Dear Reader,

In the first half of 2009, Gurit achieved its target of maintaining the operational performance level of 2008, despite a sales decline in our target markets of some 12% at constant currency translation rates. Ongoing operational improvements, further progress in Group-wide purchasing, together with rapidly introduced and often painful cost-saving measures compensated the negative effects from lower sales and thus lower capacity utilization. Gurit closed the period with a strong balance sheet and a remarkable net cash position. Our healthy financial status gives us good reason to look ahead with confidence, although we expect markets only to broadly recover next year.

In troubled times like these, it is very important to stay focused on the longer-term perspectives. Gurit pushes firmly ahead with its strategy implementation. While our global capacities are not fully loaded, we concentrate on even further improving our equipment, on training our colleagues, on exploring new market opportunities. Doing so, we build a solid foundation for future success.

We enhance our positions in all our target markets by providing our customers with tailor-made solutions, expanding our role as a leading materials and technology provider in advanced composites and by expanding our addressable markets. In this edition of SHAPE, we invite you to discover how Gurit contributes to bringing satellites safely into space, to making passenger ferries more fuel efficient, to helping expand the life span of wind energy generators and to speed up automotive design projects.

With our materials and technologies, Gurit contributes to making our one world more sustainable. Doing business globally, we also acknowledge the importance of adhering world-wide to high standards, be it in terms of environment, health and safety, in terms of employer relations, or with respect to our business conduct. Our efforts are widely recognized wherever we do business: Gurit (Tianjin) – for instance – was just presented with a prize for special social achievements in the Tianjin Economic Development Area, TEDA, in China.

The various high standards Gurit sites and Gurit employees have been traditionally complying with locally have now been integrated into our Gurit Code of Conduct also presented to you in this edition of SHAPE and on the Gurit website www.gurit.com.

Yours sincerely
Rudolf Hadorn, CEO
Corporate News

GURIT (TIANJIN) RECOGNIZED FOR OUTSTANDING EMPLOYEE RELATIONS

The Tianjin Economic Development Area (Teda) is the most successful inward investment region in China, attracting billions of dollars of foreign investment over the last 20 years. With over 4000 companies present, Teda boasts 76 subsidiaries of «Fortune 500» companies. To celebrate the achievements of the Foreign Invested Companies, Teda honored 20 outstanding General Managers who they felt had contributed to the local society and business success of Teda. Phil Harnett, General Manager of Gurit (Tianjin), received one of the 20 prestigious awards. The jury not only focused on the financial success of the companies but also on how they contribute to society. Training and staff development, labour relations, working atmosphere or staff turnover were important criteria as well as compliance with local environment, health and safety laws and policies or the general factory safety and cleanliness.

Gurit achieved remarkable rankings in a number of categories. For instance, Gurit (Tianjin) is reported to have the lowest personnel turnover of all factories in the area. In addition, Gurit’s outstanding record of having only three minor accidents since its opening two years ago was also mentioned. Last but not least, it was noted with thanks of having had only three minor accidents since its opening two years ago was also mentioned. Last but not least, it was noted with thanks.

GURIT (TIANJIN) RECEIVES ISO 14001 CERTIFICATION

Gurit (Tianjin) is pleased to announce that the company has been awarded the ISO 14001 certification for its Environmental Management Systems. Human Resources Manager Christina Yin (in red blouse) who is also responsible for EHS at Gurit (Tianjin) had coordinated the process for the independent audit made by Det Norske Veritas.

GOVERNOR OF THE BANK OF ENGLAND VISITS GURIT (UK)

In late August, Gurit (UK) had the pleasure of welcoming a group of VIP automotive journalists including Autocar and Car Design News to the new UK based Automotive facility. The two day press event was arranged to launch the facility to Gurit’s target automotive and trade press and highlight the benefits of carbon composites in automotive design. The first day of the tour started with an introduction and tour of the Gurit (UK) plant followed by presentations and interactive displays on the benefits of composites in car design given by both Martin Starkey, Managing Director Automotive, and the esteemed Automotive Designer, Peter Stevens. The journalists were then treated to a sail across the Solent from Yarmouth to Lymington in a Jeanneau 45.2, followed by an intimate dinner party hosted by Gurit and Peter Stevens in the Stanwell House hotel, Lymington. The agenda continued the following day with a VIP tour around the Aston Martin plant in Gaydon in which the guests viewed how the new technology carbon body panels are fitted to the DBS Coupé and DBS Volante – and how they integrate alongside more established body technologies, such as aluminium.

MBPV SUCCESSFUL ON ITS RECORD HUNT

5P, the marine business of Gurit, are proud to be part of the composite engineering team for the Maxi Trimaran Banque Populaire V (MPBV), the 40 metre by 23 metre boat. On Sunday August 2, 2009, this boat – engineered for a record hunt/standard N4 – beat the historic west to east transatlantic record and secured the fastest 24 hour run time, breaking the previous record by a staggering 12 hours, 32 minutes and 6 seconds. Congratulations to Skipper Pascal Bidégorry and his sailing team. During the race, which began in New York on July, 30, 2009 at 22h 47m and which concluded at Lizard Point off Cornwall, at 10h 13mn 13s (French time) on August 2, skipper Pascal Bidégorry and his eleven person crew on board the MPBV also set a new 24hr record of travelling 908 miles at an impressive average speed of 37.8 knots. Franck Cammas on Groupama 3 also set off to beat his own record just under 3 hours earlier, but then finishing eleven minutes after MPBV. From the outset of the boat’s development, the world-leading French multi-hull naval architects VPLP, who designed MPBV, had ambitions for the boat to become the largest and fastest offshore sailing trimaran on the water. They aimed to challenge and beat all existing offshore sailing records, and utilized advanced composite materials and the 20 years of experience of 5P in conjunction with HOS to develop the boat structure which would go on to achieve this in triumphant style.

