. It is very difficult to say how many calls I can answer in one day because each day is very different. All I can say is that I talk to a lot of people every day. I also help with the recruitment process, organize trips for our employees when they need to travel, and I help my colleagues from other sites with organization of accommodation and transportation when they have people travelling to Magog, as well as for our customers. I also order stationery for both sites in Magog and I'm involved in the organization of activities for our employees. In my free-time, I enjoy playing with my three-year old grandson – the sunshine of my life.»



**Tarne Sheed, Australia**

## TARNE SHEED

«I recently joined the Gurit team at the beginning of this year; I am the youngest of the team in Australia. Before work each day I manage to go to the gym; I like to live an active lifestyle; I enjoy exercise and being outdoors. My other hobbies include reading, painting and spending time with friends. In this short time I have had the opportunity to build a relationship with most of my fellow colleagues including the ones from our New Zealand office, as well as the chance to form an association with many customers with whom I speak on a daily basis.

Unfortunately, English is my only language; however some of my colleagues have been patient enough to teach me a few things from languages such as Mandarin, French and Italian.

I often receive funny phone calls from telemarketers trying to convince me to take their 40 second survey. Their tone quickly changes when I explain to them that I am unable to take their survey as I am very busy; by the time I get them off the phone it most likely would have been quicker to take their survey.»

Northern Marine setzt in neuen Schiffen auf die Qualitäten von Corecell-Sandwich-Strukturen.

北部的海运业，在他们的新船里使用了高质量的发泡芯料夹层材料。

# INNOVATING HAND-IN-HAND

SP, the marine business of Gurit, has built a remarkable relationship with US-based Northern Marine, a prominent builder of mega yachts and trawlers in the US Pacific Northwest – all based on SP's unique ability to not only provide customers with best-performance materials but also the highest levels of engineering expertise.

Al Horsmon and Harry Warticovschi – US chief naval architect and senior naval architect for SP respectively – have nurtured a long-lasting relationship with Northern Marine that has allowed SP to work hand-in-hand to innovate exciting new structures and innovations to boat designs. This successful relationship typifies SP's dedication in building strong, dependable links with boat builders the world over.

Having established a working relationship with Northern Marine in 2001 by designing the structure of the Northern-built 39m M/Y «Magic» and 46m M/Y «Lia Fail», Al Horsmon and Northern Marine began discussing the potential benefits of a Corecell™ sandwich construction on the new vessel with the captain and designer of Magic.

The proposed design offered a vessel with a structure that would be stronger, lighter, naturally insulated and quieter without giving up structural integrity, safety damage tolerance or toughness of the vessel. The biggest obstacle would be to convince the customer that a Corecell™ sandwich laminate was better than a monolithic one usually used by most of the other large composite yacht builders. However the owner of Magic, Magic's designer and Northern Marine were fully impressed with the rock solid feel Corecell™ had helped give the boat in rough seas.



A fuel tank nestled between two bottom girders

«We surfed that boat down some 10ft waves – and when it hit the trough it didn't even shudder, it felt solid and safe,» recalled the Northern trials captain. «And all this was possible with what I thought was much lighter construction than we had in our smaller trawler-style long range motor yachts.»

In producing a premium product, Northern Marine already understood the benefits that premium materials add to the value of their product. Most impressively, Northern had independently tested all kinds of structural foam – and declared Corecell™ to be the best on the market.

«We made our own independent tests on all different laminate structures using various core materials as well as various glass material choices in our «makeshift lab,» explains Tom Camp, Northern's Structural Components Manager. «By devising our own «destructive» tests to judge the samples, we could develop our own conclusions on what material is the best: We chose Corecell™, solely because of these results!»



**A web frame and a freshly landed bulkhead support the bottom girders**

By adding design, processing and technical support to the provision of Corecell™, SP could offer a value-added total package to help the customer not only build better boats but significantly advance their business. So when Northern Marine won contracts to build a series of 46m tri-deck motor yachts, but didn't have the in-house capabilities to do the structural engineering of the vessel, this was no problem – SP not only stepped in to create the structure, but also provided the drawing package to submit the craft to the American Bureau of Shipping (ABS) for certification.

As the project progressed, and with a change in ownership of the yard, new president Ken Kurtenbach worked closely with Harry Warticovschi to bring more of SP's technical skills to bear on the project.

«At the time we acquired Northern it was apparent that we had limited engineering capabilities and were in immediate need of structural engineering support,» says Ken.

