

# CONNECTED

A MAGAZINE BY



WINTER 2015 N° 5

Meeting China's Quest for Greater Quality

Extreme Cold: Only the Strongest Tech Survives

Powerful Solutions for Quieter Cities





## EDITORIAL

Since China started breaking out of its economic isolation in the late seventies, it has been growing at rates unimaginable only a few decades ago, to become the world's second largest economy today.

LEMO has been seeking to establish its presence in the world's fastest developing country since 1993. In the beginning, the market was not easy to break into due to our premium quality prices and being a single source. However, the quality and reputation of our products have gradually helped us to secure a solid foothold in this dynamic economic landscape. Our increasingly demanding quality-conscious customer base has especially developed since the creation of LEMO China in 2004 and the establishment of our own sales, distribution and cable assembly manufacturing facilities.

Our global objective is to serve customers with the highest quality products and the best possible local services. Supporting this in China, the LEMO team has grown from 9 in 2004 to 120 today with headquarters in Shanghai and sales offices spread all over this vast territory.

We have decided to dedicate this CONNECTED issue to China and to offer, in addition to our usual English and German versions, a Chinese edition to our customers in this country.

China - an economic giant? No matter the size of a market, our philosophy has been and will remain to combine high professional standards and personal local care for each and every one of our valued customers.

Alexandre Pesci  
Corporate CEO  
LEMO



"Through rough winds and temperatures below  $-40^{\circ}\text{C}$ , our customised cars run 3 to 5 times faster than traditional tracked vehicles and they use 5 to 7 times less fuel."

ÖRN THOMSEN  
DIRECTOR, ARCTIC TRUCKS NORWAY



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# TECH-BITS FROM AROUND THE WORLD

## 1. FROM IRM TO 3D-PRINTED HEARTS

Thanks to a new printing system, 3-D scans of a heart obtained by MRI can now be transformed into a physical model to help prepare surgery. First, a MRI scan depicting the heart of a patient in the form of hundreds of cross-sectional slices is processed with software where algorithms are used in conjunction with only very limited human intervention: interpretation by an expert of a very small part of each section. From this data, the new software developed by MIT and the Boston Children's Hospital can accurately reconstruct the unique anatomical features of an individual's heart before printing it out physically. Surgeons now benefit from a new and valuable tool to plan their surgical interventions to the finest detail.

1.



## 2. SEEING AGAIN, THANKS TO A NEW BIONIC EYE

Bringing eyesight to the blind may soon seem like less of a miracle. Some eye diseases cause blindness by killing the retina's photoreceptor cells without affecting the other cells involved in vision. Pixium Vision systems are based on this particularity: they take advantage of the healthy cells and replace the normal physiological functions of the dead photoreceptor cells by means of implanted micro-chips. These chips are placed behind the retina and electrically stimulate the nerve cells, which in turn transmit the visual information to the brain via the optic nerve. Great novelty: in this case, light is also used to power the chip. The first clinical tests with blind patients are planned for next year.

2.



## 3. IS THIS MEAT FRESH? THESE NANOTUBES WILL TELL!

A team of MIT chemists presented new sensors able to measure the freshness of meat in real time. This technology is based on carbon nanotubes chemically modified to respond electrically to the presence of certain gases. In this case, particles that are specifically designed to be released when the meat starts to deteriorate trigger the reaction. The sensors presented by MIT are distinctively very small and inexpensive. With the ability to be incorporated directly into packaging and providing immediate results, they are far more reliable than a pre-established expiration date. For this study, tests were performed on pork, chicken, cod and salmon.

3.





© MIT



© L!ber8



#### 4. THE EVERCHANGING BRACELET

Hungarian company L!Ber8 has just created Tago Arc, a connected bracelet which changes its appearance depending on your wishes of the day. The bracelet is in fact a curved electronic ink screen displaying patterns on its entire surface. Connected to a smartphone via NFC (Near Field Communication), it is possible to change the patterns endlessly through a dedicated smartphone application. The application provides a default pattern choice, but it also helps to create new ones or to instantly generate new designs from a picture. There is no need to "recharge" the bracelet: the small amount of energy required by E ink technology is generated by the transfer of information between the bracelet and the smartphone. Currently produced in three versions, gold, silver or black, Tago Arc will be launched at the end of the year.