Automotive Press Tour

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Being Gurit

GOVERNOR OF THE BANK OF ENGLAND VISITS GURIT (UK)

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Six hourS – and the new bridge was there

The Bradkirk footbridge over the main Preston-Blackpool railway tracks in Britain was built by AM Structures Ltd on the Isle of Wight using Gurit’s composite technology and materials. The four ready-to-install parts of the bridge were craned into place and up for years of minimum maintenance service in less than six hours.

Structural composites are increasingly used in construction. They offer light-weight, corrosion-free and easy to install solutions using off-site engineered and fabricated elements. Network Rail, the company owning and operating Britain’s rail infrastructure, was looking for the most cost-effective way to replace a life-expired steel bridge. The old structure was comprised of two steel latticework spans resting on three brick piers.

Developing a Standardised Bridge Design

Network Rail was keen to trial moulded composite technology to develop a standardised bridge design where the mould could be used for multiple spans. At first, the plug was produced. This is a single-use timber former which serves to form the final shape of the mould. The mould is then made from glass fibre reinforced epoxy resin and can be used up to 500 times.

Efficient Manufacturing Technology

The bridge elements – two 12 metre spans and two flights of steps – were manufactured by AM Structures Ltd on the Isle of Wight. Each span is a fully moulded composite monocoque sandwich structure using Gurit’s patented SPRINT® epoxy technology materials above and below a structural foam core. SPRINT® prepregs consist of a fibre reinforcement layer on either side of a precast resin film with a light tack film on one face. Unlike conventional prepregs they remain dry and offer easy handling until cured. This also gives SPRINT® materials an outstanding breathability and results in autoclave quality laminate without the expense of using an autoclave.

Virtually Maintenance-Free Structure

The bridge could have been painted using standard epoxy or polyurethane paint, yet Network Rail opted for a long-lasting gel coat finish which gives the best quality finish on the outside, most visible to the passer-by. Apart from routine inspections and the replacement of non-slip finishes and stair nosings this composite bridge is practically maintenance-free: the structure is not only corrosion-free, it features a Class 0 fire rating meaning that it is self-extinguishing, is very tough and resistant to abuse, cracking and chipping. Each 12 metre span is U-shaped with the piers forming part of the structure. This shape makes the spans extremely strong and stiff while they only weigh 1.8 tons each. The light-weight elements could therefore easily be transported from the manufacturing location on the Isle of Wight to the final site near Blackpool.

Six hours for sixty years of Service

The reconstruction of the Bradkirk bridge was done within three six hour overnight possessions without disruption of the rail traffic. The first six hours were used to remove the life-expired steel structure using an 80 ton crane. In the second six hour interval, new precast concrete cills and stair landing units were put in place using a 200 ton crane. A small 35 ton crane was sufficient for Birse Rail, the principal contractor of Network Rail, during the third and last six hours in the night of May 17, 2009 to land the four prefabricated elements precisely on the spot. Now installed, they will allow pedestrians to safely cross the railway tracks for the next 60 years at least. For further information: Thomas.royle@gurit.com

Modular bridges

In nur sechs Stunden wurden vier aus Gurit Prepgps gefertigte Elemente an Ort und Stelle zu einer praktisch wartungsfreien Fussgangerbrücke zusammengefügt.
It is Rocket Science!

Gurit high-performance composites have contributed to bringing numerous satellites safely into orbit. Satellites are carried into space by launch vehicles – rockets most people would say. The valuable cargo is installed at the top of the launcher under the payload fairing, which shelters the satellites before and during the start and on the flight through the atmosphere from thermal, aerodynamic and acoustic effects and provides the launcher with an aerodynamically optimized shape.

The World’s First Composite Payload Fairing

The first payload fairing engineered and designed by RUAG Space was for the European Ariane 1 launcher, which made its successful debut on December 24, 1979. While the first fairing generations were based on classical aircraft technology, i.e. aluminium construction, RUAG Space introduced in 1988 the world’s first fairing in composite technology based on aluminium honeycomb cores with carbon fibre-reinforced face sheets. Ever since, RUAG Space uses Gurit carbon and combined carbon/glass prepregs to build about 10 payload fairings per year. «Let’s take the example of an Ariane 5 rocket», says Paul Loeliger, Head of Production at RUAG SPACE, «on a tour through the fascinating production site at Zürich/Switzerland. Each of these payload fairings is made up of a number of smaller shell elements. The tip of the rocket consists of two 180° ogives whereas the next lower section is made up of four ogive 90° sections. The last section is then made up of cylindrical extension panels. The finished elements are then shipped to RUAG in Emmen, near Lucerne, where they are combined into two fairing halves. »

In Two Minutes Through the Atmosphere

«The payload fairing is jettisoned as soon as the launcher has left the atmosphere at a height of about 120 km. This altitude is typically reached in about 2 minutes of flight», says Hendrik Theilemann, Head of Communications at RUAG Space. «That flight, however, is not an easy ride. Shooting up through the atmosphere, the pressure impact on the payload fairing is enormous and the temperature at the tip of the launcher easily reaches 600 centigrades. This is why the fairings are also protected by a layer of special cork material that burns off during the flight. By burning, the flames take the heat energy away and protect the complex structural portion of the fairing.»

The fairing elements are produced in air-conditioned buildings. The different layers of shell elements – i.e. the inner face sheet of composite laminates, the honeycomb core, and the outer face sheet as well as the thermal protection are laid up onto specially designed moulds. The entire set-up is then processed in a gigantic autoclave. How does RUAG qualify cooperation with Gurit? «Well, we are a very demanding customer. Material characteristics are to be very precise already in aircraft technology. But space technology is many times more demanding. Deviations of a hundredth of a millimeter equal a trip around the globe in this context. We rely on suppliers who live up to these tremendous standards, and I hope that Gurit continues to supply the high quality of materials we are getting today.»

