



Gurit

shape

The Gurit Magazine
Issue 07, September 2010

Introducing RENUVO™ – The new blade repair system.
B³ SmartPacs introduced to the American market. Inauguration
of the new Tooling production campus at Red Maple.
Ground transportation relies on composite materials. Customer
development – the partnership approach.

Dear Reader

What does it mean to be a global company? There are many ways of defining this, and many apply to Gurit: We not only serve attractive global markets but are also locally present in many different areas of the world. Today, more than half of our colleagues work at Gurit production sites in Asia. This is remarkable, especially considering that it was just four years ago that we opened the first factory in China.

This summer we had the great pleasure of officially inaugurating a quantum-leap expansion at our Tooling equipment factory in Taicang: Red Maple has added a whole new manufacturing campus allowing for the manufacture of next-generation blade moulds for wind turbines of up to 7 MW. This new set-up allows us to take the Tooling business to a global level, selling an increasing number of moulds to customers in and outside of China. In addition, we have also extended our core material kitting capabilities in Tianjin where preparations are now under way for the installation of Gurit's first PET extruder to manufacture our new PET based family of structural core materials.

Being – or going – global is also true for Marine: We have successfully extended our marketing reach by targeting new international boat building markets in the Mediterranean and the Middle East and through the international roll out of the B³ SmartPac Engineering and Materials package across the globe. Gurit (Canada) has started to kit and ship engineered materials for series production boat customers and Gurit (Tianjin) is preparing itself to kit core materials also for a growing number of marine customers which will be served out of Asia.

Globalization is also reflected in the world-wide applicable standards and norms such as the quality norms all Gurit worksites adhere to, the globally accepted certifications by independent agencies that most of our products carry and our global approach in purchasing and customer development.

At Gurit, being global means looking beyond the usual confines to discover new materials, new markets, new ways. SHAPE takes you on tour through the Gurit world, discovering just that: new materials, new markets, new ways!

Yours sincerely
Rudolf Hadorn CEO



开业活动暨

公司新厂落成仪式

, the tooling business of Gurit



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Thank you for your feedback at SHAPE@gurit.com

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Concept and Design: Gurit and Eclat AG, Erlenbach

Cover: Gurit launches RENUVO™ – a new turbine blade repair system

REDUCING WASTE AND ENERGY CONSUMPTION

The Newport production site has been certified according to ISO 14001 since 2002. The 14001 management system helps Gurit (UK) to control and reduce its environmental impact. The key impacts for Gurit (UK) are waste and the use of energy. «We monitor every year the volume of waste we generate and the energy we consume,» says Simon Rhodes, Health, Safety and Environmental Manager at Gurit (UK). «In 2009 only 39% of the total amount of waste generated here went to landfill.» The target for the year was to produce less than 900 tonnes; the actual figure was 840 tonnes. Due to the continuing recycling efforts 1,132 tonnes of waste went for recycling and were diverted from landfill, which represented 54% of the waste generated. Gurit (UK) has launched several new projects to further improve its environmental performance in 2010.

- Gurit is partnering with a company that recycles a paper that is used in the production process. Together we are now introducing a process that will clean the paper and make it suitable to re-use at Gurit for a second time before it is sent for final recycling.
- A new cleaning solvent has been tried which has proved to be more efficient than the current solvent. It can be used for twice as many cleanings which halves the volume that is brought into the company and also dramatically reduces the waste produced. The new solvent is a harmless substance with an excellent Health & Safety profile.
- To ensure that equipment is properly closed down at the end of the working day, a detailed instruction sheet showing how to safely shut down machines is being produced for each work centre. This measure should make it easier to shutdown machines and reduce the energy usage.
- Energy measurement is a key to understanding where energy is used and helps to identify where savings can be made. By the end of 2010 every major work centre will have real-time energy monitoring in place. This is a step towards fully understanding where our energy is used and will help to prioritize energy reduction efforts.



Gurit (UK) also studies new ways to wash and re-use dirty pails in production. At present these contaminated pails are collected and sent for landfill disposal. The goal is to use them at least four times before disposal.

PB 1000 WINS MATERIALICA AWARD 2009



Pioneering materials can provide functional, aesthetic and production-related impulses. At the same time, engineers and developers are inspired by design

requirements to develop new materials and technologies. Now in its eighth year, MunichExpo bestows the MATERIALICA Design + Technology Award in order to highlight this interrelation. The award focuses on material applications in the areas of aerospace, automotive, engineering, sports and technical consumer goods. Last October, Gurit was presented along with Huntsman with a MATERIALICA award recognizing the superior surface quality and processing characteristics of its PB 1000 prepreg. Based on Huntsman's Araldite benzoxazines, Gurit's PB 1000 prepreg uses an alternative chemistry and offers excellent features for semi-structural and structural fire resistant composite applications. Due to the enhanced quality of the component surface and less time for surface processing (the hardening process takes 45 minutes at a temperature of 140°C and 15 minutes at 160°C) during which no volatile components are released, these products are particularly suitable for the interiors of transportation vehicles, such as in aircraft and traction vehicle construction.

INTEGRATION COMPRISES PREPAREDNESS



China Techno Foam, Gurit's second production site in China, is fast being integrated into the Gurit Group – in all aspects. Only weeks after joining Gurit, CTF reviewed and updated its emergency plan in the context of its integration into the Group. Updated paperwork does, however, not suffice. This is why CTF put up an extensive emergency training session for its employees. On June 12, 2010, CTF employees performed various emergency drills which simulated

fires, injury, and emergency evacuation situations in order to put the emergency plan to the test. During the drills, the CTF fire fighting teams practiced putting out controlled fires with water hoses and fire extinguishers. «We all know, of course, where the fire extinguishers and hoses are located. But unless everyone knows how to use them, one might lose valuable moments when rapid reaction is of the essence,» commented Site Manager Sam Ang. First aid teams practiced responding to a head injury. And all employees participated in evacuation drills: «I was impressed to see how quickly people left the building and gathered in the pre-defined locations outside. This is only possible when we know how to react.»

EXPANDED COOPERATION FOR AIRBUS AIRCRAFT

Gurit and Elbe Flugzeugwerke GmbH, Dresden, (EFW) have signed a memorandum of understanding earlier this year to intensify the successful cooperation in the area of floor panel materials for Airbus aircraft. In addition, the wholly owned EADS subsidiary EFW nominates Gurit as supplier for tape material used for the floor panels of the new Airbus A350 airplanes. The agreement also provides for increased material shipments by Gurit for the A320 family of aircraft as well as a generally intensified cooperation to jointly tap new customer segments including rail traffic applications.

GURIT WEBSITE IN FRENCH

Gurit has launched a dedicated French website – www.fr.gurit.com. It continues to enhance and develop Gurit's business in France. As a condensed version of the main website it summarizes all existing material and information and covers all main markets and associated products including Wind Energy, Tooling, Aerospace, Rail, Automotive and Marine. The French website is the third of Gurit's regional websites and follows the success of the Chinese and Italian websites.



Nachrichten aus den Gruppengesellschaften handeln u.a. von weiteren Abfallreduktionen und mehr Leuten, die per Rad zur Arbeit fahren in England, von Notfallübungen bei CTF und der Solidarität in Tianjin mit den Erdbebenopfern in China.

固瑞特集团公司发布的消息包括：减少浪费，越来越多的固瑞特（英国）公司的员工骑自行车上班，青岛能善公司消防演习活动，以及固瑞特（天津）员工团结一致为地震灾民募捐活动。

Being Gurit

DONATING TO CHINA'S EARTHQUAKE VICTIMS

A massive earthquake struck in the Qinghai Province of China in the early hours of April 14, 2010. Thousands of homes were damaged and destroyed, leaving nearly 150,000 people homeless. Gurit (Tianjin) launched a solidarity campaign inviting colleagues to donate some money for relief measures. A big majority of the Gurit employees at Tianjin responded with donations. The money will be used to promote programs designed to aid children and families affected by the earthquake. The employees' contribution came to a total of 9,530 RMB, and the General Manager of Gurit (Tianjin), Phil Harnett, matched this amount with another 9,530 RMB on behalf of Gurit (Tianjin), making a grand total of 19,060 RMB. The donations were sent to the Chinese Red Cross.



BURN CALORIES, NOT FUEL

In July the employees of Gurit (UK) rallied behind a local campaign to encourage more people on the Isle of Wight to take the bike. The campaign's aims included promoting the benefits of cycling in the local community, reducing congestion, pollution and parking issues, and highlighting the all-important health benefits regular exercise can offer. The challenge was simple: To encourage all employees to ride a bike for at least 10 minutes over the three week campaign period. After arranging for employees to have access to bikes on site, the Gurit (UK) team rose to the challenge



with 17.3% of staff managing to complete a 10 minute bike ride. Gurit (UK) also successfully recruited 13 new cyclists. Out of 52 local organizations taking part, Gurit topped the leader board in the 'large' organisation category. The team collectively completed 596 cycle trips, covered 4,315 miles and burnt 133,765 calories, saving 1,405 kg of CO₂. Well done to all who got involved!