#### 5. A BETTER WAY TO DETECT ICE ON AIRLINERS

Sometimes patches of ice, invisible from the cockpit, dangerously accumulate on the wings of airliners. Existing sensors all have the same problem: they detect ice on their own surface but not directly on the wing. It is therefore very difficult for a pilot in flight to accurately locate the frozen part of the wing and to take the right decision, such as a "defrost" stopover, with 100% certainty. A team of researchers from the Universities of West Florida and West Virginia turned to alpha particles to solve this problem. A layer of americium is applied to the wing, which emits alpha particles towards aluminium electrodes placed just above. When americium is covered with ice, even in minute quantities, the path of the alpha particles is blocked and therefore they can no longer reach the electrode. This technology could provide an accurate measurement of ice levels during flight and therefore warning alarms could be activated when critical thresholds are reached. The device should be marketed quickly, according to its designers.

4.



5.

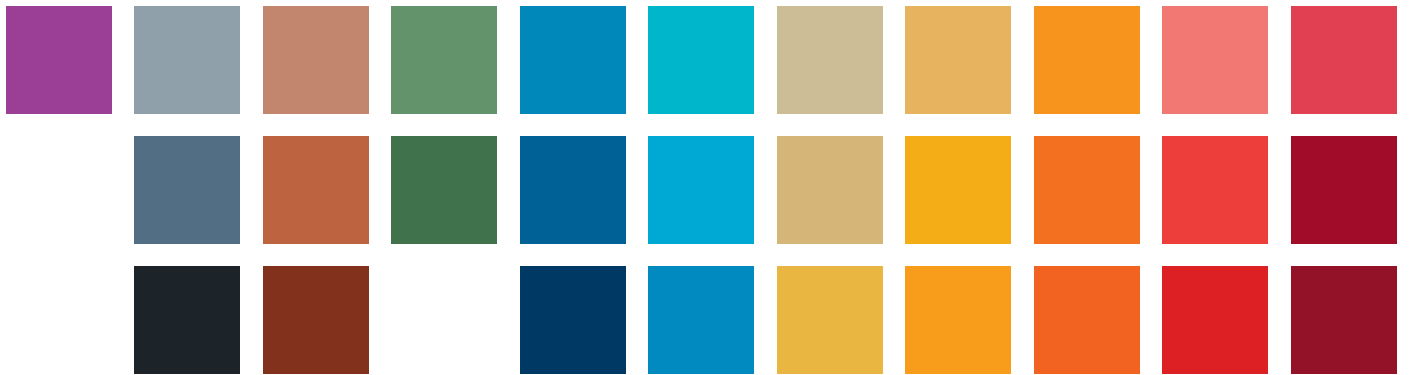
# "M" NOW ALSO STANDS FOR "MULTICOLOURED"

By Renzo Monti



M Series high performance connectors are now available in a wide variety of colours. A small revolution that is not only about aesthetics.





▲ A wide colour choice to fit everyone's need.

## THESE CONNECTORS BEING MADE OF ALUMINIUM, THEY ARE COLOURED BY THE ELECTROCHEMICAL SURFACE FINISH PROCESS KNOWN AS ANODIC OXIDATION.

It all started at the latest edition of Performance Racing Industry in Indianapolis, an annual exhibition gathering fans and professionals to discover the most high performance cars and automobile technologies in the world. Wondering among the stands, a LEMO employee was observing chassis, harnesses and race car engines. An idea was born: coloured connectors would enable personalizing the engine's looks, but also making it easier to identify parts in the forest of connectors that make up a race car engine! People around him approved and were looking forward to seeing it all.

M Series connectors were selected. Launched in 2009, they are LEMO's best for the car racing industry. These connectors being made of aluminium, they are coloured by the electrochemical surface finish process known as anodic oxidation. LEMO called on a long-time partner specialized in this technique.

The connector is immersed in acid bath and simultaneously an electric current passes through it. A 5 to 50 micron thick aluminium oxide layer forms, depending on immersion time and the required effect. Withstanding oxidation and variations in temperature much better, the processed aluminium is subsequently also covered in micropores giving it a matt surface appearance. In the colour baths, pigments attach particularly well to the porous surface structure, giving anodized objects their characteristic appearance and reflectivity.

After being anodized, the connector is relevant to specific applications. *"This surface treatment makes the part non-conducting, explains Serge Buechli, marketing manager. It will not be recommended for complex data buses or other applications where EMC properties are important. On the other hand, for more simple functions, such as the ignition of a fuel pump or punctual measurement, it is perfect!"* Cable and assembly visualization is optimized.

Anodic oxidation being feasible with other materials, like titanium, this process is also used for other products by LEMO. For instance, for those used in Broadcast, where LEMO connectors can be instantly identified by their characteristic blue colour.