Unparalleled 100% Mission Success

More than 190 payload fairings have been commissioned for European and US-American launch vehicles. To date, all RUAG Space payload fairings have been built in a variety of sizes and configurations, all of which have a corresponding 100% mission success. This qualifies RUAG Space as one of the world’s leading suppliers of payload fairings for launchers. Currently, fairings are produced for the European Ariane 6, the Lockheed Martin Atlas V-500 launch vehicles and the small European launcher Vega.
Interview with Robin Price

A BROADER PERSPECTIVE OF PURCHASING

Materials and services bought make up for a big portion of Gurit’s cost base. «World-class» purchasing plays an essential role in Gurit’s overall operations improvement scheme. SHAPE spoke with Chief Purchasing Officer Robin Price – a tell-tale name!

It’s nine months since you joined Gurit as Chief Purchasing Officer. What changes have you made?

I was lucky to join a team that was already implementing many facets of good purchasing practice, so I haven’t had to start from zero. The first thing I’ve done is to structure the way we analyse our purchasing information, and now we are able to give all the Gurit businesses a complete cost report each month and, more importantly, a cost forecast for the next 12 months. We call it the «Purchasing Radar». The next stage has been to extend our focus. Traditionally, Group Purchasing has concentrated on raw materials only. They are certainly the most important costs for us to manage, but there are also significant costs to control in other areas. We’ve split our whole spend into five categories, each managed by a category manager: Chemicals, Production Consumables, Reinforcements, Indirect Materials, and Services. I’ve just appointed Julie Lavers as category manager for services. Initially, she will concentrate on managing our expenditure on freight, but she will then move on to other areas of non-raw material spend. Each category manager is responsible for working with me to develop strategies for each commodity within their categories. We then select the right set of suppliers to help us to achieve goals within each strategy. The supply base should be dynamic. We expect constant improvement from suppliers and supplier development is something that we will emphasise more. Some suppliers will not make the grade, allowing us to introduce new suppliers. Our customers are very demanding of us, and we have to be equally demanding of our suppliers.

You’ve just introduced a new global purchasing policy. Why was that?

Every site spends money with suppliers. My team – currently nine of us located in the UK – manage the major share, but some non-raw material spends are too small to centralise and will continue to be run locally using the global processes outlined in the new policy. The policy sets some standards to ensure that Gurit gets best value at all the sites. The Group Purchasing team will work more closely with the sites and provide commercial expertise as necessary.

What affect does the global recession have upon your purchasing activities?

The economic climate is bad for everyone. However, we are seen as an attractive customer by our suppliers because of the good mix of industries we serve. Our target markets all promise considerable growth – if not this year, at least in the mid-term. And we are recognised as materials specialists at the forefront of technology. This is something our suppliers like, and they take pride in being part of our extended team.

I think your aim is to produce a world-class purchasing organisation. Are you there yet?

We’re getting better, and we look to improve even more. «World-class» is always a destination on the horizon and no matter how much we improve there is always scope for further improvement. We recently sent out a questionnaire to key people within Gurit. The feedback was that we’re on the right track in many areas, but there’s plenty of ways for us to increase our impact on the business. Part of that will come from communication. Many people still think that purchasing is just about price. There’s so much more we can do to add value to our end customers, and we will only do that by talking more to the business teams in Gurit to learn about our customers’ needs, and to give feedback on what we’ve learned about the market from our suppliers.

What about communication «up-stream»?

Very important. The key phrases here are «reducing supply risk» and, as previously mentioned, «supplier development». We like to work as closely as possible with our suppliers. We provide them with feedback on their performance and try wherever possible to help them improve their own processes. Secure supplies and consistent quality is essential for us. Seamless supplies, multiple sourcing and accurate news flow and communication allow us to reduce our inventory levels. This gives us a benefit, but one that we balance as part of our overall management of risk. If our suppliers improve quality consistency, reduce wastage and reach higher output levels, it is good for both us – supplier and purchaser. We have, for example, some ongoing six-sigma work with some of our sourcing partners, which are very promising.

So after your first nine months are you still enjoying it?

Absolutely – no question about it! Every day is different and there are the great people I work with both within our company and at our suppliers.

The Gurit Automotive team had first been using an entry-level CAD tool. They have now made the switch to CATIA. Sharing design information with OEMs using the same data format greatly facilitates cooperation.

Advising customers on composite-specific design matters for their components is a key part of Gurit’s offering as a tier 1 automotive supplier. Small changes in edge condition or draft angles can have a significant impact on a composite component’s manufacturability and price. Effective use of CAD, both as an analysis tool and a means of communication between design teams, underpins this process.

Once the component geometry is finalised, CAD work on tooling concepts begins. This is largely an iterative process with inputs from the customer, from Gurit engineers and the toolmaker’s own design team. Historically, Gurit had worked with an easy-to-use and relatively inexpensive entry-level system as its primary 3D CAD system. «We used this system to develop the design of the production tools for the current Aston Martin DBS coupé», says Martin Starkey, Managing Director of Gurit Automotive. Interim designs are frequently exchanged and modified by all parties prior to final design sign-off. «With time, it became obvious, that our system did not fully fulfil all the requirements for day to day tasks in the demanding automotive environment. Especially the creation of files for data exchange resulted in abnormally large files impeding cross communication between Gurit and its partners.»

COMMUNICATING IN CATIA

Two CAD systems are pre-eminent in the automotive industry: 

- IDEAS was largely driven by the Ford Motor Company, merged with the Unigraphics NX series of CAD systems and continues to be used at Ford and other companies. CATIA Version 4 and Version 5 have been adopted by a large number of automotive OEMs and are rapidly becoming a de facto standard for automotive design. Communicating in CATIA native file formats is a condition of becoming a tier 1 supplier for many OEMs. Gurit has therefore opted for CATIA V5. «Our system went live in November 2008 with onsite support and training in its fundamental operation,» Alan Purves, Account Engineer Design Manager remembered. Further, automotive-specific advanced training took place at the supplier in April 2009. The huge variety of CATIA modules offers scope to integrate other processes and gain further improvements in productivity, for example program- ming of CNC cutter paths for future projects could be accomplished from within CATIA using the Machining Workbench. A key part of the development of CATIA has been to integrate composites manufactur- ing and design operations, and the Composites Workbench allows ply shapes to be generated, developed and cut from within a CATIA environment.