RENUVO™ KEEPS THEM TURNING – WHENEVER, WHEREVER!

One wind turbine can easily generate up to 3,000 Euro worth of electricity per day – but only when it turns. Downtimes are costly and wind park operators ask for maximum availability. They no longer accept a two- to five-year warranty period. Today, a shorter two-year warranty period is typically followed by an extended availability contract of up to twelve years as new blade designs should have better performance and longer life expectancy. Gurit has developed RENUVO™ – a new repair material concept that facilitates easy, rapid and reliable blade repair – year round.

RENUVO™ – Gurits neues Material für rasche und zuverlässige Reparaturen von Rotorflügeln.
Renuvo-固瑞特一种新型的维修材料概念，可以使风机叶片维修变得更加简便及快速。



SHAPE readers may remember that a year ago we asked what a car would look like after driving at 260km/h for about 20 years along a wind battered sea shore to illustrate that wear does have an effect on wind turbines and their blades. Many Original Equipment Manufacturers (OEMs) have spent the last few years developing strategies for operations and maintenance (O+M) of the mechanical components: Gearbox controls, drive-trains and electrical problems now have continuous monitoring systems (CMS).

HOW TO COPE WITH THE COMPLEXITY AND DIVERSITY OF BLADE DESIGN

As a result the OEMs have promoted O+M as an essential element of the lifecycle management for any utility company or operator. To a certain degree of accuracy they are able to quantify, model and predict the future and control when and how the turbines are kept turning. There are, however, rumours afoot that the turbines are not completely modelled. There is one major element of the turbine that has escaped the grip of the CMS solutions – the blades. In a recent Wind Energy conference, a large utility company executive announced, «we hope that blades don't become the next gearbox.» The implication is that inspection and monitoring of these large structures is both ad-hoc and not equally regulated. This fear is amplified when you dig into the root cause of this concern. Blade damage may be related to manufacturing, transportation and environmental impact. Recently there have been several high profile cases whereby a turbine has failed in spectacular fashion (as can be seen on YouTube). These failures have frequently been attributed to design or manufacture error, resulting in whole wind farms being closed until all turbines were sufficiently inspected and controlled.

The level of complexity and difference that exists between turbine design and ages of blade is quite frightening. Not to mention that service teams don't have access to original drawings to know exactly what material they are repairing. These repair schedules are not an overnight event, resulting in shutdowns for extended periods. When you consider that a 2MW turbine can generate up to 3,000 Euro per day then you are talking big money for a 50 turbine wind farm closed for two weeks!

ADDRESSING A LONG-TIME SERVICING NEED

There is no 'quick fix' solution to turbine blade inspection. It is not as simple as a mechanical inspection conducted within the nacelle of a turbine. Damage is easily missed when the blades are inspected with high power binoculars from the ground. Service crews are thus required to scale these huge structures, often in windy condition and low temperatures to inspect, control, photograph and report. The availability of in service repair people to carry out this time consuming work under poor weather conditions is therefore a premium business. In addition to the skilled people to access the turbines we need equally qualified technicians to carry out maintenance and structural repair. The quality of repair is limited by the experience and knowledge of the team and the ability of the repair materials to perform in these extreme conditions.

RENUVO™ – THE «WHENEVER, WHEREVER» REPAIR CONCEPT

The inability to conduct repairs whenever and wherever has restricted the growth in the blade repair business. Often a structural repair for one single turbine can extend over two to three days, requiring sufficiently good weather for the job to be completed. The Gurit product development team has therefore investigated ways to address the obvious needs of the in service repair teams: How to get a job done, when the weather isn't perfect and time is running fast. We have tried to take out the errors in material selection by simplifying the different materials required for a repair. We have also eliminated human error in mixing and curing of wet laminating resins by providing a prepreg solution fit for purpose.



RENUVO™ – our new material solution captures the essence of the customers needs. The prepreg and multi-purpose resin technology (patent applied for) is UV curable, enabling repairs to be conducted practically year round and round the clock, as long as the temperatures are above 5 degrees Celsius. Repair can now be done even at night thanks to our UV lamp technology (patent applied for). The correct use of a lamp ensures 100% cure of the repair without the need for a 24-hour post cure.



To go that extra mile, Gurit offers a comprehensive training program with rope qualified composite engineers to support the training and adoption of this unique material solution.

NORTH AMERICA LAUNCHES THE B³ SMARTPAC CONSTRUCTION SOLUTION

Gurit is rolling out the B³ SmartPac solution globally. The attractive Marine composite construction package is now manufactured at Gurit (Canada) to supply the North American and European markets.

Gurit (Canada) had been producing kits for the marine market since 2005 and for the wind energy market since 2006. While these kits comprised only structural **Corecell**[™] foam, they allowed Gurit (Canada) to develop a broad expertise in kitting in terms of mastering the necessary production methods, establishing sound health and safety measures and achieving a great level of efficiency. This kitting know-how was successfully transferred to the Gurit



production site at Tianjin, China, three years ago, to serve the local Asian wind energy market. With the acquisition of High Modulus at the end of 2009, SP-High Modulus, the marine business of Gurit, takes «kitting» for marine customers to a next level: The concept is called the B³ SmartPac and comprises not only core material but also pre-cut glass or carbon fabrics as well as smart design features for highly accurate fits and speed of build. This new solution was a welcome challenge for the team at Magog.

OFF THE STARTING BLOCKS...

The necessary production equipment arrived at Gurit (Canada) at the end of January 2010, just weeks after the acquisition of High Modulus. Some building modifications were necessary to guarantee a smooth manufacturing process, and all machines were up and running by April. During this set-up period, Gurit colleagues from New Zealand spent time in Canada to share their SmartPac experience with the Magog team. In May 2010, production of B³ SmartPacs then officially rolled on with two day shifts of five people. Sébastien Roy, process engineer for **Corecell**[™] kits since 2005, is now in charge of SmartPac manufacture in Magog.

VALUE ADDED OFFER FOR MARINE CUSTOMERS

In comparison to a kit of **Corecell**[™] structural foam pieces, a SmartPac solution is a complete package and includes not only pre-cut fabrics, but also smart design for production and performance gains, leaning on the company's structural engineering expertise as well as its experience of working closely with production builders. All of the materials are clearly and comprehensively labelled to make the builder's job easier - increasing the speed of build and assisting quality control procedures. «For customers, the SmartPac is a great way to make the design and the build of a project more efficient – and reduce their overall build costs,» says Sébastien Roy.

The production of SmartPacs in Magog now allows Gurit to extend this turn-key service and materials package to customers in North America and Europe. The engineering, SmartPac design and production teams of Gurit work together to develop the best solution for the project. This synergetic approach depends on Gurit working hand in hand with its marine customers, and results in a greater understanding of their needs.





The M34 – the new Tour de France à la Voile Boat.

MASSIVELY REDUCED BUILDING TIMES AT THE YARDS

SmartPacs are a very profitable solution for clients. «While two people were busy for eight hours at one specific customer to prepare and lay up all the materials in a mould to produce a new boat hull, that job has come down to a mere 40 minutes – a significant benefit of using the SmartPac,» adds Sébastien. SmartPacs include a lot of practical thinking, too.

The first SmartPac projects manufactured in Magog were deck and hull packages for the Audi Meldges 20, packages for M34 which are built at Archambault in Europe and US-based Morris Yachts' Leadership 44. This 44 foot semi-production sailboat will go to the US Coast Guard Alumni Association and is a privately funded training craft for US Coast Guard cadets. Morris Yachts has committed to the use of SmartPac for the deck, hull, bulkheads, and internal structure of the boat. This project featured global support from team members of SP-High Modulus, the marine business of Gurit from around the world including New Zealand, Canada, and the USA. «One measure of success was that the entire outer skin of the deck along with 60% of the **Corecell™** core was able to be installed in one day with only four workers,» added Jean-Pierre Mouligne of Gurit (USA). The US marine sales team has also encountered good success with J Boats, a well known brand of racing sailboat built on the East coast of America. The latest two J boat models, J 95 and J 111, are built entirely as SmartPac solutions at a rate of four boats per month.

We are very happy to be able to now offer this new service and composite construction package out of Magog,» concludes Sébastien Roy. Magog had started off as a **Corecell™** plant, expanded into prepregs and formulated products and now also masters the full SmartPac manufacture and supply for marine customers. «With the help of our NZ colleagues, we adopted the SmartPac way very quickly and we are proud to supply this innovative engineering and materials solution to customers in North America and Europe.»



J 111, built entirely as a SmartPac solution.