«Our philosophy is to engineer and then build product, and have been on a mission to beef up our internal engineering department. However it is reassuring to have an outsider's perspective and input into design in that it provides a quality check for our builds, and I see a continued relationship with SP irrespective of our own in-house engineering capabilities.»

With such a strong endorsement, the relationship with Northern has continued to grow. SP now provides ongoing onsite technical support that includes monthly onsite visits, has secured an additional contract to revise the drawings and act as liaison for submittal of plans for Hull No. 2 of the 46m series. Additional modifications have been made for Hull No. 3 and SP continues to provide engineering, drafting, design and ABS approval coordination services. Most recently, NMC have also asked SP to undertake the structural engineering for a new 26m trawler.

Overall SP's relationship with Northern over the past seven years typifies the SP approach to customers: to offer a complete package of materials and support that doesn't just meet expectations but aims to completely exceed them, providing customers the chance to transform their products and give them a technical edge that will distinguish them from their competitors.

Ken Kurtenbach sums it up: «SP's input has been invaluable,» he says. Long may that continue.

---

Gurit liefert Materialien für den Innenausbau von Hochgeschwindigkeitszügen in China.

固瑞特为中国的高速列车内部提供复合材料。

---

# GROWING HIGH-SPEED TRAIN FLEET IN CHINA

Rail traffic is the most important means of transportation in China.

Trains account for two thirds of the country's passenger traffic

as well as half of its merchandise traffic.





**Facing serious traffic and pollution problems, China is rapidly expanding its railroad network and upgrading major lines for fast and high-speed service. Gurit supplies the latest kind of prepreg materials for the interior refurbishing of some of China's modern train carriages.**

China Rail expects to put not less than 160 high-speed trains in service during 2008. International train experts calculated that this will allow China Rail to provide around 120 million seat-km per day on its high-speed lines or – if you look for an even higher figure – 45 billion seat-km per year. To date, China has five different high-speed train models. They are all based on European or Japanese technology and referred to as China Railways High-Speed trains CRH1 (Bombardier Sifang Power joint venture), CRH2 (Kawasaki; Shinkansen design), CRH3 (Siemens; Velaro platform), CRH4 (future local build based on CRH2) and CRH5. CRH1, 2, and 5 are all designed for operation in the 200 to 250 km/h speed range and form the first tranches of an extensive fleet envisaged to operate medium-distance inter-city services on China's emerging network of Passenger Dedicated Lines. Only the CRH3 trains will be running at up to 300 km/h.

## **GURIT HIGH-TECH MATERIAL FOR TRAIN INTERIORS**

The CRH5 is an electric high-speed train based on the Alstom Group's wide-bodied Pendolino train family. Yet CRH5 trains do not lean to the side going round bends. The global order, worth 620 million Euros, consists of 60 trains. Alstom Transport supplies 3 complete trainsets and 6 sets in kits. The company will also supply the equipment for the remaining 51 trainsets which will be built locally, by Changchun Railway Company, its local partner. Each train is made up of eight cars.

Gurit supplied prepreg material for the internal refurbishing of 40 of these 60 CRH5 trains. The supply contract amounted to several million Swiss francs. The choice for Gurit material was mainly based on the achievable weight reduction and fire resistance properties: Changchung Railway Company opted for the latest in material technology using a sandwich construction rather than the traditional sheet-mould-compounding technology which results in solid and quite heavy laminates. The considerable weight reduction achieved with the sandwich material comprising two cyanate ester or phenolic prepreg layers on the outside and a honeycomb structure in between will – over time – result in considerable energy savings and compensate for the higher initial costs.

## **SOME TRAIN INTERIORS MORE MODERN THAN IN EUROPE**

Matthias Hucke, Key Account Manager Aerospace and Rail Business at Gurit (Kassel) is highly enthusiastic about the modern concept of these Chinese train carriage materials: «I would even say that China has opted for a more modern and more sophisticated material concept than what is currently used in most of the European high-speed trains. With respect to weight and fire retardancy, these materials are clearly superior.»

China Railways can be sure that the materials have the highest available quality in terms of fire resistance. Especially the cyanate ester prepreps offer some valuable process advantages, since their addition-curing process does not set any gases free which allows in the so called vacuum bag production processes for smoother surfaces and better adhesion to the honeycomb structure without the need for higher pressures.

