in the groove
The world of seals and service

Oil & Gas
Giant moves
Complete offshore platform decks – from land to sea

Chemical & Processing
Custom solutions for a complex industry
Helping the bioprocessing industry in its quest for cleanliness and efficiency

Solar Photovoltaic
A sunny feature ahead
Solar power’s contribution to the global energy supply is on the increase
**Giant moves**

Technip is involved in moving complete oil & gas platform decks that are fifteen stories high and as big as soccer fields from shore to their jackets out at sea using a floatover method. Low-friction product from Trelleborg Sealing Solutions facilitates skidding from dock to support structure.

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Shine on!!

The majority of today’s energy needs are served by the oil & gas industry. Trelleborg Sealing Solutions has always been a leading supplier in this area and it continues to be so. In this in the groove we explain how Orkot® is used to skid complete platform decks from shore to sea and give views from our Global Oil & Gas Group on the sector.

As our dependency on fossil fuels is predicted to reduce in the future, an important focus for us is renewable technologies. One of those is solar energy. Our expertise in sealing within semiconductor equipment means that we already command a significant market share in solar photovoltaic sealing solutions. Read about this emerging industry and why we are expecting a sunny outlook ahead.

In semiconductor we keep on introducing new products. Turcon® Variseal® PS™, for wet processing applications, is our latest. We’ve also our interesting case study on Korean company JUSUNG Engineering, who manufactures CVD equipment, an article on products supplied into the booming bioprocessing industry and colored coatings for O-Rings.

Finally, as always, if you have any comments on our latest in the groove, email me at groove@trelleborg.com. We welcome your views.

Dr. Sandro Johannes Silverio
Global Director - CPI, Semiconductor, Oil & Gas segments

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A Variseal® energized with PEEK™ gives superior performance in wet processing semiconductor applications.
Exhibiting across the Americas

From Calgary to New York City, back to Sacramento and finally on to San Francisco, Trelleborg Sealing Solutions has been on the road in the Americas. For the oil & gas, life sciences, hydro and semiconductor industries, respectively, these exhibitions have been both exciting and rewarding.

GPS 2008, considered the largest exhibition for oil & gas, was the most attended show in forty years with nearly 62,000 attendees from 97 different countries and over 2,000 exhibiting companies.

MD&M East 2008, the largest event for medical device manufacturers in the world, showcased all that is new in the life sciences industry.

Riding the wave of the alternative energy movement, HydroVision 2008 hosted more than 2,500 people from at least 68 countries.

Finally, Semicon West 2008 was a huge success. The show boasted higher numbers than 2007, a jump of 19 percent, proving that this event is very important in the eyes of semiconductor professionals.

Our new exhibition booth design is proving very effective at promoting our products. Here it is on show at MD&M East (left) and GPS (below.)
**FEA global focus**

Finite Element Analysis (FEA), used to calculate load and deformation of seals, is a key tool used by Trelleborg Sealing Solutions. In order to build on and enhance our FEA capabilities, the second Global FEA conference was recently held. Experts met together to discuss ways to further improve support. Topics included sharing of FEA knowledge between different R&D locations, internal cooperation between sites and future FEA development.

**Teaching seals in Japan**

Trelleborg Sealing Solutions Japan has developed a training course on seal technology called the “Seal Academy.” It is made up of three parts: basic, intermediate and advanced. Twenty-two participants from 11 companies participated in the first training session which took place in Tokyo during May. Hiroshi Shimizu, Technical Planning Manager, who was presenting says, “Even though it was a long, full day seminar, every single attendant seemed to keep their attention until evening. The people attending the course appeared to really value the opportunity of learning about sealing technologies through real life case studies.”

**Rapid response**

The protoXpress® team at Trelleborg Sealing Solutions Americas contributed to an amazing response time of less than 48 hours when supplying prototype parts for a recent short order request. “The rapid prototype cells located in Broomfield and Fort Wayne continue to prove invaluable, especially in an industry such as semicon that demands it,” says Quinn Collett, Trelleborg Sealing Solutions Northwest Sales Engineer.

**About protoXpress®**

Trelleborg Sealing Solutions Americas, in a measure to improve responsiveness to the market’s need for testing samples, offers the protoXpress® rapid prototyping system from two locations. Standard components and assemblies can usually be delivered in five to seven days, while items requiring a mold will ship in 15 to 20 days.

The protoXpress® rapid prototyping system is triggered by a request for quote. Prototypes delivered are of the same superior quality that customers have come to expect from Trelleborg Sealing Solutions.

**Still sealing well after all those years**

Wills Rings® have been produced at Trelleborg Sealing Solutions in Bridgwater, UK, since 1935 when they were invented and the company founded. The original metal O-Ring, these seals are still used today, especially in extreme environments such as oil & gas applications. Trelleborg Sealing Solutions was pleased to receive an order for 16 Wills Rings® for one of its original applications, an engine of a 1936, 2-liter supercharged ALTA sport, a rare car of which there were only six ever manufactured.
On show worldwide

Trelleborg Sealing Solutions is exhibiting at lots of major venues globally, why not come and see us at one of these upcoming events.

29 to 30 October
Paris, France
Aero-Engine Expo 2008
The Aero Engine Conference & EXPO has established itself as the meeting place for aero engine professionals.

4 to 7 November
Paris, France
MIDEST 2008
MIDEST is the largest international gathering of subcontracting technical expertise and services for the processing of metals, plastics, electronics and electricity.