SPEEDING UP DESIGN AND DEVELOPMENT TIME FOR ASTON MARTIN’S DBS VOLANTE

After completion of the basic training course, B-surface tool design work was undertaken for Gurit’s involvement in the Aston Martin DBS Volante project, and the value of the investment in CATIA and associated training rapidly became clear: Using the former 3D pack- age for the DBS Coupé had taken approximately 50 man hours. Using CATIA V5, a similar task for DBS Volante took just nine man hours. Tool design for the DBS Volante model represented a significant pro- gression for Gurit as the global leading carbon fibre parts supplier. «Through further development across all our processes and deploy- ment of powerful tools such as CATIA, the time taken from design freeze to parts production has effectively been halved,» concluded Martin Starkey.
CROSSING OVER TO COPENHAGEN’S OPERA NOW SAVES 50% ENERGY

The new Opera House offering spectacular views over the Renaissance city is a prime attraction of Copenhagen. Opera goers, tourists and residents crossing the harbour from Nyhavn now embark on a passenger and bicycle ferry built with Gurit composite materials. With displacement halved at constant waterline length, Arriva 3 not only features a very short build time and low maintenance costs but also saves approximately 50% of fuel compared with traditional vessels.

The Baltic Shipyard in Lübeck, Germany, is specializing in building high-speed, high-capacity vessels using advanced composite materials. Baltic and Sp’s marine business of Gurit have been working together for several years. Having used Sp’s engineering and materials successfully in previous projects, Baltic drew upon our expertise for its latest project, a monohull double-ender passenger ferryboat for inland waterways. The Arriva 3 ferry is specifically designed for quick to-and-from service for up to 100 passengers and bicycles between Nyhavn and the Opera House. The crossing to the spectacular theatre building inaugurated in 2000 takes just five minutes.

IMPRESSIVE FUEL SAVINGS
Arriva 3 was constructed with reliable materials certified for a lightweight composite design and build, allowing a significant reduction of the overall weight while ensuring meeting most demanding performance criteria. Having the ship’s displacement at constant waterline length reduced the necessary engine input also by half. As a consequence, Arriva 3 only consumes about 50% of the fuel similar vessels built in aluminium would typically use. And, in addition to remaining strong and robust, the tough epoxy surface of Arriva 3 keeps regular maintenance costs at a low.

COMPLYING WITH MOST DEMANDING FIRE RESISTANCE REQUIREMENTS
Baltic chose Sp’s S70FR Fire Retardant SPRIINT™ E-Glass prepreg materials for all sandwich panel laminates for this commercial craft that needs the most stringent industry standard, S70FR, part of our SPRIINT product range, not only passed the complex German fire resistance standard DIN18028/2 in a recent SP build, the same res-ist system was also passed by Baltic through the International Marine Organisation (IMO) FTP Code part 5 requirements in conjunction with a fire retardant (intumescent) coating for the construction of Arriva 3. The S70FR-SP system proved vital for Baltic’s overall process control and the production of large composite panels of approximately 3m² each.

SIGNIFICANTLY LOWER BUILD TIMES
Baltic’s fillet joint bonding solution — a technique comparable to welding steel plates together — uses a combination of two SP adhesive systems. A first bonding of Spbond 340L was applied to join the sandwich panels. The structural adhesive features high strength and sag resistance qualities which are fundamental to this part of the process. Spbond 340L was used to bond stainless steel and composite parts together; its high elongation at break is a necessary property to cope with the diverse thermal movement characteristics of the different materials combined. Spbond 340L was applied for gluing oil panels, stringers, bulkheads, longitudinals, transversals and deck parts together. Using a special mixing and dispensing machine made it possible to apply the adhesive at the same time as forming the fillet — a much faster method in comparison with metal-welding.

SIX MONTHS FROM KEELPLATE TO FULL FINISH
Arriva 3 is a fitting example to demonstrate that using adhesive welding can result in a short build time of just six months for a small team of 8 and 12 people. Starting in February, the Sp and Baltic teams finished the build of this 32.7m x 7m ferry well in time for its operation in the Port of Copenhagen beginning in August 2009.

According to Baltic, an aluminium construction needs four times more stringers than a composite sandwich construction. Considering that aluminium welding of 1m takes about three times longer than composite bonding, approximately 400 additional hours are required to build a comparable vessel in aluminium. The table illustrates the time savings for one of Baltic’s previous ship designs.

While this calculation highlights the considerable time savings, it does not even take into account the additional isolation process required for all aluminium outer shell surfaces. Composite sandwich constructions are by definition self-isolating. Time in maintenance using adhe-sive welding is another huge time saver.

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Markets: Wind Energy

KEEP THEM TURNING

Wind energy is still a relatively juvenile industry. Wind turbines are not only erected anew, they also need regular maintenance work to keep them turning. What is more, the ones installed in the 1980s are slowly aging. This opens the door for an ever more specialized after-market service industry. Gurit has a special product offering targeting the composite needs of this growing market.

Imagine a car driving at 260 km/h for about 20 years along a wind battered sea shore. What would that car possibly look like? The tips of wind turbine blades cut at about that speed through the air and are designed to last 20 years. Twenty years is commonly believed to be the average life expectancy of a wind turbine on land, off-shore it will probably be more like 25 years as winds are less turbulent there.