SmartPacs werden nun in Kanada für den amerikanischen und europäischen Markt hergestellt. 固瑞特加拿大正在装备SmartPac成套产品，该产品将用于美国和欧洲市场。

PRODUCT DEVELOPMENT TAKES CENTRE STAGE AT GURIT

With fully ISO-compliant production sites, comprehensive customer qualification and product certification processes and a well-structured internal product and process development scheme product development at Gurit can reach new heights.

As composite markets mature and the need to successfully launch new products in a timely and cost effective manner intensifies so does the need for robust product launches and approval procedures. Our ability to identify new product opportunities, to develop what the market needs and then to deliver a reliable and consistent quality on-time and at the right cost is key to expand Gurit's market position and to gain market share. Gurit employs a well structured process to manage each critical phase of the whole product development, qualification and approval process.

INTERNATIONAL SITE STANDARDS

The whole qualification and approval process builds on internationally recognized standards. At Gurit, we continually review the effectiveness of our systems to identify strengths that can be shared and weaknesses that can be improved on. All of our traditional manufacturing sites are certified to ISO9002-2008 Quality Management System which is maintained by local staff and audited for compliance on a regular basis by a third party. Our automotive plant is currently implementing the ISO/TS16949 standard. The Red Maple site at Taicang, China, is currently well on track to gain full ISO9002 certification before the end of this year. Some of the Gurit sites are also accredited to international Environmental (ISO14001) and/or Occupational Health and Safety Assessment Series 18001 (OHSAS 18001) standards.

PRODUCT SPECIFIC ACCREDITATION

In addition to the site compliance to ISO requirements the industry also requires additional processes and procedures to obtain customer qualifications and approvals for our products by independent globally recognized certification authorities These



processes differ from case to case depending on whether we are introducing a new product, changing the manufacturing site of Gurit or an existing customer, or qualifying a product with a new customer. Accreditation of our materials with globally recognized organizations is a prerequisite to address new potential customers and Gurit has a series of products that are listed with Germanischer Lloyd (GL), Det Norske Veritas (DNV), Bureau Veritas, the Registro Italiano Navale (RINA) and the American Bureau of Shipping (ABS). Each certification body has their own specific qualification procedure and working culture which needs to be considered to enable optimum qualification times. Furthermore, customers also have their own idiosyncrasies with respect to material qualifications and their own relationships with the certification bodies. As a result the qualification of materials has become a complex and resource consuming activity but remains a critical activity to grow market share and increase the customer base.

CUSTOMER SPECIFIC APPROVALS

The qualification of new or modified products at a customer is a structured process commonly known as Production Part Approval Process (PPAP) which has the objective of a timely, cost effective launch in production with statistically proven processes, plus a trained workforce who are supported with fully comprehensive quality documentation. The PPAP processes was pioneered and launched by AIAG (Auto Industry Action Group) as an automotive

Normen, Standards und kundenspezifische Qualifikationen gehören alle zu Gurits strukturiertem Produktentwicklungsprozess.
规范, 标准和客户特殊需求许可是固瑞特结构产品开发工艺过程的一部分。

supply chain process with the aim to ensure that 1) The customer's requirements have been understood; 2) The product supplied meets those requirements; 3) The process (including sub suppliers) is capable of producing conforming product; 4) The production control plan and quality management system will prevent non-conforming products from reaching the client or compromising the safety and reliability of finished products.

The 18 typical PPAP elements

1. Part Submission Warrant
 2. Part History
 3. Team Feasibility Checklist
 4. Process Flow Chart
 5. Floor Layout Plan
 6. Design Failure Mode and Effect Analysis
 7. Process Failure Mode and Effect Analysis
 8. Gauge Repeatability & Reproducibility (R&R) (Attributive)
 9. Gauge Repeatability & Reproducibility (R&R) (Variable)
 10. Control Plan
 11. Dimensional Test Report
 12. Material Test Report
 13. Performance Test Report
 14. Appearance Approval
 15. Initial Process Capability
 16. Fit for Function
 17. Material Safety Data Sheet
 18. ... (others)
-

There are normally eighteen separate elements to a full PPAP qualification process and customers can select whichever they consider to be appropriate for the product complexity or level of change. These elements cover a range of disciplines and functions from design risk assessments to statistically proving the production processes capability.

INTERNAL PRODUCT AND PROCESS STAGES

Internally, Gurit employs a clearly defined process when developing new products with pre-determined gateways ensuring progress along a clearly sign-posted track and a structured product and product life cycle management. The Voice of the Customers (VOC) and their specific PPAP requirements are important factors considered during the early tollgate phases of the product development process. A similar methodology is applied to the process development procedure for material manufacturing. These have been developed on the principals of Design For Six Sigma (DFSS) so that quality is considered and built into products and processes from the stage of conception to volume production and end user application.

With the wider adoption of composites into established markets the emphasis on quality has been realized by the introduction of rigorous qualification procedures that are essential for mass production. This has led to a change in mind-set for both customers and suppliers that has enabled composite technology to rapidly advance in quality, performance and cost.

GURIT (TIANJIN) IS AWARDED ABS CERTIFICATION FOR STRUCTURAL FOAM PRODUCTION

Whilst primarily a company producing materials for wind energy customers Gurit (Tianjin) is also superbly located to support the Asia Pacific marine side of the business. To respond to this growing opportunity and need, Gurit (Tianjin) decided to apply for certification of its structural foam production processes by the American Bureau of Shipping (ABS) earlier this year. From its foundation in 1862, promoting maritime safety has been the core commitment of ABS, which specializes in marine and offshore classification services. Gurit is pleased to announce that the Tianjin site gained its ABS certification on April 19, 2010. This will assist in the growth of the Asian marine business. The full range of marine core products is now also available from Gurit (Tianjin) as the site can provide a fully certified processing and kitting service for marine customers.



CTF RECEIVES ISO 9001: 2008 CERTIFICATION

China Techno Foam (CTF) is pleased to announce that the site has been awarded ISO 9001 certification for its Quality Management System in April 2010. Quality Supervisor, Solir Sun, coordinated the project with the CTF Team for the audit made by Det Norske Veritas.

CORECELL M-FOAM SECURES FURTHER INDUSTRY CERTIFICATION

M-Foam, the **Corecell™** material dedicated to marine uses, has secured further approval from two of the world's leading certification bodies: Bureau Veritas and Registro Italiano Navale (RINA). These approvals compliment the earlier accreditations by the three awarding organizations ABS Quality Evaluations, Inc. (ABS QE), Det Norske Veritas (DNV) and Germanischer Lloyd (GL).

LEADING-EDGE BOAT-BUILDING AT ABU DHABI MAR

Abu Dhabi Mar's Swift 141 project – the conversion of a former Dutch frigate into a futuristic, slender mega yacht featuring a composite superstructure – is making the marine press headlines. Involved with its communication mast, Gurit's marine specialists of SP-High Modulus also played an important part in the completion of a series of twelve high-speed composite patrol boats built at Abu Dhabi Mar.

When a boatyard takes on as impressive a project as the Swift 141 it may overshadow other activities which are equally fascinating. While work continues on the conversion of a former Dutch 141m frigate into a luxury megayacht, the Abu Dhabi Mar facility is producing other stunning high-tech composite structures: With the help of SP-High Modulus' B³ SmartPac approach Abu Dhabi Mar has built twelve composite high-speed patrol boats on a very tight schedule. Abu Dhabi Mar's approach is to seek out the best technical advice and support necessary, and then to apply it as it sees fit. On the Swift 141, Abu Dhabi Mar's team received input from a number of composites engineers and material suppliers, including SP-High Modulus who supported the project with Ampreg resin systems and developed most of the specifications for the communications mast. While some parts of the Swift 141 superstructure were moulded elsewhere, the goal was to develop an in-house composite capability. This has been demonstrated with the completion of a project to build a dozen high-speed patrol craft.



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B³ SMARTPAC AIDED PRODUCTION

The specifications for these boats were optimized for the B³ SmartPac construction solution at SP-High Modulus in New Zealand, and a comprehensive package of CNC cut carbon reinforcements and **Corecell**TM foam cores were supplied to Abu Dhabi Mar. The infused structure is considerably lighter than a conventional build, enabling a significantly higher top speed. Depending upon engine selection, speeds of up to 70 knots have been achieved.

A HULL EVERY THREE WEEKS

What is remarkable is that this has been achieved in a very short timeframe, to very high standards. While tooling was being CNC machined from a T-Paste plug by MouldCam in Australia, the B³ SmartPac design was already underway, starting in June 2009. The first hull was infused with PRIMETM 20 epoxy resin in early August, and successfully sea trialed in October. All twelve hulls had been moulded by March 2010, at an average rate of one every three weeks. This rapid production was aided by the use of the B³ SmartPac which enabled the complex, optimized minimum weight specification to be loaded in the tool in only a matter of days. The same approach was used in the internal structure and bulkheads, as well as the deck, ensuring consistent quality throughout the project.