All M Series connectors are now available in anodized version. |



# CONNECTING WITH CHINA

By Nicolas Huber

High quality solutions, local service, short lead-times and long term commitment: LEMO China has been delivering on its promise since 2004. The Swiss company's Chinese subsidiary has grown alongside this giant economy and its quest for greater quality. Our interview with LEMO China's director, David Renqing Ge.





▲ Cable assembly workshop.

**David, you were the first LEMO China employee. Your team has grown considerably since 2004.**

**David Renqing Ge:** There were just nine of us when this subsidiary was created in 2004, we now have a staff of 120! We provide all levels of service, from seeking new customers, to pre-sales consultancy, project development, stock management, shipping and delivery to customers. We even do some production for the Chinese market: cable assembly termination and injection moulding of REDEL 1P connectors. Our aim is to provide services that combine high-quality and proximity to our customers.

**This is the reason why you built up widespread presence...**

China being a huge market, we chose to cover it as effectively as possible: we have offices in 14 big cities, with Shanghai as our HQ. This structure is highly appreciated by our customers. Whenever they need our advice or support, they can call our local sales engineer and we will visit them the very same day or the day after.

**LEMO's regional presence goes beyond China...**

True. We set up LEMO Asia in 2010 in Singapore. We now have offices in Malaysia, Thailand, Vietnam and Indonesia.

**Is your proximity service strategy also the reason why you decided not to work with representatives?**

Yes, it is. We've decided from the beginning to go for direct sales and not through agents or distributors. The close contact with the market

gives us a better understanding of the trends as well as our customers' true needs. Moreover, we maintain good control of sales activities in terms of technical advice, pricing, stocks, deliveries and after-sales services. Last but not least, it allows us to keep a highly motivated and trained sales team with strong links to LEMO's Swiss headquarters.

**You are talking about quality of service, but what about the quality of LEMO technology?**

Quality is at the heart of LEMO's offer and reputation – in China as well as anywhere else. I was told a little story about a company designing and producing radiation detection equipment. They were being thoroughly audited by a Middle East client and things were not going so well. However, at one point, the auditors noticed LEMO connectors on the front panel of the company's equipment and their faces lit up: "The quality of your equipment can't be bad if you're using the best quality connectors!" Another example was when we were attending an exhibition specialized in medical equipment: a rather elderly visitor approached our booth and picked up a B Series connector. He was so stunned by its quality that he was almost screaming with joy "It's so beautiful I could cry! It's more of a piece of art than an industrial product!" (laughs). So, yes, you can find many cheaper copies, but the quality of LEMO's original push-pull connectors is what our customers are requesting and they are willing to pay for.

**How come LEMO China started cable assembly?**

Again, to deliver the best quality to our Chinese customers. In the first 2-3 years, we were selling only connectors and, from time to time, we received quality complaints which were in fact not linked to our connectors, but to their assembly to the cable. So we decided to take care of the assembly ourselves and started a small workshop in our facility...

**...which grew fast...**

... incredibly fast! It even led us to move into a new office in 2008. That same year, we officially introduced the cable assembly service to our customers. Today, it accounts for about 40% of our overall sales volume! What's most important is that our clients now benefit from higher-quality and better tailored complete solutions. It reduces their maintenance costs, increases their brand and market value. It is also a very effective way for us to gain their trust and loyalty. ►

DAVID RENQING GE,  
LEMO CHINA'S DIRECTOR





▲ The new LEMO China building.

*"THE DEMAND FOR HIGH QUALITY TECHNOLOGIES IS RISING IN CHINA. SO WE ARE CONFIDENT THAT WE WILL CONTINUE TO PROSPER IN THE COMING YEARS."*

**This led you to move to yet another new building in 2015...**

Yes indeed. This new building is still in Pudong, Shanghai, just 4 km away from our previous offices. It is much bigger: we now have a surface of 700 m<sup>2</sup> for offices, 1100 m<sup>2</sup> for warehouse, 1900 m<sup>2</sup> for cable assembly. Moreover, we have enough space to further expand our activities, if necessary.

**For what applications are LEMO's solutions used in China?**

They are used in a very wide range of applications requesting high quality and reliability and/or in harsh environments. This includes testing and measurement, such as professional GPS, IR cameras – most of the key IR camera makers in China are now working with us. Applications also include medical equipment, cable assembly plants, military, broadcasting, research or automobile testing.

**Who are your competitors?**

We are competing with both global and local connector manufacturers. However, our unique Push-Pull system, premium quality and strong local services make all the difference: we are the leaders in this niche market.