Interview with Flemming Sørensen

# TEAMING UP FOR SUCCESS

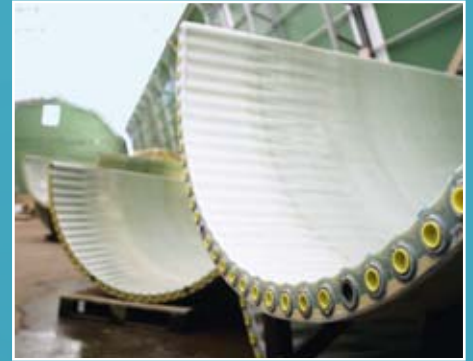
SSP Technology A/S (SSP), a pioneering rotor blade and composite manufacturing technology company, was founded by Rune Schytt-Nielsen and Flemming Sørensen in 2001. From small beginnings the company has now grown to more than 150 experienced employees. Initially SSP focused on blade design and developing series blade manufacture, however over the years, the company diversified its activities. Today SSP is a leading technology company offering rotor blades, mould manufacture and blade development all of which use of state-of-the-art technologies and materials supplied to clients world-wide. shape spoke with SSP's CTO, Flemming Sørensen, about the company's remarkable history and how the collaboration with Gurit helped drive its development.

---

SSP setzt auf die konstante Produkt-Qualität und das Entwicklungs-Knowhow von Gurit.

SSP 依赖于固瑞特恒定的产品品质和不断发展的专业知识。

---



**shape:** Flemming, can you tell us about SSP's current projects?

Flemming Sørensen: SSP Technology is in a rapid growth period, where things are running extremely fast. We are working on several projects from development and manufacture of blades, moulds and components to certification of blades. So far, all our projects have been successful and we, as well as our customers, are satisfied with the results. It is, however, undoubtedly a challenge to organize and run all these projects in order to meet the demands of the customer in terms of quality and deadlines, but so far we have been able to comply with our customer's wishes and we look forward to the challenges awaiting us in the future.

How close is the co-operation with Gurit?

Our success in blade technology is first and foremost due to our skilled and motivated staff who work together to ensure a sustainable future for the generations to come. However, our success also rests upon the

close cooperation with our different suppliers. A strong sense of mutual trust characterizes our relationship with our suppliers and this is of greatest importance to us. We see our relationship with suppliers, such as Gurit, as very strong and it has been so since the beginning of SSP. We believe that it is important that we work together with our suppliers as a team in order to achieve our goals. Gurit with their expertise and high technological level has been a good support to us in developing projects and achieving success.

What have been the major achievements in your partnership with Gurit?

Being a small company in rapid growth, we are dependent on skilled and reliable suppliers. Gurit's consistent quality of product and constant focus on quality improvement are essential to us and our close co-operation with Gurit's development department has been a great help in the process of developing our tooling and component concepts.

Looking forward, how do you see SSP developing and how will this affect the relationship with Gurit?

Looking forward, we expect SSP to develop with the same speed as now and in the same direction as we started in 2008, and the goal is to position ourselves even stronger in the years to come. We have our blade development, mould production and component production including the root joint, which already in 2008/09 will be inserted in six different blade types ranging from 39 to 63 meters. This large quantity of products gives rise to some big challenges in terms of optimization of materials both technically but also with regard to price. Ongoing optimization is important for our continued competitiveness. In this respect, we are pleased to work with suppliers like Gurit, whose technological level of expertise is very high and we look forward to working together with Gurit in the future.

# WIND TURBINE BLADE TECHNOLOGY

**There are few industries in the world which have seen growth in the last five years which can match that of wind energy. The market has progressed at a pace which has put pressure on every part of the supply chain, as requirements for both more, and larger turbines have grown beyond all expectation. Globally, wind energy is now established as a viable resource for power generation, with modern turbines providing kilowatt/hour prices which are competitive to their more mainstream rivals.**

The development of blades for the new generation turbines has been one of the largest areas of development and growth. In just a few years, physical blade size has grown around 300%, with many blades now well in excess of 45 m (147 ft) in length. In addition to this, requirement for these blades has grown with the turbine demand, and facilities designed to manufacture blades are, in many cases, now producing blades at a rate five-fold their designed capability.

## POISED FOR GROWTH

The effect of this throughout the advanced composites industry has been massive. Supply of materials has been under pressure in all areas to match the increased build requirements. In addition to this, the focus has been to produce not just more units of larger sizes, but to reduce weight and increase stiffness to provide more efficient blades.