TYPICAL BLADE REPAIR WORK

The blade production market is characterised by rapid technical advances, global blade manufacturing/assembly sites, new entrants, and the fast introduction of new larger blades. These market trends, combined with environmental considerations, inevitably lead to blade repairs which fall into three categories:

1. Manufacturing issues
   a. Fibre waviness and laminate overlaps
   b. Bad bonds, delaminations and voids
   c. Quality issues that relate to a batch of blades; resin/adhesive issues or errors in blade processing

2. Transport damage
   a. Damage on the trailing edge due to movement of the transport securing straps
   b. Accidental damage from transport/installation: damage caused by fork lifts or cranes.

3. Environmental damage
   a. Leading edge erosion
   b. Trailing edge splits
   c. Lightening strikes – Scorching and blade tip splits

The most common repairs are related to lightning strikes. Wind turbines are designed to take lightning strikes and are typically protected by a strong copper wire surfacing at regular intervals in the rod, the excess heat at the point of entry bursts the composite surrounding the copper wire.

Blade damage is not easy to detect; often it is a change in the sound from one of the blades that signals a change in its aerodynamics. Composite specialists then clean out the damaged section and lay down new layers of fibre fabric, resin and gelcoats for smooth surface - not unlike repairing the hull of a boat, except for the fact that this work is usually done in air heights.

Regular servicing of blades is a key element in reducing downtime and gaining the optimum power output from the wind turbine generator. As an example, Wind Energy Services in the US claim that leading edge erosion on blades can result in a 5% - 10% power loss per blade.

THE ADVENT OF A GROWING SERVICE INDUSTRY

Within the last 15 years, the installed wind energy capacity rose from about 7 GW worldwide to well over 120 GW today. All these turbines need to be serviced. Service costs certainly depend on the location, on the type of turbine, on its age and size. It is fair to expect maintenance costs to rise along with the age of the equipment. At the same time, service costs form a smaller percentage of the overall costs as the average size of wind turbines rise. The European Wind Energy Association cites that 1.2 to 1.5 eurocents per kWh of wind power produced over the total lifetime of a turbine can be attributed to operation and maintenance. Similar figures have been produced by the Danish Wind Industry Association who state that the yearly maintenance costs are typically 1.5% to 2% of original installed wind turbine generator cost. For a 1.5 MW wind turbine, costing Euro 1.2 M this equates to Euro 24,000/year.

Blade repairs are typically performed by the Wind Turbine Generator OEMs or the Blade builders in the warranty period. The warranty period is typically 2-15 years depending on customer, and most blade repairs during this period involve using the original blade materials and repair procedures defined by the OEMs.

Outside the warranty period the blade repairs become the responsibility of the wind farm operator and the repairs can involve the use of materials that were not originally used in the blade build and the repairs can be performed by sub contract repair companies.

Several industry surveys have studied the outlook of the wind energy after market recently. With the aging of wind farms, they conclude, the opportunity for after-market service providers is bound to grow. Currently, the global wind turbine maintenance, repair and overhaul service market is estimated to grow from USD 3.9 billion today to over USD 9 billion by 2013, including work done on wind turbine blades, generators, gear boxes and other turbine components. This equates to an 18% annual growth rate. With easily over 20% increase per year, industry analysts expect to see the biggest growth in North America and China where the wind energy capacity is believed to
The wide range of wind energy participants ranging from large power utility, to manufacturers and niche players, the industry specialists reckon that there is a true need for a structured and reliable service business model to meet the needs of this after-market. Up to today, the after-market has been dominated by the Original Equipment Manufacturers. As the market matures and the demand for specialized aftermarket services outgrows the existing capacity independent third-party service providers are expected to fill this rising demand gap. Gurit is ready to supply them with a comprehensive compsite blade repair system.

**TARGETED MARKET APPROACH IN THE US**

Gurit and Composites One have joined together to offer a specially developed range of blade repair materials for the North American Wind Energy market. These competitively priced products are specifically designed for repair, possess the appropriate approval by O.E.Ms and ISO 9001, and are available to all developers wind resource states in the U.S at very short lead times. Alongside this specifically designed service, Composites One and Gurit are also launching a product selection guide that will detail the range of materials used to repair the most commonly found damages in to service blades. The guide contains detailed guides to repairing inflalted blades, as well as recommended materials. Compiled by Gurit and Composites One, the guide is based upon the combined expertise of the two companies who have supplied materials and technology into the wind energy market for 15 years.

**GURIT WIND TURBINE BLADE REPAIR SYSTEMS**

<table>
<thead>
<tr>
<th>Category</th>
<th>Product</th>
<th>Description</th>
<th>Mix ratio resin/hardener (by volume)</th>
<th>Application</th>
<th>Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laminating</td>
<td>Ampreg21</td>
<td>Low viscosity wet laminating system with range of hardener speeds</td>
<td>100:38</td>
<td>Structural repairs to blade shells</td>
<td>Small 1.33 kg packs up to 1,000 kg BCS</td>
</tr>
<tr>
<td>Infusion</td>
<td>PRIME 20LV</td>
<td>Low viscosity infusion system with good cure progression &amp; high toughnness at ambient only cure, Range of hardener speeds</td>
<td>100:31</td>
<td>Structural repairs to blade shells &amp; injection into voids</td>
<td>3.9 kg packs to 1,000 kg IBC</td>
</tr>
<tr>
<td>Adhesives</td>
<td>Spabond 340LV</td>
<td>High strength &amp; toughness structural adhesive with range of hardener speeds</td>
<td>100:50</td>
<td>Trailing edge splits &amp; damage due to lightning strikes, delaminations &amp; bell bounds</td>
<td>400 ml cartridges up to 2,000 kg drums</td>
</tr>
<tr>
<td></td>
<td>Spabond 730</td>
<td>Fast curing structural adhesive, Gels in 10 minute, solid in 2 hours &amp; full properties achieved overnight</td>
<td>100:100</td>
<td>Small repairs &amp; splits on trailing edge sections</td>
<td>400 ml cartridges</td>
</tr>
<tr>
<td>Filters</td>
<td>15 Min Spot filler</td>
<td>Fast curing spot filler</td>
<td>100:100</td>
<td>Filling &amp; furring of leading edge &amp; defects on blade surface</td>
<td>1 kg resin &amp; hardener up to 24 kg resin = 24 kg hardener</td>
</tr>
<tr>
<td>Gelcoat</td>
<td>SP8662 with SP1755 hardener &amp; SP1757 accelerator</td>
<td>3 component UV stable Epoxy Gelcoat</td>
<td>100:37:7 up to 3:5</td>
<td>Repair of topcoat used on prepreg blades produced by Vestas &amp; Gamesa</td>
<td>1.6 kg packs</td>
</tr>
</tbody>
</table>