4 to 7 May
Houston, TX, USA
Offshore Technology Conference 2009
OTC is the premier offshore industry event for professionals, service industries and suppliers to gather and discuss common issues of ocean resource development. Technological innovations and forums on economic, social, and political aspects of resource development and environmental protection have been the mainstay of this worldwide conference.

10 to 12 February
Anaheim, CA, USA
MD&M West 2009
Since 1985, MD&M West has provided an unparalleled array of resources for the design and manufacture of both current and next-generation medical devices. No other event… the world over… can match the breadth and depth of MD&M West in delivering the most complete and comprehensive resource for medical manufacturers.

3 to 5 December
New Orleans, LA, USA
International WorkBoat Show 2008
The International WorkBoat Show is the largest commercial marine trade show in North America serving people and businesses working on the coastal, inland and offshore waters. One-thousand companies will display products and services for commercial vessels and the companies that build, service and operate them.
SEMICON Japan 2008
SEMICON Japan is the largest trade fair for the semiconductor industry in Japan. And with close to 1,500 exhibiting companies, SEMICON Japan is unrivaled as a place for information gathering and networking.

Elmia Subcontractor 2008
Elmia Subcontractor is the leading international, specialized fair for subcontractors to the engineering industry in Northern Europe.

Food Pharma Tech 08
Food Pharma Tech is Northern Europe’s largest trade fair for the food and pharmaceutical industries comprising a wide selection of products within both areas.

Swisstech 2008
Swisstech is Europe’s central fair for the subcontracting industries, focusing on mechanical-technical components and system solutions.

baum 2008
The largest and most important industry platform for this rapidly growing region is bauma China in Shanghai, which will open its gates for the fourth time. bauma China allows manufacturers to showcase their products in a professional setting, acquire new customers and make optimum use of business opportunities.

KOAA Show Korea 2008
This exhibition focuses on the Korean automotive parts and other related industries.

SEMICON Japan 2008
SEMICON Japan is the largest trade fair for the semiconductor industry in Japan. And with close to 1,500 exhibiting companies, SEMICON Japan is unrivaled as a place for information gathering and networking.
Find out how Technip moves complete oil & gas platform decks out to sea using the floatover method.

Orkot® is used for low-friction pads that facilitate skidding of the platform deck onto a transport vessel and then out to its offshore installation.
Technip is involved in moving complete oil & gas platform decks that are fifteen stories high and as big as soccer fields from shore to their jackets out at sea using a floatover method. Low-friction product from Trelleborg Sealing Solutions facilitates skidding from dock to support structure.

"Installing a large platform deck, or topside, onto its jacket, or legs, using the floatover method is gaining popularity," says David Emery, OFP2 T&I Project Manager in the Offshore Platforms – Product Business Unit of Technip. "This is because the operational cost is much lower than other methods of installation, such as modular lifts or a single piece installation by a heavy lift barge. Also, a high proportion of the hookup and pre-commissioning work can be completed onshore prior to loadout, significantly reducing the duration and cost of the offshore commissioning phase."

**Orkot® pads are used for skidding oil & gas platform decks out to sea**

Orkot® TLMM from Trelleborg Sealing Solutions is used for low-friction pads that facilitate the skidding of oil and gas platform decks onto transportation vessels. "It was chosen
as a more economical alternative to Teflon® pads,” continues David. “Bound inside and below the supports of the topsides (substructures), it’s a critical part of the loadout procedure for topsides onto the transportation vessel and then onto their offshore installation.”

The decision to use Orkot® bearings was based on the material’s excellent characteristics. These included high load capacity and compression strength, a low friction coefficient and good chemical resistance, along with ease of machining and bounding. Demands are high in a floatover operation. The material has to not only remain stable during the skidding operation, but also continuously withstand high loads for the time the topsides take to construct, around two years.

“The next use will be for the OFON 2 Project for the OFP2 topsides (14,000 metric ton/ 15,432 ton topside),” says David. “We continue working with Trelleborg Sealing Solutions because the Orkot® material is excellent and effective in the application. It is also due to the quality of the service we receive. Trelleborg Sealing Solutions personnel are always available and they have high involvement.

“An example of this is how they worked with us on the design of the pads. These were adapted to include a machined groove below the bearing to allow a better flow of grease on the skid way. Their specialists have also trained our personnel in pad bounding at our facility.”

“Orkot® material is excellent and effective in the application.”

Initially Orkot® TLMM was fitted on the AMENAM 1 Platform (11,000 metric ton/ 12,125 ton topsides) in 2003. Then it was successfully used for the East Area Project for the GN Platform (18,000 metric ton/ 19,842 ton topsides) and recently for the AMENAM 2 Platform (9,600 metric ton/ 10,582 ton topsides) installed in 2006.
The whole platform deck, or topside, rests on Orkot® pads which are laid on a runway to skid the platform on to its transport barge. Due to the pads’ low-friction characteristics, hydraulic cylinders (stand jacks) can push the platform from the shore and onto the barge.

LOAD TRANSFER:
The vessel is ballasted to make contact with and then transfer the deck load to the support structure.

SEPARATION:
After completion of the deck load transfer, deck/vessel separation occurs and the vessel is retrieved from the jacket with the assistance of tugs.
Unideck® floatover method

Unideck® enables a very short installation time allowing it to be used even in severe swell conditions. Conventional floatover by ballasting is too slow and can cause excessive impact between the topside and the jacket.