12 Schnellboote wurden mit SP-High Modulus B³ SmartPac bei Abu Dhabi Mar gebaut.

12高速巡逻船在阿布扎比建造，使用的是SP-High 高模B³ SmartPac的概念。



DEVELOPING NEW TOOLING RESINS

Integrating Red Maple into the Gurit Group has sparked many promising, interdisciplinary and cross-activity projects. Key to developing the business at Red Maple beyond infusion technology turbine blade moulds is the development and introduction of an infusible resin suitable for use on tooling for high temperature prepreg curing tools.



The process used for tooling manufacture, along with the requirements of the end customer for tooling life, temperature resistance and durability make the task to develop a new tooling resin for prepreg moulds a real challenge. The Materials Formulation team at Gurit (UK) and the R&D team of Red Maple, the Tooling Business of Gurit, have successfully met the goal.

Gurit Materials Engineering Manager, Yves Didier-Carter, who led the UK development team commented «The synergy between UK methodical development and Red Maple rapid reactivity ensured that the technical demand of this project was met in a very challenging timescale». The required characteristics for the new resin were very demanding: It must have suitable viscosity for infusion at relatively low temperature, must be de-moulded after low curing temperature to limit plug costs and/or prevent damage to the plug. In addition, it must develop a full Tg of 160°C after postcuring to provide compatibility with prepreg curing temperatures, withstand repeated thermal cycles without degrading and come with an acceptable price tag.

Existing Gurit materials including T-Prime 160 already delivered on most of the requirements and are a well-accepted solution in the marketplace. The scope for the new product was to look at advancing two main areas

- Eliminating the need for gelcoats and therefore increasing the delamination strength of the overall system
- Investigating new resin systems in order to further increase thermal cycling resistance.

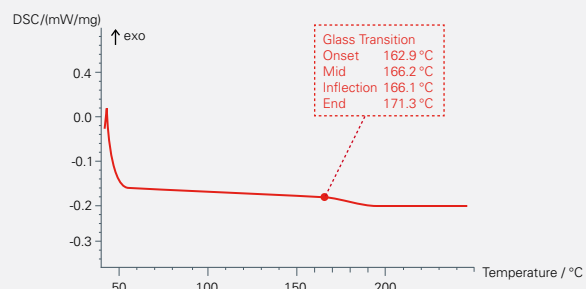
«Combining the expertise of the materials development specialists in the UK and the R&D colleagues in China has been a very interesting and rewarding experience», says Iain Cranwell, R&D manager at Red Maple. Together, the two research teams have successfully developed a low temperature infusible system which can be demoulded after low temperature curing. After postcure,



a sufficiently high Tg is possible making the solution suitable for the low cycle/high temperature requirements of the wind, and possibly aerospace, market. Resistance testing to environmental ageing and thermal cycling is ongoing but looking promising to date, with expected improvements of 2–3 times the current thermal cycling performance of T-Prime 160.

What does Tg – or Glass Transition Temperature – mean?

Thermoset materials, such as epoxy, once cured cannot be melted but they do go through a change of state when heated - from rigid like a glass to flexible like a rubber or leather. This change occurs at a temperature (actually a range of temperatures) which is specific to the structure of the molecules. Above this temperature the material structure is reversibly changed, but in the case of a mould for example, deformation can occur which means the shape of the mould changes. Obviously this is not desired. For a prepreg curing mould the Tg must be above the temperature of the curing prepreg which, with exotherm, can reach 150°C in wind turbine blade manufacturing.



Gurit und Red Maple entwickeln zusammen neue Harze für Prepreg-Bauformen.
固瑞特和红枫共同协作开发一种新型的应用于预浸料的树脂。

TAKING THE NEXT GENERATION OF LONGER BLADE MOULDS GLOBAL



Das neue Produktionswerk von Red Maple wurde im August eröffnet.
今年八月，红枫的新生产线正式投入使用。

With the establishment of its new production campus at Taicang, Gurit's Tooling Business, Red Maple, is more than doubling its shop floor area from 11,500m² to a capacity of over 24,000m². The first two new 6,000m² production buildings – designed to accommodate the production of longer blade moulds for next generation wind turbines of up to 7 MW – were officially inaugurated in August.

Red Maple's new Taicang production campus is designed to allow for the construction of five new production halls, each of them covering 6,000m² and thus nearly the size of an international football field. Size matters in blade mould manufacturing, as Chinese and international blade manufacturers move from 1.5 MW turbines up the scale. The new buildings can accommodate the production of blade moulds for wind turbines of up to 7 MW. The first two buildings were inaugurated in August in a festive ceremony hosted by the Board of Directors.

TRADITIONAL OPENING CEREMONY

Gurit Chairman, Dr. Paul Hälg, congratulated management on the completion of the fascinating facility and expressed his best wishes for the new Beijing Road Campus. He joined the other Members of the Board, Management and representatives of the local authorities for the formal ribbon cutting ceremony and officially handed the premises over to production. Dancing lions appeared in a shower of fireworks – the traditional Chinese way of bringing luck and prosperity.

READY FOR MOULDS FOR UP TO 7MW TURBINES

The first two buildings are already operational. The first building, which is home to four sets of plugs, has seen the successful completion of several moulds in the new production bays. Each building comprises three bays with every one of them equipped with four 20-ton-overhead cranes to move the huge moulds around. The second building features the same size and crane-fitting, but will host the plug and frame production for the 1.5–7 MW blades

which will serve both the Chinese and the global wind turbine blade market. The impressive yard between the two finished buildings makes any visitor feel small. «This area will remain open even when the additional three buildings at the back will be up in the future,» says Gabriel Mironov, General Manager Tooling. The open space is needed to maneuver the finished blade tooling equipment around and prepare them for shipment. The Beijing Road facility has easy road access to the nearby deep water ports of the Shanghai area which greatly supports Gurit's ambition to expand its Tooling Business globally.

«We've come a long way in a very short time,» says Gabriel Mironov. «I still remember our first customer meeting, sitting around on wooden boxes in a circle. That was only three years ago. And now we are opening a brand-new production campus which more than doubles our existing capacity and soon will include a state-of-the-art office building, too.» Before too long, an additional CNC building will also be finished.

MOST LIKELY THE LARGEST CNC MACHINE IN ASIA

The CNC machine that will be located in that building will most likely be the largest of its kind in Asia. It is currently being built in Europe and should be installed and operational at the Beijing road facility in the fourth quarter. The CNC building will be fully climate controlled to guarantee for utmost accuracy. The new CNC machine which is used to produce the master plugs for new blade moulds (see also SHAPE 6) will cover a working envelope of stunning 65m x 7.2m x 5.8m.





A PASSION FOR SAILING

The 18ft skiff is certainly one of the most exciting sailing classes. It takes three talented people to sail these boats, with all of them doing their job and trusting in the team's abilities and judgments. When this all comes together in competition, whether sailing at 5 or 25 knots, it inspires an amazing feeling of control over a very powerful boat.

The marine experts of Gurit are actively involved in the field of the 18ft skiffs: On the one hand, SP-High Modulus supplies key engineering and material to the class, on the other hand, some of our SP-High Modulus colleagues from Down Under successfully «fly» these sailing machines.

KEY MATERIAL AND ENGINEERING SUPPLIER TO THE CLASS

SP-High Modulus has been supplying the materials for the 18 ft skiffs since they became one design over 12 years ago. The basic laminate is made up of two layers of SE84 HSC150, a core of 48KG 10mm Nomex and two layers of SE84 HSC150. Originally the boats were built at McConaghy Boats in Mona Vale. Five years ago the moulds were moved to Van Munster Boats where they are built today. The professional and personal involvement of Gurit staff is very important to maintain excellent connections in the marine field – a world driven by passion. Good sailors are respected by clients such as naval architects, boat builders, boat owners and captains.

ONGOING ENGINEERING FOR THE CLASS

SP-High Modulus supported the 18ft Skiff Club to improve the stiffness and strength of the skiffs. «Stiffer rigs, new sails and heavier crew are now inducing higher loads on the composite structure of hull and deck,» explains Valerio Corniani, Engineering Manager at SP-High Modulus in Australia. «The structures were showing local failures indicating that the original design was no longer suited for the increased loads. We modified the hull laminates, the internal structure and the geometry of the deck to ensure that the loads were correctly and efficiently transferred across the structural elements of the skiff. We also optimized the internal structure removing those components which are not required as structural reinforcements.» The result is a stiffer, stronger and lighter boat. As the design team and the builder are local, the support spanned from computer aided analysis to yard support, sketching on the mould, in front of the builder and the design team the modifications we designed. «This not only allowed us to strengthen our relationship with one of the most famous naval architects in Australia and a very influential Australian Olympic

sailor and yard owner but also enables us to supply additional material and engineering support for new boats built in Australia,» Valerio added.