Gurit produces a range of products for blade repairs. These products have been used by a number of Wind Turbine Generator O.E.Ms for original blade builds but are supplied in small, more user friendly packs for in-field blade repairs. The range of repair materials offered by Gurit are suitable for both structural and blade surface repairs on epoxy infused and prepreg blades.

Interview with Rudolf Hadorn

**STICKING TO STRATEGIC PRIORITIES**

2009 is a year of global recession. Recovery comes slower and more gradually than anticipated. SHAPE wanted to know from CEO Rudolf Hadorn how Gurit was coping with the current challenges.

What does Gurit need most in challenging times like these? Three things, I would say: A clear strategic goal, discipline in execution, besides, of course, the financial means to safely stay in business. Let me put that into perspective. Some of our customers witness rather substantial sales reductions this year versus 2008. And this clearly affects Gurit, too. Yet, while we are suffering from lower sales and declining capacity utilizations, we adjust our cost base as best as we can to protect our profitability and the solidity of our balance sheet. And we stay focused on the implementation of our long-term strategy.

What about Gurit’s capacity utilization? Two years ago, Gurit invested into the global expansion of its production capabilities – based on the growth projections expected for the coming years at that time. Last year, our production capacities were not fully loaded. In the first half of 2009, sales to our target markets declined by 12% based on constant currency translation rates. While the situation in the European market is just about satisfactory, the leading edge of our prepreg markets in Canada is disappointing, and in China we also have considerable reserves in prepreg, while we are full in our foam expansion and kitting activities. While we believe that the idle capacity will be beneficial in the next upturn, the task now is to use the low capacity utilization for retrofit programs, targeted machinery upgrades and for additional employee training. We want to be in the best shape possible when markets recover.

Where exactly is Gurit investing right now? We have just about doubled our foam kitting capacity in China with the purchase of two new Saxis routers to kit Corcell foam this fall. And in Europe, we have launched a targeted retrofit program for our prepreg machines. 2009 will not see massive capital expenditures, but wisely targeted and effective investments in line with our long-term strategy.

What are the major strategic objectives? For the whole Gurit Group, we certainly want to be in the best shape and ready for the next upswing. Therefore we continue to invest in our product development and aim to address our customers’ needs. Looking at the various target markets, our strategy can be summarized as follows: In Wind Energy, we want to be recognized as the leading materials and technology partner for all wind rotor blades manufacturing technologies. We have considerably strengthened our wind Energy marketing and sales force for North America and the Nordic countries in Europe. Apart from prepreg we are thus also strengthening our presence in formulated products and especially in core products. The acquisition of a majority stake in the company China Techno Foam in Tsingdao also has to be seen in that context. We want to extend our foam presence in China with locally scaled, locally produced core materials for the Chinese market. Moving our production as close as possible to our customers is another strategic thrust. As China will be one of the major growth markets for Wind Energy, we are also installing some of our capacities for resin formulation at Gurit (Tianjin).

In Transportation, we want to maintain our leadership position in aircraft interiors materials in Europe and leverage this know-how into other interesting markets such as Rail. We are also expanding into corematerials for a next generation of high-speed trains in China. Last but not least, we want to bring our Automotive business up to a next level. In the second half of this year we will start supplying Class-A carbon car body parts to a second premium car maker. We hope to leverage our strong position in Europe and develop this into a real sales figures when the economy picks up again.

In Marine—a very difficult market for the time being—we want to penetrate that market deeper with newly developed materials such as M-Foam and comprehensive materials and technology packages for high-end production boat builders. The new contract with Nautor/Swan is an important step in that direction.

Klar auf die mittelfristige Strategie ausgerichtet, meinten Gurit die Herausforderungen der Rezession.

Interview mit Rudolf Hadorn: Wie Gurit die Herausforderungen der Rezession meistert.

采用Gurit adapted to the global economic crisis. It is now looking ahead to a strong recovery in 2010.
M-FOAM – THE FOAM FOR ALL MARINE APPLICATIONS

Gurit has launched M-Foam, a new structural foam that combines the product characteristics most important in marine applications into one single material.

Since the SAN chemistry-based structural foam family Corecell was first introduced to the marine industry, it has developed a reputation for toughness and reliable processing. The A and P grade Corecell foams have been used on many successful marine projects ranging from production boats to superyachts and one-off racers such as Volvo 70’s and Open 60’s. Due to the property of very high shear elongation, Corecell was so far predominantly used for slamming areas, while the static properties had limited potential applications compared with PVC foam.

FROM MARKET ANALYSIS TO THE PRODUCT BRIEF AND THE FINAL PRODUCT

Gurit’s market analysis showed that there was an opportunity to consolidate Corecell’s leading position in the marine market by developing a new product that gave optimal properties in both dynamic and static situations, was equally compatible with prepreg and infusion processes, and retained the benefits of existing Corecell products with low resin uptake, no out-gassing and robust processing. In other words, we wanted to create a single new structural foam with superb material characteristics for any kind of marine application.