The technology developed by Technip combines ballasting and jacking to improve the stability of the heavy transport vessel during the transportation phase and uses jacking to provide a quick transfer of the integrated deck weight onto the pre-installed jacket. This avoids high dynamic impact loads.

World’s first

The Platform AMP1 of the Amenam/Kpono Phase 1 project was 60 meters/ 200 feet long, 40 meters/ 130 feet wide and 50 meters/ 160 feet high and had three working levels each the size of a soccer field. At 11,500 metric tons/ 12,677 tons the floatover installation on-site offshore on March 13, 2003 constituted a major achievement for a facility of that size. The extremely critical floatover operation involved pinpoint accuracy. This was followed by further installations, including the current record holder in the Gulf of Guinea using the Unideck® system, the 18,000 metric ton/ 19,842 ton gas compression GN platform for the East Area project.
About Technip

Technip provides all or part of the services for basic and detail engineering, procurement, construction and project management, at optimized costs in oil & gas fields. The group has a long track record in implementing large turnkey contracts and arranging related international financing on behalf of its clients. In particular, in the offshore segment, Technip is in a position to fulfill the expectations of operators wanting to entrust the largest possible range of services to a single contractor able to manage all aspects of a major field development.

The Offshore Platforms – Product Business Unit

Technip designs, constructs and installs, in deep or shallow waters, fixed and floating platforms for the production and processing of oil or gas. The Offshore Platforms product line promotes products developed by Technip like:

- The TPG 500, a self-installing fixed jack up platform
- The Unideck® floatover for installation of topsides
- The SPAR, a deepwater drilling and production platform

In addition to the large fixed and semi-submersible platforms described above, Technip is also active in the design and installation of Floating, Production, Storage and Offloading Systems (FPSO).

Topsides: Home away from home offshore

The topside structures that are moved to the jackets out at sea using the floatover method are massive constructions. They are as high as a 15-story apartment building, and each of their three working levels is the size of a soccer field. Not only is the platform a complete factory made of steel, it is fitted with all the equipment to extract and store oil and gas before transfer to transport ships. It is also, for staff that will live on the offshore rigs for months on end, a home away from home. There are on average around 100 individual bedrooms and bathrooms. Like a giant hotel in the middle of the sea, there are restaurants, fitness suites, and some even have running tracks. The platform decks are fully fitted before transport, including everything from beds to plumbing.

Find out more about Technip at: www.technip.com
Headquartered in Korea, JUSUNG Engineering is an independent supplier of CVD equipment to semiconductor and LCD manufacturers. With a turnover last year of 130 million euros / $184 million, JUSUNG has gained worldwide recognition within the industry as a technology leader in the field. *In the groove* spoke to Kim Tae-Young, from JUSUNG’s purchasing department, about client demands and his company’s cooperation with Trelleborg Sealing Solutions.

**Silicon Valley:**

**Korean style**

**In short...**

- JUSUNG Engineering is an independent supplier of CVD equipment to semiconductor and LCD manufacturers.
- Due to high vacuums, ultra-clean seals are required in CVD equipment.
- JUSUNG selected seals in Isolast® J9670 perfluoroelastomer material developed by Trelleborg Sealing Solutions.
- Tests proved that these seals provide long operating life in CVD applications.
Visitors to the JUSUNG Engineering’s central offices in Gyunggi-Do are often reminded of Silicon Valley in California. And, indeed, the JUSUNG complex with its expansive office space and backdrop of sky and mountains is a real offshoot of the American high-tech equipment industry. Since its foundation in 1995, the company has witnessed extraordinary growth in the rapidly changing field of semiconductors. JUSUNG has developed and now successfully markets various CVD and etching systems, found at the core of today’s semiconductor and display technology.

“exports now make up 73 percent of our sales”

Thanks to such advances and continuously high product quality, JUSUNG has earned the respect of the world’s premier semiconductor manufacturers. Full-scale exports began in
1997, and JUSUNG now supplies products for the mass production lines of semiconductor makers in Korea as well as on international markets. “We provide our equipment to Hynix, LG Philips, KISCO in Korea, CMO in Taiwan and other companies across Europe,” Mr. Tae-Young proudly explains. “And we’re no longer reliant on domestic customers, since exports now make up 73 percent of our sales.”

Nowadays LCD production and technology in Korea represent Asia’s hub for the international market. Securing competitive strength in this sector meant developing and mass-producing domestic LCD manufacturing equipment. It is here that JUSUNG Engineering’s PECVD appliances, such as the Technova™, play a significant role in the manufacturing of the thin-film transistors (TFTs) found in LCD displays.

“the high vacuums produced demand ultra-clean seals to prevent contamination”

“The users of our CVD equipment require high-quality sealing products. This is because the high vacuums produced demand ultra-clean seals to prevent contamination,” Kim Tae-Young notes. “In addition, they often encounter very aggressive chemical and/or thermal environments.” Since JUSUNG is always looking to improve its products, the company decided to try out seals in Isolast® J9670 material developed by Trelleborg Sealing Solutions. This proprietary perfluoroelastomer compound is one of the Isolast® Fab Range™ especially engineered for semiconductor applications. It is designed to operate at temperatures up to 315°C / 599°F and offers superior resistance to almost every chemical.

JUSUNG Engineering has been integrating Isolast® J9670 seals in its equipment for two-and-a-half years now. Trelleborg Sealing Solutions Korea provided free samples for testing. A technical seminar was also arranged to introduce the product to JUSUNG staff. The result is an enthusiastic Kim Tae-Young. “We tested Isolast® J9670 and determined that it is more resistant to SF6 plasma gas than our previous seals.”