---

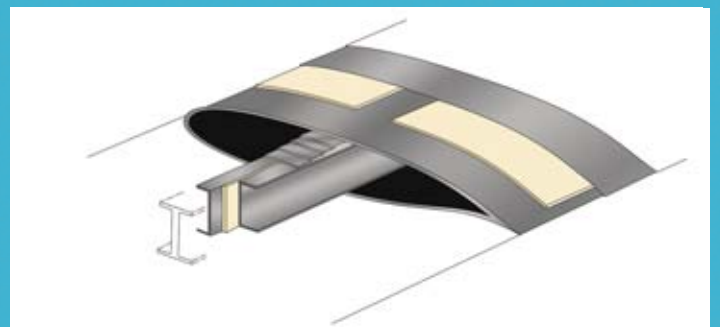
Gurit verfügt über ein umfassendes Produktangebot für die Konstruktion von Windrotorblättern.

固瑞特的产品包罗万象，可以提供为组成风动叶片所需的所有零部件。

---

## SHELL, SPAR AND ROOT AS MAIN DESIGN ELEMENTS

A modern wind turbine blade is constructed from four components. The shell forms the aerodynamics of the blade, the spar provides structural support for the shell, the root attaches the blade to the turbine and the surfacing solution provides protection against sun, wind and weather. These components are fabricated from epoxy resins and a combination of glass and carbon fibres in an industrial process. The cross-sectional illustration of a wind turbine blade shows the UV resistant surface coating, the layers of multiaxial glass fabric (fibers laid in many directions to take loads from all directions) on the top and bottom of the shell and the polymer core material separating these skins to provide stiffness to the shell. The two halves of the shell are bonded to the spar, which is composed of unidirectional (all fibers in one direction, like a tree trunk) glass or carbon fibers laid thickly on the top and bottom and separated by a sheet of glass or carbon fiber material, which increases the stiffness of the beam in the same way as a steel beam is stiffer than a plain sheet of steel. The root joint is bonded to the blade and is composed of thick glass or carbon laminate with bolts embedded in it to transmit the huge forces the turbine blade generates through to the turbine shaft. Gurit manufactures all the materials needed to produce these components and fabricate a complete wind turbine blade.





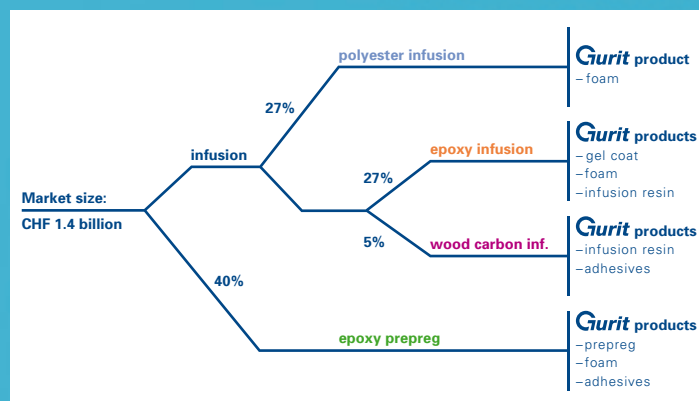
Blade production is complex and we are unique in offering the industry a combination of structural engineering, materials development and manufacture, combined with on site expert technical support and prototyping facilities.

## TWO MAIN MANUFACTURING METHODS

The manufacture of modern composite wind turbine blades has seen a technology split between two very different production routes. The resin infusion system (or variations of it) has become a popular choice for blade manufacturing and has proven to be a viable choice for fast production of large blades. The other route, which uses pre-impregnated reinforcements, allows blade manufacturing times at least equal to those of a resin infusion process, but also provides a higher quality and production control inherently available from this technology. As production becomes more automated and cyclic, the latter option has become increasingly popular as it allows considerably further scope for process optimization and lean management.

The current market trends have pushed blade technology at levels equal to the growth in demand for machines. Recent years have seen large steps in production technology providing focus on development of larger and better blades. Whilst this is still a priority, consolidation of process management for the current production blades has become more of a priority as volumes increase further.

The development of future blades is reaching a major milestone. Until now only a few blades whose design has required it have utilized carbon fiber materials. However, the physical growth of blades now places an emphasis on creating structures which have sufficient properties such as stiffness to allow them to be effective in power generation.



**Wind Energy is an important composite market using a wide range of materials. According to the manufacturing technology employed by the customers, Gurit supplies a different product mix.**

## MATERIAL OPTIONS FOR THE FUTURE

The incorporation of a stronger fiber is an obvious choice for meeting these criteria, albeit with a significant price increase against more common and lower grade glass fibers. Its inclusion requires a significant refocus for the blade designers to optimize both design and manufacturing processes and ensure that the material is being used at its optimum in the structure.