**The quality of LEMO products and services appears to have convinced China...**

Since our debut in 2004, we multiplied our sales by 8 and quadrupled the number of active customers. We add around 500 new customers to our client base every year. We are happy with these results, but keep on working to improve them!

**What about the future and your perspectives?**

The Chinese market and economy continue to grow, even if its growth has slowed down. More importantly to us, the demand for high quality technologies is rising. We are confident that we

will continue to prosper in the coming years. The SEA market is still growing. More and more OEM businesses are moving to this area, a growing number of local companies have started to design and produce equipment and machines – these are great opportunities for LEMO solutions.

**What is on the LEMO China "to-do" list right now?**

The LEMO brand is regarded and trusted as "high quality" on the Chinese connector market. This is great, but it comes with an "expensive connectors" label! We are considering how to even better control and reduce our overall costs to provide our superior quality solutions at more competitive prices. Producing in China technologies for the Chinese market is one of the possibilities. So we will continue to enhance and enlarge our cable assembly production capability. |



# THE RISE OF *LEMO CHINA*

LEMO's presence in China began even before LEMO officially arrived on the market... very poor copies of LEMO's 00 Series were already in circulation. Official set-up started in 1993 with the hiring of a Swiss citizen married to a Chinese woman and living in Hong Kong. At first, it was very difficult to find customers because of the "Swiss quality" prices and the single source. The first contacts were made in the medical and nuclear markets. To increase its presence, LEMO then decided to work with a distributor who supported the business until the launch of LEMO China in 2004.

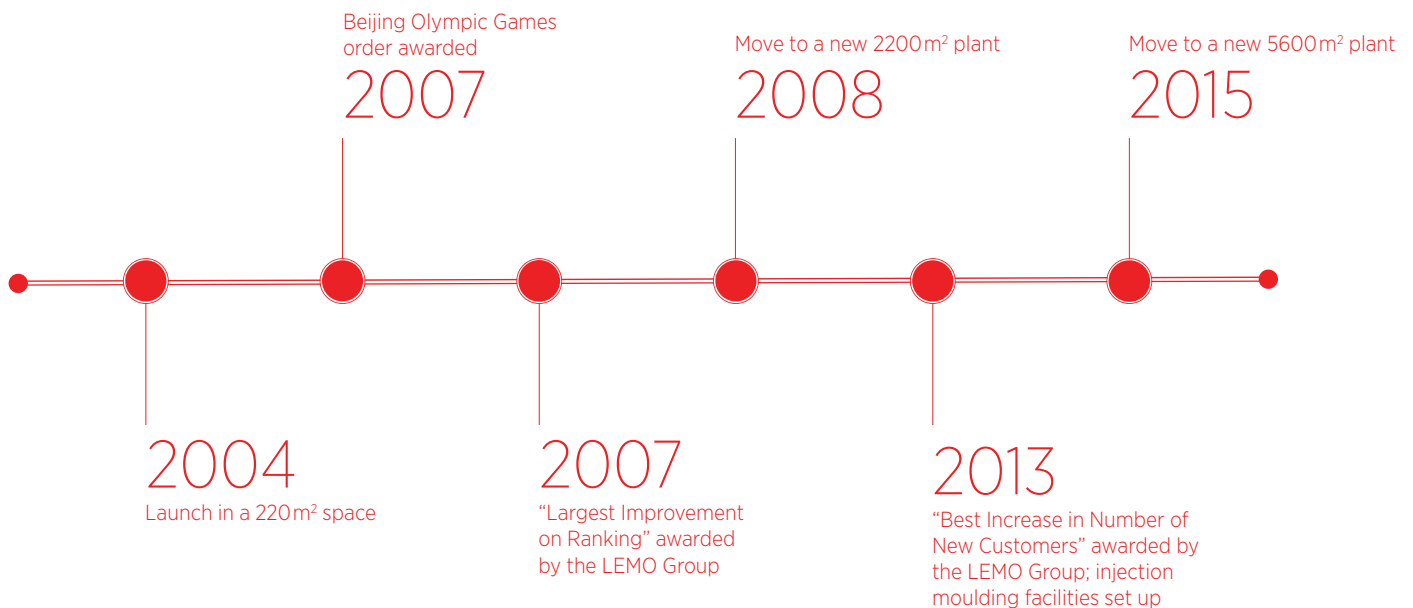
During the first years, the Swiss brand and its products were not known to many potential customers. So the team conducted numerous visits, taking with them LEMO's legendary big

sample case. A simple and effective way for Chinese industrials to see and touch the high-quality tailor-made products. In parallel, LEMO published advertisements in over 20 magazines every year.