“Our engineers tested Isolast®…. and were pleased to see that no cracks or leakage were observed”

However, JUSUNG was not only concerned with chemical resistance. Mr. Tae-Young was also looking to increase productivity by way of improved sealing efficiency and extended product life. “Our engineers tested Isolast® against various plasma gases and were pleased to see that no cracks or leakage were observed after six months. This is the kind of long operating life we need if we’re to fulfill our customers’ demands.”

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**Definitions**

**CVD**
Abbreviation for chemical vapor deposition, the growth of thin solid films on a crystalline substrate as the result of thermochemical vapor-phase reactions

**PECVD**
Stands for plasma-enhanced chemical vapor deposition and offers the advantages of low process temperature and flexible film properties, often used in the manufacture of TFTs

**LCD**
Liquid crystal display, consisting of segments of a liquid crystal whose reflectivity varies according to the voltage applied, changing in appearance from clear to opaque

**TFT**
Abbreviation for thin-film transistor, a transistor constructed entirely by thin-film techniques for use in thin-film circuits, as found in flatpanel displays
Republic of Korea

**Population:** Circa 48 million

**Capital City:** Seoul – the world’s 10th-largest city, with a population of more than 10 million

**GDP:** $969.9 billion (2007)

**Geography:** Korea is a peninsula bordered by the Yellow Sea and the Sea of Japan. It is sometimes called the “crossroads of Northeast Asia,” as it lies between Japan, the Russian far east and China.

**History:** Korea was split between the United States and Russia in 1948 at the end of WWII. The southern half became the Republic of Korea; the north, the Democratic People’s Republic of Korea. War between these two countries broke out on June 25, 1950, and a cease-fire agreement was signed in 1953. Today, the Republic of Korea is a liberal democracy and maintains the 10th largest economy in the world.

**Major Industrial Products:** Semiconductors, automobiles, ships, consumer electronics, mobile telecommunication equipment, steel and chemicals

Sources:
- [http://www.korea.net](http://www.korea.net)

Trelleborg Sealing Solutions supplies an extensive range of products specifically for the semiconductor industry.

To find out more about semiconductor Sealing Solutions visit: [tss.trelleborg.com](http://tss.trelleborg.com)
“Volatility has been the main characteristic of the oil market this year,” says Eric Bucci, Oil & Gas Segment Manager Americas. “In the summer, crude oil hit a new high of $147/ barrel and looked as if it was set to go even higher, but by early September it was down below $91/ barrel*. It’s been bobbing around all over the place during 2008.”

“whatever may be happening on the price of crude oil, overall demand continues to increase”

“We’re seeing any disruption to supply or changes in economic circumstances of major producers almost immediately reflected in price movement,” continues Eric. “This has been the case after hurricanes hit our shores, when Saudi Arabia reduced production and following government actions linked to the US banking crisis.”

But whatever may be happening on the price of crude oil, overall demand continues to increase and Asia Pacific drives much of the rise.

“China is energy hungry,” says Glen Wang, Oil & Gas Segment Manager Asia Pacific. “There the economy is booming and India is also enjoying rapid expansion. Both are now competing with the US, the European Union and Japan for the lion’s share of available global oil.”

“one percent up, on last year. That’s despite all the disruptions we’ve seen in the market place.”

“OPEC has cut its 2008 forecast several times this year for world oil demand,” says Bill Allan, Oil & Gas Segment Manager Europe. “It now stands at 86.8 million barrels per day (bpd) and though that is a lower estimate, it is still 880 thousand bpd, or one percent up, on last year. That’s despite all the disruptions we’ve seen in the market place.

“The world economy is predicted to grow by 3.7 percent in 2009, and current forecasts for oil demand are 87.7 million bpd. That’s up another one percent next year,” Bill continues. “For us as seal suppliers, that’s good news as there is no foreseeable slow down in the industry. Even better, as we focus on higher technology sealing, we can meet growing needs as wells are drilled deeper and exploration goes further offshore.”

*$147/ €100 and $91/ €63
Global action

“I think that the oil & gas industry is one of the most global of all,” says Bill Allan. “As our customers coordinate their business internationally, so must we.”

That is why the Trelleborg Sealing Solutions Oil & Gas Group was formed. Its headed up by Sandro Silverio in his role as Global Director of Oil & Gas and coordinating things regionally are Bill Allan in Europe, which includes Russia, Eric Bucci in the Americas, including South America, and Glen Wang in the emerging Asia Pacific market.

“As our customers coordinate their business internationally, so must we.”

“We hold regular Group meetings to review progress, outline our objectives, exchange experiences especially on shared customers, talk about new products and discuss trends,” continues Bill. “The last meeting was hosted by our colleagues in Paris in September this year. Along with us regional representatives, Group members from France, Russia, Norway, the UK, Italy, Holland and our export office in Switzerland attended.”

How are oil prices determined?

Commodity traders are responsible for oil prices by bidding on oil futures contracts. These are agreements to buy or sell a commodity at a specific date in the future at a specific price.

There are many factors they look at when developing the bids that create oil prices:

Current supply in terms of output, especially the production quota set by OPEC, the Organization of Petroleum Exporting Countries. This includes Algeria, Indonesia, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, UAE and Venezuela.