Gurit has been a leader in technology solutions for 25 years, with a focus to ensuring composite structures are optimized in both design and process. The in-house engineering group is able to provide a direct feed into materials development and vice-versa. The materials and solutions Gurit provides are in use by almost all major wind turbine manufacturers and are proven in service with thousands of large turbines.

Learn more about Gurit's latest product and technology innovations for building wind blades in the TechTalk section.

## Markets: Marine

SP has a formidable reputation in the yachting world, having contributed to many of the world's best-in-class boats – four out of five of the top yachts in Barcelona World Race 2008 benefited from SP materials and engineering. So when PUMA's Boston-based Ocean Racing team decided to create a boat to try and bring home the 2008/2009 Volvo Open 70 title, they decided to call on SP.

The result is *il mostro*, christened in a ceremony held in Boston, Massachusetts, on May 12, 2008. Italian for «The Monster», SP supplied a dedicated team of engineers to work alongside boat builder Goetz Custom Boats and Customline Yachts, ensuring the SP materials within the Botin and Carkeek-designed racing machine perform to their optimum capability.

*il mostro* will need to cope with stern conditions during the demanding 39,000 mile race and SP used materials that demonstrate tremendous stability and strength. The use of SA70 in conjunction with SE70 and Structural SPRINT® ST70 has significantly helped reduce the overall weight of the vessel, while SP engineers also specifically batch selected carbon fibres to achieve the maximum mechanical properties allowed by the VO70 rule. As a result, less material was used making for a lighter, stronger boat without sacrificing structural integrity. Finally SE70's excellent surface finish combined with ST70's strength and ease of application was ideal for use in *il mostro*.

The result is a boat with a technical leading edge that the PUMA Ocean Racing team hopes will lead them to victory.

PUMA Skipper, Ken Read, said: «I am just incredibly pleased with the effort that went into the boat design and build process. We started building just over six months ago and finished within days of our goal.»

«SP's engineers have worked tirelessly to get this boat ready and their expertise in helping us optimise the craft has been essential in developing what we hope will be a very fast boat. I am now looking forward to the chance to do what we as a team do best and that's to go out and sail.»

# SP HELP PUMA CREATE A REAL MONSTER

In the world of marine racing, it's all about advantage – and that's what SP, the marine business of Gurit, gives every boat it works on.

---

Die Volvo Open 70 Yacht «il mostro» von Puma setzt auf Gurits SP-Materialien.

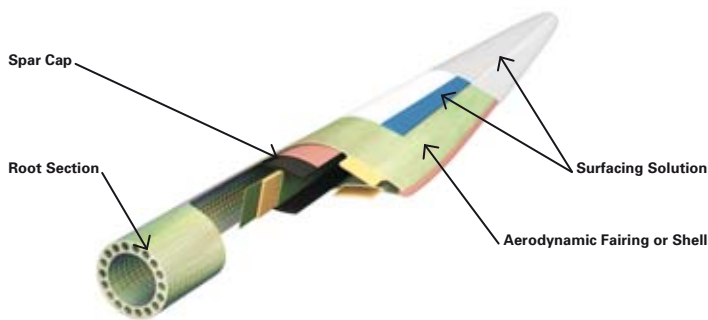
游艇 Puma's Volvo Open 70 yacht «il mostro»使用的就是固瑞特SP材料.

---



# COST OF QUALITY DRIVES INNOVATION

The root section, the structural spar or spar cap, the aerodynamic fairing or shell and the surfacing solution are the four main elements in the manufacture of wind turbine blades. Each of these components has a distinct set of technology requirements as well as engineering and material solutions. While the incorporation of these four elements into a finished blade varies from one blade manufacturer to another, they all share the common goal to increase quality and productivity while simultaneously engineering cost away from the blade. Gurit innovations provide the right answers by cutting back cycle-times and improving specific physical and chemical characteristics.



## SPRINT®IPT FOR PERFECT SURFACES OF PREPREG WIND BLADES

The surfacing of a wind blade either consists of an in-mould gelcoat, or an in-mould primer followed by a subsequent painting operation. In-mould gelcoats do not require any post-production treatment. These coatings have been used extensively on smaller blades (<30 m), but as blades become larger, mould time has become more critical and in-mould gelcoats have become less desirable as they can add significant time to the shell manufacturing process. The painting solution has the advantage of separating the surfacing process from the shell manufacturing. However, the painting process still requires some form of in-mould primer to provide a sandable surface to serve as a mechanical key for the paint.