FLYING THE SP-HIGH MODULUS FLAG

SP-High Modulus was the main sponsor of the Australian 18ft skiff championship, flying the new brand prominently in the marine world. SP-High Modulus provided structural engineering support for the Australian 18ft skiff club. This club owns most of the 18ft skiffs in Australia.

Die Kollegen in Australien sind passionierte – und erfolgreiche – 18-Fuss-Skiff-Segler.

固瑞特（澳大利亚）的员工热情积极，赢得了18英尺轻舟水手的赛事。

Gurit (Australia) colleagues Paul Kulmar, Aaron Links, and Niall Kinch all share a passion for the 18ft skiffs. While Paul is not sailing the skiffs anymore today, Aaron and Niall are, and very successfully so.

Aaron won three World Championships and ranked 2nd twice: «I have sailed the class for 10 years as mainsheet hand and I just love the class due to the excitement, the physical and technical challenges and the great competition.» Together with Trent Barnabas aboard Michael Coxon's Thurlow Fisher (picture below), Aaron has won in late August both the North American 18ft Skiff Championship as well as the prestigious «Bridge to Bridge» race, i.e. from Golden Gate to Bay Bridge with an average speed over 20 knots. Congratulations!

Niall (in front on the picture on the left side) sailed for 35 years and sailed 18ft skiffs for eight years. He was Australian Champion in 2005 and twice a runner up in the World Championship: «Think about the power to weight ratio! Over 600 sq feet of spinnaker on a platform that weighs only 160kg. Then you have the leverage of the wings and the boats regularly take off – literally! – when sailing down wind.»

Paul started sailing 18ft skiffs in 1975. The following year, 1976 he won the World championships. «That was very much a family affair. My brother, Stephen was the skipper. My brother in law, Paul Ziems was the sheet hand and I was the forward hand. All our 18's were designed by Stephen and myself. The boats were built and maintained by myself.»



GROWING MATERIAL DEMAND FOR GROUND TRANSPORTATION

Gurit has a long tradition as a materials supplier for aircraft interiors and a growing range of secondary aircraft structures. This expertise is drawing the attention of additional mass transportation customers to Gurit.



Weight optimisation, durability and wear resistance of materials and, most importantly, passenger safety are not only important material requirements for airborne traffic applications. Ground transport is also discovering the advantages of modern composite structures. Gurit has won substantial follow on orders for the manufacture of train car interiors from China. Like no other country on the globe, China is currently expanding its rail network to accommodate both electric multi unit trains and high-speed trains. Gurit supplies prepreg materials to both train categories. «Any weight reduction translates into savings over time. Especially with rolling stock, as train carriages generally serve for long periods of well up to 25 years,» says Matthias Hucke of Gurit (Kassel). Such weight savings are not limited to standard trains. «Fire retardant and ultra-lightweight materials are convincing solutions for urban transport, too. While high speed or intercity trains stop as infrequently as possible, that is only at major cities or junctions, a metro train works in a constant «stop-and-go» mode. The lighter a train, the faster it stops or accelerates and the more people or cargo it can load. And this – over time – translates into higher energy efficiency,» adds Matthias.

Gurit-Prepregs werden vermehrt im Schienen-Fern- und Nahverkehr eingesetzt.
固瑞特预浸料正在逐步加大在陆地交通方面的应用，主要是城际快线和城市间的轨道交通。



Gurit's material range and well established processing methods, tried and tested for over 30 years in the aerospace industry, open up new possibilities for additional weight savings in ground transit: innovative crushed core press sandwich constructions yield cost competitive parts that are up to 40% lighter than current sheet moulding compound (SMC) solutions. Typical applications include window and ceiling panels, luggage compartments, air conditioning fairings, cockpit structures and even body parts. The outstanding fire protection properties of the Gurit phenolic, cyanate ester and benzoxazine resin systems and prepregs add to the attractiveness of these materials – especially when trains operate in tunnels. On top of their outstanding mechanical properties, prepregs give more design freedom, too.

LAUNCHING A COMPREHENSIVE PVCELL™ G-FOAM PORTFOLIO

The PVCell™ G-Foam family is a PVC structural foam material category developed and produced at the Gurit China Techno Foam in Qingdao/PR China. PVCell™ G-Foam targets the Chinese wind turbine rotor blade market where PVC foams are widely used as structural core materials in blades built using infusion technology. Starting from the PVC production know-how of China Techno Foam, Gurit's second Chinese production facility, the new material range was developed in less than eight months in a joint Gurit and China Techno Foam R&D process. The development of the first material grade (G60 – i.e. 60 kg/m³) had already been finished by the end of 2009, and the material was successfully introduced to the market in spring. PVCell™ G60 is tested and fully qualified by Germanischer Lloyd. The development of the additional grades (G45, G80, G100, G130 and G200) has been completed in the meantime and the full product family is now available and fully documented (see table). The respective product data sheet information can be downloaded at <http://www.gurit.com> in the data sheets and brochures section. The procedure to gain full product accreditation with Germanischer Lloyd as well as Det Norske Veritas for all grades is well under way. PVCell™ G-Foam is available in a wide range of formats with all standard cut patterns and finishes possible, these include Plain Sheet, CS, VIC, PH among others. China Techno Foam has successfully ramped up production of the PVCell™ G-Foam family and is prepared to double the initial capacity to meet future market demand.

Das vollständige Portefeuille von PVCell™ G-Foam ist nun erhältlich.

PVCell G 发泡整体投资都已经正式启动。

Datasheet

Type	Test Method	Unit	G45	G60	G80	G100	G130	G200
Nominal Density		kg/m³	48	60	80	100	130	200
		lb/ft³	3	3.7	5	6.2	8.1	12.5
Compressive Strength	ASTM D1621	MPa	0.6	0.9	1.3	1.9	2.9	4.8
		psi	87	130	189	276	421	696
Compressive Modulus	ASTM D1621-1973b	MPa	40	65	90	125	180	300
		psi	5,802	9,425	13,053	18,130	26,107	43,511
Shear Strength	ASTM C-273	MPa	0.55	0.78	1.1	1.5	2.0	3.5
		psi	80	113	160	218	290	508
Shear Modulus	ASTM C-273	MPa	15	21	32	40	55	80
		psi	2,176	3,045	4,641	5,802	7,977	11,603
Shear Elongation	ASTM C-273	%	16	20	20	25	25	40
Tensile Strength	ASTM C-297	MPa	1.2	1.8	2.3	3.1	4.2	6.4
		psi	174	261	334	450	609	928
Tensile Modulus	ASTM C-279	MPa	52	72	100	135	200	300
		psi	7,542	10,440	14,504	19,580	29,007	43,511

GURIT APPRENTICE AWARDED SPECIAL COMMENDATION



James Spencer joined the Gurit (UK) apprentice scheme in 2007 straight from college. His interest in engineering and manufacturing was clear from the start: «My Dad works in engineering and because of this I've always had an interest in this area. I knew I wanted a career where I apply logical thinking and learn skills which meant I could solve problems not everyone else could». Although working and studying simultaneously have been a challenge at times, the apprenticeship has been a great opportunity to learn the theory and to put it straight into practice. The hard work felt very worth while when James was recognised by the UK Composites Trade Association with an Apprentice Award. Out of nominations from across the UK James was awarded a special commendation from the judging panel. «I couldn't believe it, when I found out it made all my effort worth while and it put a big smile on my face». When asked if he would recommend the apprentice route to others James was very clear: «There are lots of candidates leaving university who are finding it hard to get jobs right now. I've now got both a really wide variety of experience and qualifications. Right from the start I've found Gurit to be a really friendly place. It has helped build my confidence and given me lots of other workplace skills like communication and building relationships.» So what is next for James? Typically he has his sights set on the future and his ongoing career at Gurit. In his own words, he wants to be «an engineer, a successful engineer» and has not ruled out the possibility of continuing his studies up to degree level. As a final word, James wanted to say thank you to all his colleagues who have helped and supported him along the way, «I've had some good teachers!»

Die Mitarbeitenden von Gurit (Canada) sind stolz auf ihr Programm für kontinuierliche Verbesserungen.

固瑞特（加拿大）的员工对于公司持续改进的工艺过程引以为荣。

A PASSION FOR ENERGY AND THE EAST

Peter Leupp, Head of Power Systems and member of ABB's Group Executive Committee, is a power expert and has also spent a number of years in Asia. He was recently elected to the Board of Directors of Gurit in April 2010.

«I was impressed by Gurit's know-how and technology base.»

SHAPE: At the Annual General Meeting you said Gurit was your first external mandate as a Board member. What made you accept the opportunity to serve on Gurit's Board?

Leupp: When I was approached, I did some fact finding on Gurit and was impressed by their know-how and technology base as well as their international character and market position. I could relate to their business and understand their opportunities and challenges. I could relate to many of these aspects based on my experience with many of the ABB subsidiaries' Boards I serve on. I felt I would be able to contribute to the future success of Gurit and leverage my technical background, business experience and Asian exposure. This prompted me to gladly accept the position.