Oil reserves, including what is available in US refineries and what is stored at the Strategic Petroleum Reserves, the world’s stockpiles of emergency crude oil

Oil demand, particularly from the US as estimated by the Energy Information Agency, an independent statistical agency of the US Department of Energy. During the summer, forecasts for travel from AAA are used to determine potential gasoline use. During the winter, weather forecasts are used to determine potential home heating oil use.

Significant changes and events in oil-producing countries including decisions on oil extraction levels, new sources coming on stream, natural disasters and economic events.
Custom solutions for a complex industry

Trelleborg Sealing Solutions keeps the bioprocessing industry clean and efficient
The bioprocessing industry is booming these days, with over 47.3 billion Euros/75 billion USD in sales last year alone. It’s a complex science, requiring exact measurements, precise timing and sterile conditions. In many cases the complexity is magnified—literally—by volume, requiring bio bags as large as 2,500 Liters for some production runs.

These conditions create multiple sealing challenges at critical stages in the process. With so many processing components to consider, many industry leaders turn to Trelleborg Sealing Solutions, whose products help ensure that the process is as clean and efficient as possible, every step of the way.

**PEEK™ paddles and bearings withstand corrosion upstream**

During the upstream stage in bioprocessing, bioreactors ferment media in large bags, not unlike the initial stages of making beer and wine. These bioreactors continually stir the media with plastic paddles to keep everything mixed and warm. As it ferments, the fluid can often become corrosive, which could erode metal paddles and their bearings over time. PEEK™ paddles and bearings are an alternative.

“Our paddles and bearings are made from thermoplastic material,” says Jerry Zawada, Life Sciences Segment Manager for Trelleborg Sealing Solutions Americas. “They’re ideal for this application because they can’t be degraded by the liquid.” Another benefit to the PEEK™ bearings is that they don’t require lubrication, saving time and maintenance.

**Silicone sheets ensure purity and quality downstream**

In the process known as downstream, the harvested elements go through a lengthy diafiltration and purification process. Here, media is pushed over silicone sheeting, which filters the flow. Larger debris attaches to the silicone sheeting, while smaller particles go through. This process is repeated a number of times in the downstream phase of bioprocessing until the cells have met purity and quality requirements.

Scientists use silicone products for this phase because silicone is inherently inert to bacteria, mold and fungi, keeping the process pure. “Because we are experts in silicone production,” says Zawada, “Trelleborg Sealing Solutions is able to manufacture silicone sheeting that meets or exceeds industry standards.”

**Tubing and manifold systems at every bioprocessing stage**

Each stage in the bioprocessing industry is connected with tubing. Sometimes it’s just one tube connecting two components together. Other times, the process requires a group of tubes in a manifold system, connecting multiple components simultaneously.

Either way, the tubing creates unique challenges for engineers in setting up the system and keeping it clean. “Historically, large-scale bioprocessing has been done with stainless steel pipelines,” says Zawada. “These pipes had to be cleaned in place (CIP) and sterilized in place (SIP) between batches,” he says. Even with these procedures bug traps—little
areas where bacteria and viruses can lodge—were possible inside the tubing, especially at connection joints, which might not get completely cleaned.

**Silicone tubing replaces stainless steel lines**

Today, biotech industries are in the process of implementing single-use production, as advocated by the Bio-Process Systems Alliance (BPSA). “This new trend has replaced a lot of the stainless steel tubing lines that run from component to component with disposable silicone tubing,” says Zawada. Not only does the silicone tubing offer a significant cost reduction by saving time between runs, it also helps ensure less contamination.

Disposable tubing from Trelleborg Sealing Solutions keeps the system clean in two ways. First, it doesn’t need to be cleaned between batches, and second, it’s made from platinum-cured silicone. This has less extractables and leachables than other plastics and curing methods. This is important, because otherwise chemicals from the plastics could leach into the system and contaminate the fluids. For this reason, Trelleborg Sealing Solutions also provides platinum-cured tubing to bioprocessing bag manufacturers, since the bags come as an assembly, with tubing already connected.

**Liquid injection molding saves time and eases assembly**

Another way Trelleborg Sealing Solutions helps engineers keep the bioprocessing system clean and efficient is through liquid injection molding (LIM). In the past, tubes were connected with plastic barb fittings and wire ties or nylon straps. This system was problematic because it could leak. It was also time-consuming, requiring engineers to test the straps and complete pressure checks between runs.

Trelleborg Sealing Solutions has provided a solution to this problem by creating custom tubing assemblies and overmolded joints. “Each joint is overmolded with liquid injection molding to fit the specific shape,” says Zawada. Now, instead of tying the tubes in place and running pressure checks, engineers simply connect each end using a quick connect, and they’re ready to run another batch.

For systems requiring a tri-clamp fitting instead of a quick connect, Trelleborg Sealing Solutions offers another solution: sanitary gaskets. These gaskets fit in between the two fittings to prevent leakage. Some manufacturers request sanitary gaskets be liquid injection molded to the tube itself as a custom assembly, creating even greater efficiency between batches. Whether a joint is a Y, T or manifold, LIM improves the system. Not only does it make the tubes and joints easier to assemble, it also keeps the system pure because the joints are one continuous, smooth surface. This means there is no place for bug traps to form.

**Custom solutions for a variety of needs**

In every bioprocessing stage, Trelleborg Sealing Solutions provides sealing solutions that save time and prevent contamination. In many cases, that means a custom product for specific needs. When a custom product is called for, Trelleborg Sealing Solutions engineers work closely with manufacturing engineers to customize their production process.