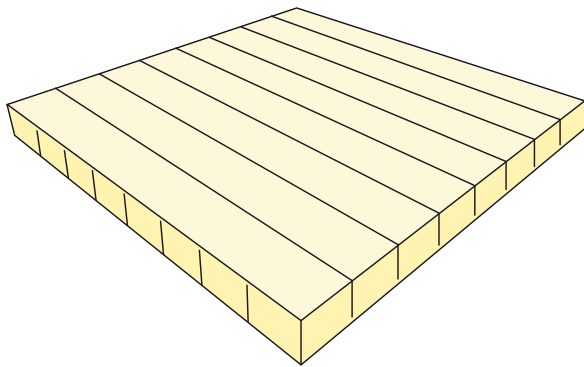
For prepreg shells, Gurit has developed a solution to provide a primer surface as an integrated component of the shell reinforcing prepreg material. This has the benefit of removing the separate process step of priming using a wet system that has an associated application and tack-off times. The new product called SPRINT®IPT combines the experience Gurit gained in the automotive market to produce Class A carbon body panels with the industrial requirements of the wind energy market for high deposition rates, heavy weight fabrics and an appropriate quality of surface for subsequent painting. SPRINT®IPT combines the standard SPRINT® triax technology with a surfacing film to produce Integrated Primer Technology (IPT). The result is a significant reduction in the shell manufacturing time and cost by removal of the in-mould priming process, and an increased quality of the surface as SPRINT®IPT reduces the number of defects such as pinholes and sink marks.

## GURIT DEVELOPMENTS FOR INFUSED SHELLS

In the production of infused wind blade shells, the first production stage is the application of an in-mould primer or gelcoat into the mould. This coat provides either the final exterior surface or a priming coat for subsequent painting, and serves the secondary function of sealing the mould tool against air leaks. The coat is then heated

to cure to a level where operators can walk on its surface. The fabrics, core, and spar caps are then positioned before the application of a vacuum stack. The vacuum stack will vary from one blade to another and will utilize various types of mesh to facilitate resin flow during the infusion process. The core and reinforcement lay-up are also optimized to facilitate fast and even resin infusion whilst maintaining their primary structural functions.

One of the key variables of the infusion process is the consistency of the resin flow from blade to blade, and the subsequent variation in blade weight and quality. To overcome these phenomena, Gurit developed customized cutting patterns in the core material to optimise resin flow and distribution, whilst maintaining low resin uptake within the structure and eliminating the need for sacrificial meshes.



#### Corecell Optimized Infusion Format

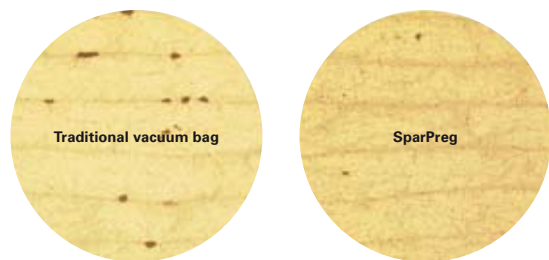
This cut system uses a thin knife cut (typically 0.8mm) at a 30mm cut spacing on one side of the sheet, coupled with the same pattern but in the perpendicular orientation on the opposing face. Using the cuts in this way provides excellent flow characteristics, whilst providing the conformability required to suit difficult mould shapes and curvatures. The low cost characteristics of this type of pattern are enabled firstly by the material requiring no glass scrim to be applied (often used to provide stability to heavily cut infusion core patterns), and that no drilling or perforating is required – the depth of the cuts and the regular 30mm by 30mm intersection provides a perfect infusion flow between the laminate skins. In industrial wind blade manufacturing, this cut configuration has been proven to:

- Reduce overall resin consumption
- Provide consistently as much as 20% faster infusion times
- Provide more repeatable infusion quality
- Reduce dry areas caused by scrim cloth
- Improve flow from perforations created by cross-cuts rather than drilled holes

## GETTING THE AIR OUT OF UNIDIRECTIONAL COMPONENTS WITH SPARPREG

Wind blade shells can be categorized by the engineering design into two types: either the shell is structural or non structural. Structural shells include two unidirectional (UD) spar caps running from the root to the tip of each shell half, which are later connected by bonded and over-laminated shear webs. Non structural shells are reinforced by a structural spar component that has been assembled in a parallel production operation. This spar structure is normally complete with caps, shear webs, and root section, and is bonded into the light weight shell structure in the final blade assembly. In both cases, the spar component is the main load-bearing structure of a wind turbine blade and utilizes UD fibre, glass or carbon, to provide bending strength and stiffness. The quantity of UD material required is significant, resulting in laminate sections up to 50mm thick towards the root section. This provides some technical challenges when considering fibre alignment, resin content, void content, deposition rate, exotherm control, and connection to the shear web using multi-axial materials. Furthermore, as blade size has increased and carbon fibre is used more widely, the strength requirements have become the main design driver placing even more focus on fibre alignment and high quality laminates with low void content.