A Product Development brief was written by Product Management in liaison with our SP marine specialists using the feedback of customers and the input of Gurit’s technical team, setting clear targets for each property required, and referring to competitor benchmarks. The development project team included specialists from various Gurit sites: Yan Simard, IE&O Chemical Engineer at Gurit (Canada) in Magog, was the project manager. He was supported by a team consisting of Alain Lesclair, R&D and Quality Manager at Gurit (Canada), Joe Summers, Product Management, and Julian Sellier, Project Engineer, who both work out of Gurit (UK) in Newport, and two additional Canadian colleagues, Miguel Turcotte, Laboratory Composites Technician, and Kurtis Duddy, Composite Processing.

VALUABLE INPUT FROM STRUCTURAL ENGINEERING

Regular meetings were held with the other team members acting as consultants. A key contribution to the project was Gurit’s engineering capability. Structural Engineers were instrumental in defining what mechanical properties were necessary to achieve sufficient strength. Julien Sellier made several benchmark models available, based on as-built marine structures, typical for sandwich panel applications, allowing rapid feedback on how M-Foam performed against the other products of our own Corecell range, as well as the competitors’ products. The main criterion used for these studies was to match the original design strength and highlight weight saving due to the use of M-Foam. Models used were:

- Hull laminate for 40’, 60’, 100’ and 130’ yachts. The foam of the sandwich panel is subject to high core shear loads. Also the foam stiffness will have an effect on the skin wrinkling capability of the sandwich laminate (local instability of the skins in sandwich panels).
- Deck laminate for 40’, 60’, 100’ and 130’ yachts. The foam stiffness (compressive modulus and shear modulus) are critical for the buckling stability of the sandwich panel under compressive loads. Core shear strength is also important in that case to ensure the water loadings can be withstood.

INCREASED CORE SHEAR STRENGTH

Marine foams are very specific as they need a compromise between their ability to withstand dynamic loads (slamming on hull panels) and high static loads (compression in the deck in the case of a sailing yacht). In terms of mechanical properties, impact resistance is largely driven by the shear elongation. M-Foam, being based on a similar chemistry as the A and P grade, inherited the high shear elongation characteristics of those market leading products. M-Foam’s major improvement lies in the increased core shear strength combined with an overall lower density range.

The M-Foam project was started in earnest at the beginning of 2009. The final product was launched on July 17, 2009 with a preceding teaser and information campaign. Sharing the general Corecell benefits, Corecell M-Foam is the only core material available to offer a complete cost-effective package comprising high shear strength, low weight and high elongation, low resin uptake for infusion processes and high temperature stability for prepreg processes. Easy to manufacture, the fine cell size and tough M-Foam offers a superior uniformity through lower density variation and is compatible with polyester, vinylester and epoxy resin systems. In addition, Corecell’s unique “knife-cuts” ensure very low resin absorption and thus save both weight and cost. For additional technical information, please consult the section on Corecell Core Materials in the Marine section of the Gurit website www.gurit.com.

Initial feedback from the market has been very positive, and the most important aspect of any launch, sales, are expected to follow.
SP has gained a three-year exclusive supply agreement with Nautor who builds the world renowned Swan range of sail boats ranging from 40 – 130 feet. All newly designed Swans will be built in Gurit’s patented SPRINT® technology, Corecell structural foam core, and Spabond structural adhesives. SP will also be contracted for the structural engineering for all future boats.

Nautor has a long and illustrious history as a quality production boat builder that specialises in performance driven, ocean-going, luxury sailing yachts. Although Nautor has been a very valuable customer to SP for well over a decade, they have in the past utilised various manufacturing methods with non-SP products. The last eight years has seen the Finnish company expand their manufacturing techniques and push boundaries with the use of SP’s materials and technology.

As a result, the most sophisticated Nautor yachts produced to date will be launched later this year – the full SPRINT® carbon epoxy high performance Swan 60 and 80. Paul Riley, Marine Sales Account Manager, explains how Nautor and SP have shared a close working partnership and forged significant technical developments throughout the project. «Nautor was the first marine company to adopt SPRINT® technology in the production of a large structure and this was applied in the manufacture of the Swan 45 and 601 ranges. The lightweight decks on this full bred racer cruiser provided practical production experience for SP and allowed the SPRINT® range to be refined to increase robustness, and flexibility in fabric and resin selection. The 45’s production process also initiated the introduction of tack films for work on vertical surfaces. In turn, Nautor’s commitment to the project has seen the company make considerable investment in new production facilities, including a 100 foot computer controlled curing oven which facilitates precise temperature control throughout the curing process,» Paul Riley explained. On completion, the Swan 45 performed beautifully and consistently achieved good results on the race course.

**PRODUCTION BOATS BUILT LIKE ONE-OFF YACHTS**

Nautor was obviously keen to capitalise on the successful performance of this first SPRINT® production boat, and the concept of the Nautor 601 was born and latterly the new 60 and 80. Paul Riley, Marine Sales Account Manager, explains how Nautor customers expect: superior quality of interior comfort and stylish fit-out, all combined with impressive racing performance. This brief called for the use of state-of-the-art materials, innovative manufacturing processes, combined with an intelligent approach to engineering.

**PRODUCTION PROCESSING**

With the one-design concept, every aspect of the build of the boat must be repeatable. SPRINT® with its fixed resin content, fibre weights and pre-catalysed resin systems means accurate weight and laminate thickness can be produced consistently in a simple process with the opportunity for error removed. A prototype was not produced for the Swan 60 project, so each boat in the series, including the first, had to be exact and delivered at the correct weight with no margin for error as future modifications could not be made.

With a team of eight men, the inner skin of the 60 was then laid. This whole process took only three and a half days before applying the vacuum bag and curing – an extremely rapid laminating time by ordinary standards. The inclusion of extra resin within the SPRINT® material to facilitate core bonding resulted in further time-savings in what would normally be a very time consuming process of priming the core, or the use of glue films, on either side of the core material. Not only was the procedure extremely time-efficient but it was also very clean, completely eradicating the need for any wet systems and the associated drawbacks. Good standards and continuous improvement of Health and Safety practices are a very important issue for Nautor who continuously strives to improve the environment for operators.