“We thrive on developing cost-effective solutions which help our customers achieve their goals,” says Zawada. That includes material requirements as well as packaging and handling specifications. “We play a critical role in helping these manufacturers get FDA approval,” he says. From growing cells in bioreactors to storing the finished product, Trelleborg Sealing Solutions can provide solutions to the bioprocessing industry every step of the way.
Silicone in Everyday Life

Not only is silicone used in bioprocessing, it also has many everyday applications as well. From conditioning your hair in the morning to feeding the fish at night, chances are you’re using silicone many times throughout your day. Here are just a few of the everyday but perhaps little-known uses of silicone:

**Bakeware and cooking utensils** – Silicone is an excellent choice for these products because it is heat and water resistant and has non-stick properties. From spatulas to pans, silicone is a cook’s best friend.

**Dry cleaning** – A relatively new application of silicone is dry cleaning, also called the D5 dry cleaning process. Waste produced from this process is non-toxic and non-hazardous, making it the environmentally-friendly option in what is typically a high-polluting industry.

**Contacts** – Another new silicone application is contact lenses. Also known as “silicone hydrogel contacts,” these lenses allow more oxygen to the eye, keeping it healthy. In addition, they are less susceptible to protein deposit buildup and are easier to handle.

**Aquariums** – Many aquariums are sealed with silicone. Because the joints sealed with silicone can withstand hundreds of metric tons of pressure, silicone is an ideal choice for large and small tanks alike.

**Leave-in hair conditioner products** – The silicone in these products can actually reduce hair’s frizziness because its water-resistant qualities keep humidity from penetrating the hair.

So now you know. The next time you pick up a new product for your home, check it out. Silicone just may be a top ingredient.
Solar Photovoltaic

Though the International Energy Agency puts solar power’s current contribution to the global energy supply at less than one percent per year, the future looks bright for this renewable technology. A recent report by Greenpeace and the European Photovoltaic Industry Association believes that solar energy will be able to power two billion people’s lives by 2030. Which is good news for our environment – and the solar photovoltaic industry too.

The market for solar photovoltaic equipment is booming

As a result, solar photovoltaic is the fastest growing renewable energy technology on earth, the industry witnessing a 60 percent market growth in the period between 2000 and 2004. Consequently, the global demand for photovoltaic equipment is continuing to rise at a similarly rapid rate. Since the initial investments involved are huge, many smaller solar energy partners are merging with traditional multinationals to enable them to develop and improve on current technology.

A sunny future ahead

With oil and gas prices rising dramatically, governments, local authorities and homeowners are naturally looking for alternative energy sources. And it is no secret that the sun is the best source of energy we have. In fact, in just one hour it can potentially provide our planet with all the energy its inhabitants demand over an entire year. Not only can the sun provide us with all of our energy needs – 10,000 times over, according to Greenpeace – it can also do so without the disadvantages of fossil fuels, such as polluting the air or depleting the ozone layer. And best of all, this is one resource that will never run out – at least not for the next five billion years.
Solar power is a sustainable low-cost energy source that is expected to contribute significantly to growing future energy demands.

Many semiconductor equipment companies are becoming involved in solar cell and solar photovoltaic equipment production.

Due to the speed in growth of this industry, these companies are relying upon their existing suppliers to support them in development.

Trelleborg Sealing Solutions has used experience in other industries to offer a specialized range of products for the solar photovoltaic industry.
These large companies are getting involved because the market for energy is huge. At present, the world’s population consumes about 15 terawatts of power. One terawatt is 1,000 gigawatts and corresponds to the capacity of today’s largest coal-fired power plant. That translates into a business worth 4.2 trillion € / $6 trillion a year by today’s standards – and by 2050 global power consumption is set to double.

**Manufacturers are streamlining processes in solar cell production**

Meanwhile, the European Union is paying attractive subsidies as well as higher-than-market feed-in tariffs for solar energy to tempt and retain investors. Germany, it seems, is particularly eager to invest in the future. It has an installed generating capacity of more than 6,500 megawatts (MW) planned by 2010. That makes it the world’s market leader, followed by the USA with 3,065 MW and Japan with 2,400 MW. The solar energy business is booming. Last year the production of solar cells worldwide represented a total capacity of 4.2 gigawatts, and this figure is expected to shoot up to well over 20 gigawatts by 2010.

“The key to success in this market lies in further reducing costs, and this is where equipment manufacturers can play a decisive role by streamlining the processes involved in the production of solar cells, modules and wafers,” says Elke Voehringer-Klein, Semicon and Solar Photovoltaic Segment Manager for Europe. “Since many of these processes are similar to those found in semiconductor manufacturing, suppliers to the semicon industry could apply their experience to the photovoltaic cell market.”

**Relying on existing trusted suppliers**

It comes as no surprise, then, that Trelleborg Sealing Solutions has put its background in semiconductors to good use in supplying the photovoltaic cell industry. In fact, the company has been providing major equipment manufacturers and R&D centers with a wide range of sealing products for the past 10 years – in other words, since the market first took off. As a result, Trelleborg Sealing Solutions can boast a double-digit share of the sealing market for semicon and photovoltaic production equipment.