Spar caps are often manufactured off-line to enable full quality validation of this critical component before integration with the shell structure. One of the key issues with spar cap manufacture is the attainment of low void content with large UD cap thickness. The problem is compounded by the low permeability of UD materials, making them notoriously difficult to infuse, or – in the case of prepreg – remove the interply air. These issues are normally overcome by integrating multi-axial materials within the UD laminate stack to provide faster infusion rates, and to facilitate air removal from a prepreg stack.



SparPreg Laminate

## TechTalk: A closer look at innovation

Für die unterschiedlichen Konstruktionsweisen von Windflügeln hat Gurit spezifische neue Produkte und Technologien entwickelt.

固瑞特开发了新的产品和技术用于风力涡轮叶片制造的各式生产工艺。

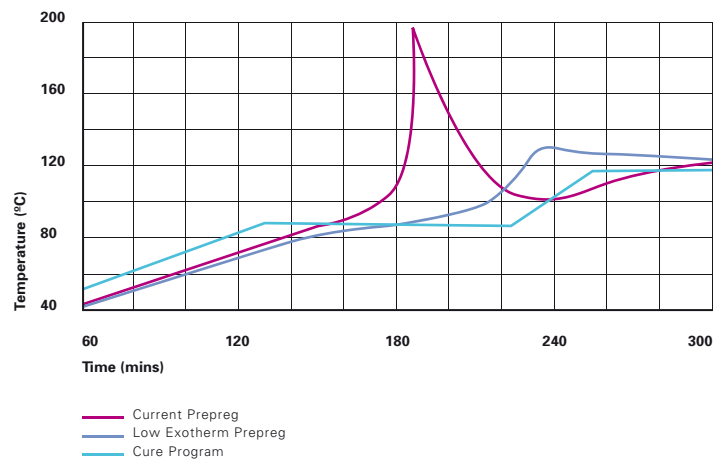
With the focus in the market to look at the Cost of Quality for blade manufacturing there has been an increasing demand for products that produce a consistent quality for a competitive overall blade cost. One of the key areas for improvement are spar caps where the associated difficulties in processing had lead to variability in part quality and/or expensive engineering solutions. Using Gurit's experience in air breathe materials and solutions, namely SPRINT® and Airstream™, a new unidirectional material has been developed known as SparPreg™. This product has been specially formulated to facilitate the removal of inter-ply (between the plies) air within a UD stack using standard vacuum bag processes, and without intermediate debulking stages. SparPreg™ is also designed to be fully compatible with SPRINT® multiaxial materials, providing a very versatile material solution for all structural spar concepts.

### LOW EXOTHERMAL MATERIALS FOR THE ROOT MANUFACTURE

The root section of the blade has the primary function of transferring the loads from the composite structure, via metal inserts, to the hub and main drive shaft of the wind turbine. The metal inserts are normally bonded into the composite using infusion or adhesive resins, or using mechanical fasteners at 90° to the laminate. To accommodate the metal inserts the laminate section thickness is typically 50–100mm depending on the design of the root. As with the spar caps this laminate needs to be of high quality with a high fibre volume fraction and low void content, but as the load requirement of the root is different to that of the spar, it is normally made from both unidirectional and multiaxial materials.

The root section of a blade is incorporated into the blade structure using many engineering solutions. It may be integrated into the structural shell, integrated into a structural spar or spar cap, or manufactured separately to both spar and shell and bonded into the structure at the point of blade assembly. Whatever the format of the root section, the key requirement is to produce a thick section of laminate of high dimensional tolerance, with high fibre volume fraction and minimum void content.

One of the major constraints to root productivity is the exothermic reaction of the laminate during the cure due to the inherent thickness of the component. Indeed this is also a major constraint for shell and spar manufacture leading to a requirement for increased tooling performance (and therefore investment) to maintain efficient cycle times. To overcome this fundamental issue, Gurit has used its extensive knowledge of resin chemistry to develop a range of products with significantly reduced exothermic characteristics. The exothermic characteristics of the new resin matrix for PrepregLE and SPRINT®LE materials is illustrated in the graphic below in a worst case thick matrix casting (no reinforcements or core) highlighting the significant potential to reduce or eliminate intermediate dwell temperatures in a component cure-cycle, reducing the overall cycle-time.