All the internal structure, bulkheads, transverse, longitudinal beams, keel box and engine mounting structure were produced separately in female moulds. The Swan 60’s bulkheads and internal frames are constructed with flanges so they can be sited and bonded into place with high strength structural adhesives – again minimising wet laminating processes and reducing man-hours and labour costs considerably. On SP’s technical team’s recommendation, the structure was bonded into the hull using a combination of SP’s Spabond 340, 340LV and 130 adhesives.

**RELIABLE AND PREDICTABLE MATERIAL**

Working with SPRINT® and female moulds also means the laminate thickness is extremely predictable and repeatable. This combined with a consistent surface finish allows certain tolerances to be achieved, enabling the secondary bonding of the internal structure to be a relatively simple process. The need to compensate for miscalculations that can result in the filling of large gaps or cutting of laminates is also removed.

“Once we became familiar with the process, SPRINT® has proven to be a reliable and predictable material, as well as saving valuable man-hours. It also enables you to accurately predict final weights and properties of laminates which makes boatbuilding much easier.” Mr Kjell Vasta, Nautor’s Technical Director commented. «We are able to repeatedly produce laminate with very low void contents, correct fibre to resin ratios and predict mechanical properties – exactly what a reputable boat builder needs!»
THE GURIT CODE OF CONDUCT

Apart from hard facts and financial information, topics like Corporate Governance, Social Responsibility and Business Ethics increasingly become investment criteria and areas of general interest. The Board and Management of Gurit have signed off on the Gurit Code of Conduct – a comprehensive Guide of business principles applicable throughout the Group.

The core activities of Gurit today were formed both organically and by a series of acquisitions over the last decade. Growing into a single organization, we developed a set of values, called «Values4Success» and discussed in earlier editions of SHAPE. They are based on a mutual understanding of our personal values such as trust, respect, honesty, loyalty and integrity. The «Values4Success» provide a framework to guide our daily actions and the way we respond to difficult decisions.

- Customers – our priority
- Renewal through innovation
- Profit through empowerment
- Success through people

IN ACCORDANCE WITH THE LAW

While we conduct business within the framework of «Values4Success», our business conduct also must be strictly in accordance with national and international law and many additional rules and regulations. As the social and economic environment is changing at an ever-faster pace, we want to uphold the strengths of Gurit: Establishing clear guidelines which integrate our continuously growing set of standards is an essential step in that direction. The Gurit Code of Conduct sets out those same standards of conduct that our employees have always applied using good common sense and is designed to help deal with ethical and legal compliance in our day-to-day work and applies to the entire Gurit Group. We will therefore ask senior Gurit staff to study and sign the Gurit Code of Conduct and share and discuss this Code with all colleagues.

SHARED, DISCUSSED AND PUBLICLY MADE AVAILABLE

The Gurit Code of Conduct is not only shared and regularly discussed with each and every employee in the context of the yearly appraisals, but also made publicly available on our website www.gurit.com. Special chapters are dedicated to our full compliance with the law, our information procedures, our environment, health and safety policy, our business ethics rules, our employee and customer relations policies and – last but not least – compliance.

Gurit is determined to adhere to the Gurit Code of Conduct and expects all employees – and where applicable also all external parties we work with – to fully comply with the Code.

GURIT WEBSITE NOW AVAILABLE IN CHINESE

In order to enhance and develop our business in China, Gurit has created a dedicated Chinese website www.gurit.cn. Being already a prime Wind Energy market for Gurit, China also offers great opportunities for our Transportation and Marine products. The website was launched in time to support Gurit’s presence at China Composites in September 2009. The Chinese website is a condensed version of the main website summarizing all current, existing materials and information. The gurit.cn website covers all main market areas and associated products including Wind Energy, Aerospace, Rail, Automotive and Marine. The website has been fully translated into Chinese and will further enhance and strengthen our customer base and product offering.

GET ON YOUR BIKES!

Gurt (UK) has various initiatives to keep employees in shape: the on-site gym is used by many colleagues over lunch-time and after work. Others keep fit swimming at Gurnard Pines, the local leisure club. The easiest available daily fitness training, however, is to ride the bike to work. «Gurit not only linked its site to the public cycle path network on the Isle of Wight, we also have special bicycle offers for our employees,» says John Foggatt who eagerly advocates the «Get on your bikes» initiative or the car sharing scheme to relieve some space in the car park. «We offer a great selection of bikes at a considerable discount.» Working together with a local bicycle and sports shop, Avocet Sports, Gurit can provide its employees – and families – with cycles at some 30% discounts. Some 30 bicycles have already been sold in the context of this programme. SHAPE spoke with Warwick Lauder, Design Engineer, who recently got an 18-speed mountain bike through the «Get on your bikes» plan. «I think it is a great initiative, promoting true green transportation to and from Gurit, and I would like to congratulate John on that brilliant idea. It certainly got me on my bike. I live about 4 miles from Gurit, accessible by the lovely bike path that runs beside the Medina River. This is really a very nice ride to work.» And Warwick does not limit his bicycle ride to nice and sunny days. «This summer I have been riding to work really every day along that bike path. The shower and gym facilities at Gurit (UK) allow you to ride into work – whatever weather conditions. I usually hit the gym when I get to Gurit in the morning anyway, then refresh myself before I start my working day.»

Die Gurit Website ist nun auch auf Chinesisch aufgeschaltet. Preislich attraktive Fahrräder überzeugen immer mehr Gurit-Mitarbeitende zur Arbeit zu radeln.

固瑞特网站已经开通了中文。
GURIT AGENDA 2009/2010

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:

  10 – 11 November 2009

» METS 2009, Amsterdam
  17 – 19 November 2009

» JEC Composites Show, Paris
  13 – 15 April 2010