“Many semicon companies have formed their own special photovoltaic units and naturally turned to their existing suppliers,” continues Elke. “Due to the rapidly expanding nature of the industry, they have little time to experiment and so rely on their trusted partners. Here, Trelleborg Sealing Solutions is able to draw on its extensive materials and product portfolio. It helps clients save costs during all stages of development, by recommending the optimum seal for any given application. Clients benefit from synergy effects resulting from our experience in many other industrial areas, as well as a high level of stock availability and the ability to make use of existing production facilities.”

**Trelleborg Sealing Solutions supplies specialized materials and products**

The specialized products offered to the photovoltaic industry include O-Rings and custom-engineered components manufactured from low outgassing fluoroelastomers and Resifluor® high-performance fluoroelastomer materials, along with Turcon® Variseal® spring-energized seals, other sealing profiles in Turcon® PTFE based material and Airseal®. All of these products are tested at independent institutes and certified accordingly. They display a high thermal resistance coupled with extremely low outgassing. This makes them ideal for use in equipment for the manufacture of solar cells, modules and wafers, where process contamination needs to be kept to a minimum.
The Good, the Bad and the Ugly: How the sun affects us all

The Good – Let’s start with the good. Without the sun, we wouldn’t be here. The sun supplies the heat we need to exist and the light and energy for photosynthesis—the process where plants convert the sun’s energy into usable chemical energy we consume and the oxygen that sustains all life.

The Bad – On to the bad. While the sun certainly sustains life on earth, it can also harm it. Made up of hydrogen and helium gases, the sun’s core temperature (15 million °C / 27 million °F) is so intense that it creates nuclear reactions, whose by-products are light and energy. These have been known to destroy orbiting satellites and burn out transformers on Earth.

The Ugly – And finally, the ugly. The sun’s harmful ultraviolet rays are responsible for eye damage as well as skin damage like sunburns, premature aging and skin cancer. Over one million new cases of melanoma, the most harmful form of skin cancer, are diagnosed each year in the United States alone. Melanoma accounts for 75 percent of skin cancer deaths.

Sources:
http://www.solarviews.com/eng/sun.htm
http://www.nineplanets.org/sol.html
http://www.esa.int/esaSC/SEML7BS1VED_index_0.html
Metal spring energizer is replaced with PEEK™

Trelleborg Sealing Solutions launches Turcon® Variseal® PS™, a PEEK-energized seal with extremely low leach out in semiconductor wet processing applications. This product is notable for its engineering integrity, expressly for its superior purity in semiconductor applications. It is an all-polymer product with no metallic components. A further development of the traditional metallic spring-energized Turcon® Variseal®, the Variseal® PS™ uses a Turcon® jacket to maintain its ability to seal, with the sealing load applied using PEEK™ polymer.

Turcon® Variseal® PS™ avoids contamination that can occur due to chemical attack on metal

In such demanding industries as semiconductor, traditional sealing methods are put to extreme tests. All metals can be subject to chemical attack, no matter what their composition, and when this happens, seal life can be cut radically short. Most importantly, chemical attacks on metal can cause contamination that is unacceptable in these sensitive semiconductor processes.

“Ionic leach out is dramatically reduced”

“By utilizing a PEEK™ spring in place of a metal one, the risk of ionic leach out is dramatically reduced. Although FFKM is excellent in some semiconductor applications, the combination of Turcon® PTFE and PEEK™ is superior in wet processing,” says Stuart Moares, Product Manager for Trelleborg Sealing Solutions. “Testing well-known FFKMs against PTFE, even the high-purity grades of FFKMs came in at more than 18,000 parts per billion cations detected, while the Variseal® PS™ had less than 2,000 parts per billion.”
Turcon® Variseal® PS™: The facts

The patent-pending Turcon Variseal® PS™ operates at temperatures up to 80°C/176°F.

Resistant to virtually all chemicals, it withstands pressures up to 400Bar/5,800 psi.

It is available in sizes from 3mm/0.020 in to 2.3m/90 in for fitment in custom or standard O-Ring grooves, making for easy retrofit.

What is PEEK™?

Polyetheretherketone (PEEK™), also referred to as polyketone, is a semicrystalline thermoplastic and is typically used as a replacement for machined metals. It has excellent friction and wear properties combined with outstanding chemical compatibility, even at elevated temperatures. Being inherently pure, PEEK™ has exceptionally low levels of ionic extractables and superior outgassing characteristics making it ideal for semiconductor applications.
Trelleborg Sealing Solutions launches a range of colored coatings for O-Rings. Based on superior coating technology, these surface treatments are ultra-thin and resistant to cracking and peeling. Allowing segregation of similar seals, they demonstrate almost the same properties as comparable clear coatings, facilitating both push-fit and automated assembly.

**In short...**
- Launching colored coatings for O-Rings
- Ideal for segregating seals in production facilities
- Ultra-thin, they resist cracking and peeling
- Improve friction characteristics of elastomer O-Rings
Trelleborg Sealing Solutions provides a wide range of readily available colored coatings, including turquoise, pink, brown, green, white, blue, yellow, orange and red. The surface treatments can be applied to most seals, standard or custom, in the majority of elastomer compounds.
As O-Ring materials are usually black, one seal may appear almost identical to another, but can vary slightly in dimension or be of different compounds. A large number of O-Rings may be used in one assembly. This is especially the case in automotive component manufacture, and installing a seal in the incorrect location can cause leakage or even seal failure.

**Color-coding is one of the best ways of segregating seals**

An effective and easy means of segregation within a production facility is therefore critical to ensure there are no mix-ups, and color-coding is one of the best ways of segregating O-Rings. In addition, as lighter colors can be more easily detected within a black or dark assembly, they can also aid end-of-line quality checking.