Being Gurit

# RECOGNISING EXCELLENCE

**shape** talked to last year's Gurit Australia Award winner Warwick Lauder, who is currently enrolled in Gurit (UK)'s Graduate Training Programme.

**Gurit Australia honours top achievers in the field of composite materials at Melbourne's Monash University every year. This year, the Gurit Award went to three top-scoring students in a double Aerospace and Mechanical degree programme who will graduate next year. Ms Annika Harvey, Ms Carly Sward and Mr Prakash Gururajan all achieved top marks and shared the annual prize money. In the picture below, Gurit's Valerio Corniani presents Prakash with his award for a feasibility study on composite train carriages.**



**shape:** How did you find out about Gurit?

Warwick: At a presentation made by the engineering manager of the Australian Gurit office at my university. I was immediately interested. Winning the Award for Excellence then gave me the opportunity to have dinner with the Managing Director of the Australian office, and to learn more about

the Graduate Training Programme which I then chose for several reasons. Firstly, the design engineering at Gurit was exactly what I was looking for as they design whole boats on a much smaller time scale than in the Aerospace industry. As a design engineer I can design every aspect rather than being limited to just certain sections. Another appeal was Gurit's cutting edge technology in composite materials and, last but not least, the opportunity to travel. The programme is very multicultural with graduates recruited from Australia, the US, China, and Italy.

What are your professional aspirations?

I hope to stay in the UK office for a few years and expand my engineering knowledge as much as possible. There's a lot for me to learn over here. I aim to be a project manager on a major engineering project within a few years. After several years I could see myself either travelling to another Gurit site or returning to the Australian office as a senior design engineer, possibly acting as a team leader. Further down the track I would like to complete a MBA and move into upper management.

What is the main fascination of composites for you?

Their flexibility of use. Unlike «normal» engineering materials such as steel, composites have their major strength aligned along one or two axes only. This allows you to tailor

the engineering solution by using only as much material as required, thus creating huge performance gains.

What are you currently working on at Gurit?

I am currently in the middle of three months of engineering training. This involves learning the different engineering programs used within the office, and the theory behind them. The training also covers the various classification societies used to classify both sailing and motor yachts.

However, not only does the engineering training focus on the analytical side of engineering, but we're also receiving lateral thinking training to increase our creative thinking.

Is professional life very different from being a student?

Both lifestyles included many projects, each having their own priorities and deadlines. In the professional world there is less flexibility to complete the work. As a student, I could easily take a few hours off to go and have some beers at a barbecue, knowing that I could return to work later that night. Another difference is the consequence of a wrong answer. At university, a wrong calculation can mean the difference between a credit and a high distinction. In industry it can result in expensive repairs or even fatalities.

## GURIT AGENDA 2008/2009

Gurit will showcase its wide range of material packages, solutions and technologies at a trade show near you.

The Gurit teams look forward to meeting you and introducing you to the latest in advanced composites at the following shows:

- » **Composite World Expo, Schaumburg, USA, 3–5 September**
- » **SPE Automotive, Detroit, USA, 16–18 September**
- » **China Composites, Shanghai, 17–19 September**
- » **Monaco Yacht Show, Monaco, 24–27 September**
- » **IBEX, Miami, USA, 6–8 October**
- » **Materialica, Munich, Germany, 15–16 October**
- » **Feiplar Composites, São Paulo, Brazil, 11–12 November**
- » **Tidal Energy Summit, London, UK, 11–12 November**
- » **IBEX, Miami, US, 6–8 October**
- » **METS, Amsterdam, The Netherlands, 18–20 November**

# Gurit

Schaffhauserstrasse 339  
CH-8050 Zürich/Oerlikon  
Switzerland  
[www.gurit.com](http://www.gurit.com)

**Imprint:** Gurit Holding AG, Group Communications

**Editor in Chief:** Bernhard Schweizer **Pictures:** Northern Marine (10, 11),  
Martin Bydalek (11), SSP Technology A/S (14, 15), PUMA (Cover, 18, 19)

**Additional pictures:** Company archives and [www.istockphoto.com](http://www.istockphoto.com)

**Concept and Design:** Eclat AG, Erlenbach