You have lived in Asia, haven't you?

Yes I have. Asia is a very diverse region. We moved to China in 2000 and stayed there for nearly seven years. During that time, I witnessed first-hand how dynamically this region was developing. ABB had first targeted the infrastructure market in China in the 1980s. Building up a network of local joint ventures, the Group then moved on to producing equipment locally in and for China. As a next step, we also started sourcing components from there to other mar-

kets, tapping China as an export hub. Doing business in an increasingly global environment requires companies to be local in many countries. Gurit is very much on a similar path. Apart from China, I also look back on many years of doing business with India, where I also served on the Board and of course based on my regular travels to the country. Both of these Asian giants are fascinating from a cultural as well as from an economic point of view, as is the rest of Asia, for that matter.

You seem to have developed quite a passion for Asia.

I guess you could call it passion, in a certain way. Personally, I would say, my approach to Asia is also very realistic. If you look back, India, China and the rest of Asia made up the lion's share of world trade until the 17th century – and I believe Asia will regain this role. The western world should not see this as a threat; it is a reality in our global world and an invitation for us to think of our own strengths and options. My generation dreamt of going West, to America, when we were young – I tell young people today to go East, to study Asian languages and see for themselves the spirit, vitality and ambition in these countries.

And this dynamic development needs a lot of electrical power.

Not only electricity but infrastructure in general. Whenever I travel to China, I am impressed to see how the infrastructure is developing. The Chinese will soon have the most extensive network of highways and

high speed trains, some of the most modern deep water port infrastructures, among the fastest growing aircraft fleets and airport infrastructure, and one of the most modern electricity grids in the world. Com-

«I tell young people today to go East.»

ing back to your original remark, development of the power infrastructure is a key contributor to economic growth - not only in China or Asia, but globally. Global energy consumption is expected to continue rising with demand for electricity growing at an even faster pace. At the same time however, we need to address the climate challenge and cut back on carbon dioxide emissions. The biggest part of that equation, I believe, will be energy efficiency and a growing contribution of electricity from renewable energies.

Certain studies suggest that Europe for example should be able to produce a considerable part of its electricity from renewable sources by 2050. What is your view?

Theoretically, I could subscribe to that. Practically? A goal like that requires a lot of investment, a lot of international cooperation, a lot of new thinking and a great deal more of intelligence in our power networks. The electricity transmission infrastructure was built with a view to bring electricity from

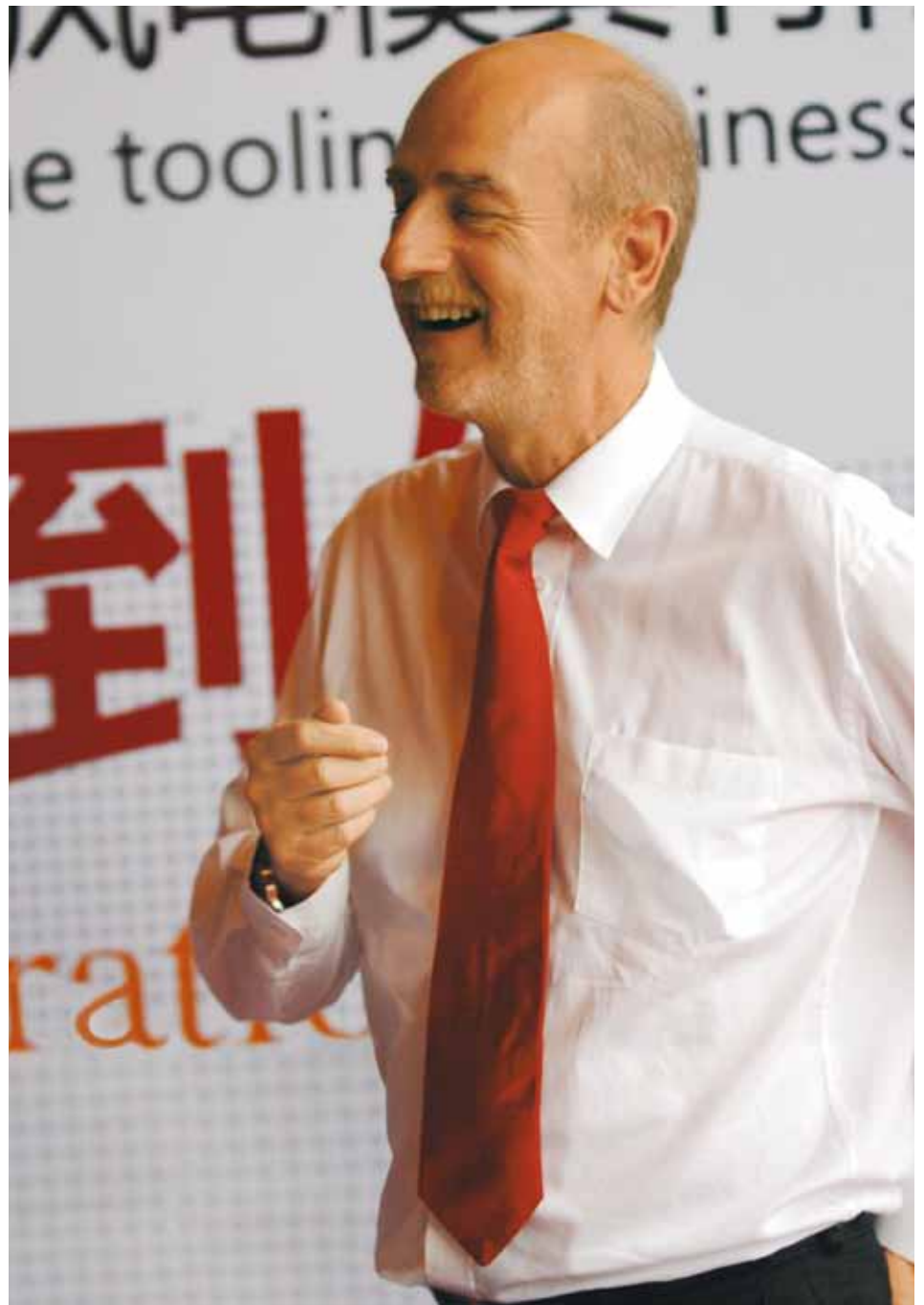
steady sources of power generation to users not located too far away. Today and even more so tomorrow, we will have a rising number of power generation sources, often located at great distances from consumers. Some of these sources like wind or solar will be unpredictable and intermittent. We will even have situations where the locally produced peak wind or solar energy cannot be fed into the grids because the transmission capacities are not available, which means that this energy can neither be used nor stored. Energy storage therefore is our second big challenge: Pump storage hydro power is perhaps the only viable bulk storage technology available today. Fly wheels and batteries are other examples of storage, though on a smaller scale. Eventually maybe even the decentralized batteries of electric cars will feed their surplus power back to the grid. A third key issue is the lack

«We need to put a lot more intelligence into our electricity.»

of high capacity transmission networks between various geographic areas. Such networks are needed to balance the production and demand over growing distances and their establishment requires a great deal of international cooperation. Last but not least, we have some technical constraints to tackle – for instance while gas, coal or hydro power plants can easily produce more or

Verwaltungsrat Peter Leupp erklärt, wieso neben Infrastruktur auch viel Intelligenz nötig ist, um die Energieprobleme der Zukunft zu lösen.

固瑞特董事会成员Peter Leupp先生介绍说，传动装置和智能设备将会是解决能源问题的关键要素。



less energy on demand, others like nuclear power plants can hardly be dimmed and as mentioned before we have to find ways of balance demand and supply when it comes to leveraging renewables.

This shows that a lot of cooperation and coordination is needed on the level of power generators and nations. But what about consumers?

As I said before, we need to put a lot more intelligence into our electricity. As grids become smarter, consumers will have a greater say in terms of their consumption and power tariffs will become more flexible, reflecting varying demand levels for instance during the course of a day. This

may already motivate some energy saving measures and steer a certain portion of the demand to times of the day when energy is readily available and cheap. To give you an example: It is a standard procedure in some areas of Switzerland for instance that a washing machine or dryer takes a nap over lunch time when power is needed for cooking. Why should a perfectly insulated deep freezer or fridge not sufficiently cool down over night only and store the cold during the day. Appliances and power meters also need to become smarter to be able to manage not only the difference between peak energy production and demand and but also to react to the available renewable energy mix at a given time.

JOINING FORCES FOR QUALITY MANAGEMENT

The two manufacturing sites dedicated to Gurit's aerospace business, Kassel in Germany and Zullwil in Switzerland, have implemented a joint quality management system according to the requirements of aerospace standards AS/EN/JISQ 9100. The successful implementation was officially approved and certified by the auditors of TÜV-Süd on June 25, 2010 with world-wide effect.