**The widest range of colored coatings available as standard from one seal supplier**

“Trelleborg Sealing Solutions offers what we believe is the widest range of colored coatings available as standard from one seal supplier,” says Simone Frick, Product Engineer for O-Rings. “Much research has been involved in the development of these surface treatments. Ultra-thin, they have no negative effect on the performance of the elastomer O-Ring and have the benefit of enhancing friction characteristics. Offering superior resistance against cracking, unlike some competitive products, they are virtually impossible to peel from their substrate.”

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**Improved friction characteristics make assembly easier**

Like clear coatings, the colored coatings improve the friction characteristics of elastomer O-Rings. Dependent on the surface treatment, they can make once only push-fit assembly easier or facilitate automated assembly, preventing the O-Rings from sticking together during this process.

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**Color perception**

Rods and cones. Hue and saturation. Shade and tint. All play a key role in color perception. But there’s more to color than what meets the eye.

Color has emotional, physical and psychological effects on us as well. It has the power to increase our heart rate, affect our mood and even influence purchasing decisions.

Today, color is big business. Corporations spend billions of dollars each year in color market research. Some say red communicates danger or risk, white conveys innocence and purity and blue represents trust. From the latest trends in kitchen remodels to the hottest selling cars, one thing is sure. Color matters.
From the original seal to the coated solution

The Process flow

Depending on the coating or surface treatment, the seals will pass through different production steps. For Handling Aids these include control, packaging and labeling.

To ensure a high quality result, the micro-thin coatings of the Assembly and Application Professionals are applied in a numerically controlled process. This has two additional cleaning stages followed by plasma activation, which guarantees a firm and permanent surface bond for the elastic coating.

Series production and sampling

For the automated coating process a minimum quantity is required, dependent on the seal’s size and material.

Small quantities of seals up to 100 pieces can be coated manually for samples. This excludes Flexcoat™ LF color and CF color. However, to get a reliable comparison, it is recommended to test samples from an automated near-series production coating process.

Diagram shows the process flow for Handling Aids, Assembly Professionals and Application Professionals:

Diagram of the coating process for Assembly Professionals and Application Professionals
## The Application Professionals

### Flexcoat™

<table>
<thead>
<tr>
<th>Type</th>
<th>Flexcoat™ PF</th>
<th>Flexcoat™ LF transparent</th>
<th>Flexcoat™ LF color&lt;sup&gt;4&lt;/sup&gt;</th>
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<td>coating, PTFE</td>
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<td>Coating thickness&lt;sup&gt;1&lt;/sup&gt;</td>
<td>2–10μm 78.74–393.1μin</td>
<td>2–10μm 78.74–393.1μin</td>
<td>2–10μm 78.74–393.1μin</td>
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<td>-45°C to +175°C -49°F to +347°F</td>
<td>-40°C to +150°C -40°F to +302°F</td>
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<td>Approvals / guidelines</td>
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<td>no substances requiring declaration according to VDA 232-100</td>
<td>no substances requiring declaration according to VDA 232-100</td>
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<tr>
<td>Hardness (surface)</td>
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<td>up to +4IRHD</td>
<td>up to +4IRHD</td>
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<tr>
<td>Appearance</td>
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<td>dry</td>
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<tr>
<td>Characteristics</td>
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<td>Base material types</td>
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<tr>
<td>Application area</td>
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<td>I + A</td>
<td>A</td>
</tr>
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</table>

### Advantages

1. **Supply /separation**
2. **Easier assembly/ once-only assembly**
3. **Reduced insertion force / repeat assembly**
4. **Reduction of stick-slip effects**
5. **Low dynamic loadings**
6. **General dynamic use (without limit)**

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1. Important: The coating thickness is not quoted as a capability criterion but is for guidance only; deviations are possible depending on part geometry
2. Only valid for coating layer
3. Dependent on the part and the material, has to be requested specially
4. Available for special materials from Maltese production only
### Flexcoat™ SF
- Coating, PTFE
- Black
- UV-indicator
  - 2–10μm
  - 78.74–393.1μin
- Temp.: -40°C to +150°C
  - -40°F to +302°F
- No substances requiring declaration according to VDA 232-100
- Up to +4IRHD
- Dry
- Computer-controlled, secure process, water-based
- All types of elastomers, except Silicones/Fluorosilicones (depending on formulation)
- Yes
- I + A

### Flexcoat™ DF
- Chemical modification
- Reference samples
- Temp.: -40°C to +150°C
- Like NBR
- No substances requiring declaration according to VDA 232-100
- Up to +4IRHD
- Dry
- Environmentally-friendly process
- Only NBR (black)
- No coating layer
- Yes
- I + A

**Did you know?**
Segregating seals that seem to be similar is really important. An Ethylene Propylene Diene Rubber (EPDM) and Nitrile-Butadiene Rubber (NBR) O-Ring can appear identical, but the EPDM material is resistant to water and dissolves in oil while the NBR is resistant to oil and dissolves in water.
just around the corner at your local Trelleborg Sealing Solutions.
Welcome! Directly at check-in you will meet our friendly, helpful Sales and Application Engineers who globally deliver equally high levels of service and technical support. Our international network of over 70 facilities worldwide is at your service, wherever you are. We hope you enjoy your stay with Trelleborg Sealing Solutions and we look forward to seeing you again.

A pleasant surprise awaits you...

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