«A joint certification as one organization of two production sites is a novelty at Gurit and strong proof of the integration of the two aerospace production sites Kassel and Zullwil,» says Axel Beck, Head of Quality Management at Gurit (Zullwil) and Gurit (Kassel). The auditors of TÜV-Süd emphasized in their report that the colleagues at both sites had already in the past shown outstanding dedication to the quality management system, and continue to do so today. Headquartered in Munich, TÜV-Süd is a technical services corporation, providing consulting, testing, certification, and training services.

A TOOL FOR CONTINUOUS IMPROVEMENT

Meeting the standards of the quality management system takes centre stage at both sites, Kassel and Zullwil, making it far more than just an administrative affair. «We see quality management as a tool for continuous improvement and are thus extremely happy with the auditors' report,» adds Axel. Kees Reijnen, General Manager Transportation at Gurit congratulated all aerospace colleagues on this collectively achieved success and underlines the ongoing support of Management: «We control and strengthen all processes that enhance customer satisfaction and thus the long-term success of our company. We realized at an early stage that a joint quality management system covering both aerospace work sites not only allows for substantial cost savings but also generates considerable improvement opportunities and strengthens the organization as one entity focusing on the future.»

INTERNAL AUDITORS ARE KEY DRIVERS OF PROCESS

Internal auditors are vital players in any quality management process. They systematically and objectively assess compliance with standards and identify opportunities for improvement. «In February, we built a highly motivated team of colleagues from all the different functions to take on this additional task,» explains Axel Beck. A first internal auditors' training was scheduled for March. The newly acquired quality management know-how was then expanded upon in follow-on sessions which focused on specific aspects.

PUSHING AHEAD AS A TEAM

Bringing together all forces across all ranks - from General Management to apprentices - to work towards one shared goal enabled the two sites to achieve a lot in a short time: One quality management hand book now applies to both work sites. All processes were reviewed by colleagues from both sites and structured in a lean way, always focusing on the creation of additional value. «The certification is an important milestone, but not the end of our efforts. We are continuously striving for further improvements. And I am very thankful and happy to see that this process may count on everyone's support,» concludes Axel Beck.

THE KIT THAT FITS

Over the last twelve months, Gurit (Tianjin) has developed a comprehensive kitting capability to complement the Group's core material strategy.

Gurit (Tianjin) hat im letzten Jahr die Kitting-Kapazitäten massiv ausgebaut.
固瑞特（天津）在过去12个月里扩大了 kitting的生产能力。

Gurit's core material strategy primarily targets the rapidly growing Chinese wind turbine blade market and also aims at marine applications. Out of Tianjin, Gurit today offers all commonly used core materials in all the formats required by customers. For wind energy and marine markets, the core materials most commonly used include SAN, PVC, PET structural foams and Balsa wood. The successful development of Gurit's branded core material portfolio, through acquisition and investments in new processing lines, allows Gurit (Tianjin) to offer all relevant core materials: **Corecell™**, **PVCCell™**, **G-Foam**, **G-PET**, and **G-Balsa**.

To provide the comprehensive range of shapes and styles requested by customers, Gurit (Tianjin) has a large selection of equipment capable of the simplest grooved plain sheet through to the most complex three dimensional shape generation only possible to achieve with 5-axis CNC machining.

EASY FITTING JIG-SAW

A typical kit of precisely tailored core material may include over 200 individual parts. They are all labelled and packaged into boxes, making the exactly fitting lay-up of the pieces into e.g. a wind turbine blade mould and easy-fitting giant jig-saw. The manufacture of these kits requires a blend of machining techniques. The more complex parts are CNC machined while the simpler pieces are made on semi-automatic or manual machines. At Gurit (Tianjin), we use the most suitable technology to optimise processing costs and material yields. At the same time this guarantees our customers that they can benefit from the least total cost.

PRODUCT AND COST OPTIMISATION GO HAND-IN-HAND

The accuracy of the kits produced at Gurit (Tianjin) is a true benefit to the customers. Thanks to the repeatable and consistent quality of the precisely fitting core pieces they can minimise the usage of resin, saving cost and assisting in producing a more stable weight and overall lighter blade. The cost of the materials forms a significant part of kit costs. Therefore it is obvious, that yield rates are important to the kitting process. Recent work by the Process Engineering Team of Gurit (Tianjin) has again lifted yield rates for a typical kit. At Gurit (Tianjin)'s specialized tailoring and kitting facility, the biggest part of the core material sheets is turned into kitted products. Such a high yield is hardly achievable when customers produce kits by

themselves. Innovative use of software tools to optimise nesting and to post process parts with new machining techniques lies at the heart of such a high material yield ratio. A further customer advantage is the simplified supply that Gurit (Tianjin) is able to provide, with kits containing all required pieces for the build combining even different core materials like e.g. **Corecell™** and Balsa hybrid kits.



Tianjin can supply all types of core for Wind Energy and Marine applications.

New kits can normally be programmed in two weeks using customer's drawings. The trial kits are quickly produced for exact matching with the moulds. One of Gurit (Tianjin)'s four software and three Composite Processing Engineers can attend site to work with the customer's engineers to produce quick and reliable results. The final foam or hybrid kits are then supplied on a Kanban just-in-time basis so minimising customer inventories and associated paperwork.

The kitting facility at Gurit (Tianjin) is now very busy, so three additional expansion ovens are on order for Corecell and due to be delivered in October, making a total of 12 ovens. This new extension will allow Gurit (Tianjin) – a manufacturing site predominantly dedicated to the Asian Wind Energy market – to increase its kitting capacity by 30% and to also serve the local Asian and global marine market.



Complex shapes can be cut using 5-axis CNC machines.

A GROWING POWER IN SUPER-YACHT CONSTRUCTION

Traditionally an important player in commercial ship building, Turkey has seen dynamic growth in its super yacht sector over the last decade. In fact, producing a growing number of motor yachts between 30 and 65 meters, the east Mediterranean country is now forging a reputation as the home to many of the leading composite super yacht builders of the world.



Peri 37m

Active in this territory from the early days of the use of modern composites in Turkey, SP-High Modulus, the marine business of Gurit, has sought to play the role of technical partner in order to add significant value and innovation to the client. A prime example of our involvement in Turkey's super yacht market is our long-standing relationship with Cyrus Yachts, part of the Dutch Vitters Group (see also SHAPE Nr 4). Adding true value has enabled SP-High Modulus, to successfully compete against lower-cost local suppliers in what can be very much a commodity-driven market when large material packages are involved.

Key to this success factor was Gurit's ability to provide true one-stop-shop, supplying turn-key solutions where SP-High Modulus undertakes the structural engineering and then is chosen to supply a complete composite material package, thus being a prime factor in the move from design concept to luxurious reality. Increasingly often, clients are seeing the benefit of being able to partner with World class structural engineering consultancy and then to choose the same partner to supply a range of high quality, technologically advanced, reliable composite materials including resin systems, reinforcements, adhesives and structural foam core.

EXPANDING MARKET SHARE

SP-High Modulus has played a significant part in the growth of Turkey's super yacht market by assisting boatyards in promoting composites over traditional materials such as wood, steel and aluminium. Customers also see enhanced value from their relationship with Gurit through the further provision of technical support and consultancy by our Process Engineers who have provided on-site training to the customers' composite teams in the use of our materials; instigated the creation of quality control systems and advised technically on yard set up. Our holistic approach is greatly valued by boatyards especially when moving to composite construction for the first time, this, in turn, strengthens the long-term relationship from that of customer and supplier to a genuine partnership.

NEW ERP SYSTEM

Gurit (Spain) has implemented a new ERP system which integrates all production, quality, purchasing and customer information management needs.

Navision offers a more efficient and flexible data management system as it can be adjusted to any need at a moment's notice. Its ability to deliver data in real time is highly appreciated – and represents a big leap over the former system, which had to be interrupted to run analyses at the end of the month. Perhaps the biggest advantage for the different departments, however, is the seamless integration of all functions. Finance, for instance, is no longer «isolated»: all accounting and billing is now directly tied into the production process allowing for much quicker billing procedures and automated inventory assessments. Quality assurance, and all sorts of purchasing related information, logistics and Customer Relationship Management are also directly linked to the ERP system. Navision is also linked to Mapex, a new production management and documentation tool. The system provides complete, reliable and quick control of all the information that can be captured in the production area and greatly improves the traceability throughout the production processes.

The Mapex applications were specifically tailored to the local needs as defined by the management, operations and IT teams at Gurit (Spain). Another highly appreciated feature of the new system is its ease-of-use. New touch screens are located at each machine, so any operator can enter information and consult documents that show clear and simple graphs. All staff and team leaders received specific training and happily adopted the new system as it freed them from tedious paper work. Requiring just manual confirmation of data provided by Mapex, the system now calculates manufacturing time, provides estimates for tool preparation and maintenance time. The system has helped to further improve the overall productivity and transparency. Information

related to customer deliveries (OTIF), overall equipment efficiency (OEE), tests of quality (FTT), amount of waste (SCRAP), roll change over times and documentation of each machine are now available at any time and clearly visible in illuminating graphs that show how each and everyone's work contributes to the company's overall progress.

This largely unique offering has successfully led to a considerable expansion in market share: Today, SP-High Modulus is supplying the majority of leading builders of state-of-the-art composite yachts in Turkey. The recent global recession showed how important innovation and excellence are to the super yacht market: Despite many yards around the globe being 'moth-balled' or shut down during 2009, our customers in Turkey all remained manufacturing thanks to their skilled construction, innovative designs, strengthening brands and a focus on the future.

SUPER YACHTS GAIN MOMENTUM

Turkey's share of the global Superyacht order book has grown to 14% from 6% in 2009. Recent successes for SP-High Modulus in Turkey include a two-year supply agreement signed with Peri Yachts, Antalya, and two extensive material packages for new 38m and 35m yachts with Vicem Yachts, Istanbul, in addition to the 45 m project already under construction in their Antalya facility.

Vicem Yachts and Peri Yachts are increasingly recognised as innovative and growing global brands, and with Cyrus Yachts offering a more traditional styling as the Motor Yacht arm of the Vitters Group, then along with several more recently established companies, the power base of Turkey will continue to grab market share.

CHALLENGES FOR THE FUTURE

The recent economic recovery was mainly supported by an increased share of large super yachts, boats of 50 meters plus. The 50 – 70 m range represents a natural progression area for Gurit as we are strongly positioned in the 30 – 49m range. Success in this sector will require further focus and selling of the concept of a composite solution and the benefits to be gained for yard and the client. We are already supplying materials and engineering for radar masts and upper deck structures for some of the larger yachts, so the message of weight saving, increased fuel economy, lower running costs and ease of build is beginning to be more widely accepted.

As confidence returns in the global economy, it is particularly the composite yards in Turkey that are increasingly well-placed to benefit through the combination of innovative design and competitive construction rates allied to the benefits of SP-High Modulus' world class structural engineering and class leading advanced composite materials.

Die Türkei ist ein wichtiges Herstellerland für Superyachten.

土耳其是超级游艇的重要生产的国家。



THE PARTNERSHIP APPROACH

Supplier development is recognised as a key strategy for purchasing professionals to deliver a range of benefits across the entire business. In 2010, Gurit pushed this approach to a new level, working with a number of key partners to ensure that it remains the leading provider of composite technology to its selected markets worldwide. So, what exactly is supplier development?

Supplier development can be described as the process of working collaboratively with suppliers to improve or expand their capabilities. The success of the program relies on the focus, engagement and empowerment of all those participating, regardless of their function within their organizations. Research has shown that adopting supplier development strategies can result in significant improvements in supplier performance including reducing product defects by 5 – 90% and improving product performance by 10 – 30%. It also leads to an improvement in on-time deliveries and a reduction in the order-fulfilment cycle-time.

Gurit appointed Cliff Roberts as category manager for reinforcement materials at the beginning of the year. One of his main targets is to improve the quality of woven materials by setting up supplier development projects with five key suppliers. Weaving either glass or carbon fibres brings with it a number of challenges, ranging from the quality and consistency of raw material fibres to, ultimately, the quality of our finished sales products. Critical to Gurit is its commitment to deliver a composite fabric that meets our customer specifications in full.

Cliff comments, «Our chosen suppliers embraced the invitation to take part and realized the benefits of closely working with Gurit on this project.» With production facilities across three continents, such a globalized supplier base brings its own challenges. «The key to the success of this project was to gain the support of the senior management from each organization, and then having clearly defined objectives. Here without question each organisation enthusiastically lent their support to the project,» continues Cliff. «Our task was then to use recognised tools and techniques and, whilst following the program's overall objectives, designed and delivered a customised solution to fit in within their own capabilities, resources and culture.»

Ahlstrom Corporation is one of the companies involved. Their technical customer service manager Petro Huoponen remarked, «For Gurit we use a team approach for monitoring the quality level of woven unidirectional fabric. A team board is used for showing the

quality yields, key performance indicators per machine and other tests that are ongoing for quality level improvement. The team results are reported at site level to the steering group and best practices can be shared to other manufacturing sites like Bishopville in the US. We involve different levels of organization to work towards a common goal in cross functional teams. When working with customer related development needs we try to get the customer focus addressed all the way to the machine operator level. This attitude is shown when dealing with customer related feedbacks be it a wish for a new type of product, new customer specific roll dimensions or a solving the root cause of a non-compliance report.»



«Supplier development is not a one-off project, but rather an ongoing activity to improve the whole supply chain from our raw material producers right through to our customers,» says Gurit chief purchasing officer Robin Price. «I am pleased with the progress during 2010, but of course my expectations for 2011 and beyond are even higher.»

In enger Zusammenarbeit mit Lieferanten lassen sich zum Vorteil von Lieferant und Kunde Qualitätsverbesserungen erzielen. 供应商开发提高最终产品质量将会有益于客户 和供应商双方。

S'ENGAGER

«BASICALLY, YOU'RE NEVER DONE!»

Knowing that the best answer to a capacity challenge implies more than simply adding equipment and resources, Gurit (Canada) launched a systematic continuous improvement process to maximize the use of the available resources.



To start and guide this change process, Gurit (Canada) hired a consultant who first trained managers and employees about the global economic and competitive context. Sharing this broader perspective, everybody realized the need for a continuous improvement process in order to make a true difference. «I remember well that we were running close

to maximum capacity then,» remembers Alain Leclair, R&D and Quality Manager. «But we also understood, that we could do things better.» So, in a next step, different projects were identified which were to be managed internally.

USING A COMBINED «TOOL BOX»

Gurit (Canada) decided to rely on tried-and-tested tools such as the six sigma methodology or the Toyota philosophy of:

- Challenge – Form a long-term vision and meet challenges with courage and creativity;
- «Kaizen» – improve business operations continuously;
- «Genchi Genbutsu» – Go to the source to find the facts to make correct decisions.

Selected staff received a six sigma green belt and a continuous improvement facilitator training in order to complete their «tool box». Gurit (Canada) began to implement a five sigma approach in production including initiatives like better work station organization, formal training guides, the implementation of dedicated shift meetings, preventive and predictive maintenance, the definition of clear Key Performance Indicators that are directly linked with global and personal objectives and, last but not least, the establishment of Télé-Gurit, a Gurit television, to improve communication with all levels of employees.

FIRST PROJECT YIELDS EVIDENT PROGRESS

One Key objective was to improve the assembly process of the moulds at the CoreCell plant. A team consisting of operators and

employees from maintenance and process engineering suggested and designed a fully automated assembly machine to replace the former process which involved lifting significant loads manually. A well-prepared capital expenditure proposal was presented to management which approved it within days. The outcome was striking: the rapidly agreed investment and the installation of the new equipment eliminated a former process bottleneck and showed everyone that management supports good ideas generated in the continuous improvement teams.

GURIT EMPLOYEES PROVIDE FIRST-HAND INFORMATION

The «Mouvement Québécois de la Qualité», the Quebec Quality Association, regularly organizes industry visits for Quality and Continuous Improvement managers to share best practices. On April 15, Gurit (Canada) hosted such an event looking at ways to get people involved in continuous improvement. During the plant visit, Gurit employees explained their respective improvement projects: «For everyone involved, this was a great moment of pride. Our visitors have given us a lot of positive feedback and encouraged us to continue. And we are very motivated to do so, because, with continuous improvement, basically, you're never done», says Karine Martin, Continuous Improvement Coordinator.

In the context of the continuous improvement initiative, Gurit (Canada) has not only created training manuals for standard work practices but also launched a new training management software developed by the IT department. It is designed to track employee training and their newly acquired competences and also to improve health and safety, quality and productivity standards.

In late May, Gurit (Canada) carried out its first Single Minute Exchange of Die (SMED) at the CoreCell plant. SMED is another continuous improvement tool to optimise the set-up time of equipment. The activity was undertaken during a blade change on a block splitting machine. The team reduced the set up time by 50%.

PARTICIPER

GET INVOLVED

GURIT AGENDA 2010

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:

- » **Husum Wind Energy, Husum, Germany**
21 – 25 September 2010
- » **Monaco Yacht Show, Monte Carlo**
22 – 25 September 2010
- » **IBEX, Louisville, Kentucky, USA**
28 – 30 September 2010
- » **METS, Amsterdam, The Netherlands**
16 – 18 November 2010
- » **Tidal Energy Summit 2010, London, UK**
23 – 24 November 2010
- » **Auckland International Boat Show, Auckland, NZ**
T.B.C.
- » **JEC, Paris, France**
29 – 31 March 2011
- » **Aircraft Interiors, Hamburg,**
5 – 7 April 2011



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