Today, LEMO China is present in Shanghai, Beijing, Guangzhou, Harbin, Changchun, Shenyang, Taiyuan, Zhengzhou, Xi'an, Nanjing, Wuhan, Changsha, Chengdu and Shenzhen. LEMO Asia, which is based in Singapore, adds offices in Malaysia, Thailand, Vietnam and Indonesia.

LEMO takes part in ten exhibitions in China every year. It also organises 30 technical seminars every year (benefitting around 1,000 engineers since 2013).

## IN A FEW DATES



# WINTER IS COMING

**Extreme cold is hard on high-technology equipment: it slows, seizes, rigidifies, paralyzes and even breaks it. Developing equipment capable of resisting extreme cold requires mastery of cutting-edge technology in the field of materials and components. Put on your winter coat and discover our special feature.**





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THE CABLE THAT KEEPS ITS COOL

# ACROSS THE ARCTIC ON WHEELS

By Brigitte Rebetez

Polar storms, extreme cold, crevasse zones... the vehicles transformed by Arctic Trucks are up to any challenge. They are able to satisfy the needs of scientific expeditions, rescuers and a growing number of companies. The Icelandic venture's next area of challenge: deserts scorched by the sun.



▲ Arctic Trucks rebuilds the vehicle frame, drivetrain and body, mounts special tyres, adds various specialized equipment and accessories and an electrical system to drive them.





▲ The modified trucks are engineered for very rough terrains.

Their vehicles have already run more than 200'000 kilometres across the Antarctic, in temperatures as low as -58 degrees centigrade. Their longest expedition in this polar region covered 9600 km in 82 days (and nights). In 2007 these extreme four-wheel-drive cars were tested by the presenters of the television series *Top Gear* on board. This famous British television show, with a 350 million audience, set out on the extraordinary adventure of making it to the magnetic north pole by car.

The origins of Arctic Trucks date back to the early nineties, when Toyota Iceland started customizing its four-wheel-drive vans to confront the island's harsh winters. Today, independent from the Japanese company, the company transforms off-road models of several car manufacturers. With every improvement and innovative solution, it has developed considerable know-how that meets the needs of a growing number of various customers: scientific expeditions, telecom, energy and petrol companies, rescuers or private adventurers.

In order to meet particularly sophisticated requests, it is not uncommon for technicians to work on tailor-made solutions. For instance, to honour an order from the Swedish and Norwegian Defence, Arctic Trucks have fully

transformed hundreds of cars with high tech military equipment, armoured with excellent performance on and off-road.

To be able to face the challenging terrain, carry enough fuel and supplies to cross continents unsupported and survive the extreme cold, the vehicle frame, drivetrain and body are rebuilt. An additional electrical system is installed to drive the various specialized equipment and accessories needed to complete the challenge.

Since it is hard to find large tyres that perform well on snow and ice, the Icelandic company has undertaken to design and develop their own tyres, using a frost-resistant compound embedded with nails. *"They have to cope with the worst conditions,"* explains Örn Thomsen, director of Arctic Truck Norway, *meaning rough winds and temperatures below -40°!*

In addition to supplying motor vehicles for polar expeditions, the company is also specializing in organization, training, assistance and logistics with a staff able to cope with the hardest conditions in the world. Obviously, one has to be ready to face all possible dangers when venturing into the Far North, even through zones full of crevasses. The company is perfectly up to these situations: in Novem-

ber 2010, with the help of its high performance vehicles, rapid intervention was possible following a distress call issued by the Novo airbase in Antarctica. The life of a person stuck in a deep crevasse could be saved.

Arctic Trucks also strives to reduce its vehicles' impact on the environment. Their expertise and technical improvements keep reducing the environmental impact. These vehicles are 3 to 5 times faster than traditional tracked vehicles and they use 5 to 7 times less fuel.

Twenty-five years after its creation, Arctic Trucks is more active than ever. The company is now present in eighteen countries, from Norway to Russia, Kazakhstan and the Emirates, where technicians have become top specialists in adapting four-wheel-drive cars to other extreme conditions, such as mountains and deserts. *"The vehicles that we transform for the Middle East have to be able to face blistering desert heat of +50,"* tells Örn Thomsen. *This means a 100° difference compared to the temperatures that our polar vehicles have to resist!"*

Busy customizing the latest Toyota Hilux model, Arctic Trucks is planning to expand into new countries with harsh environmental conditions, such as Australia and USA. |



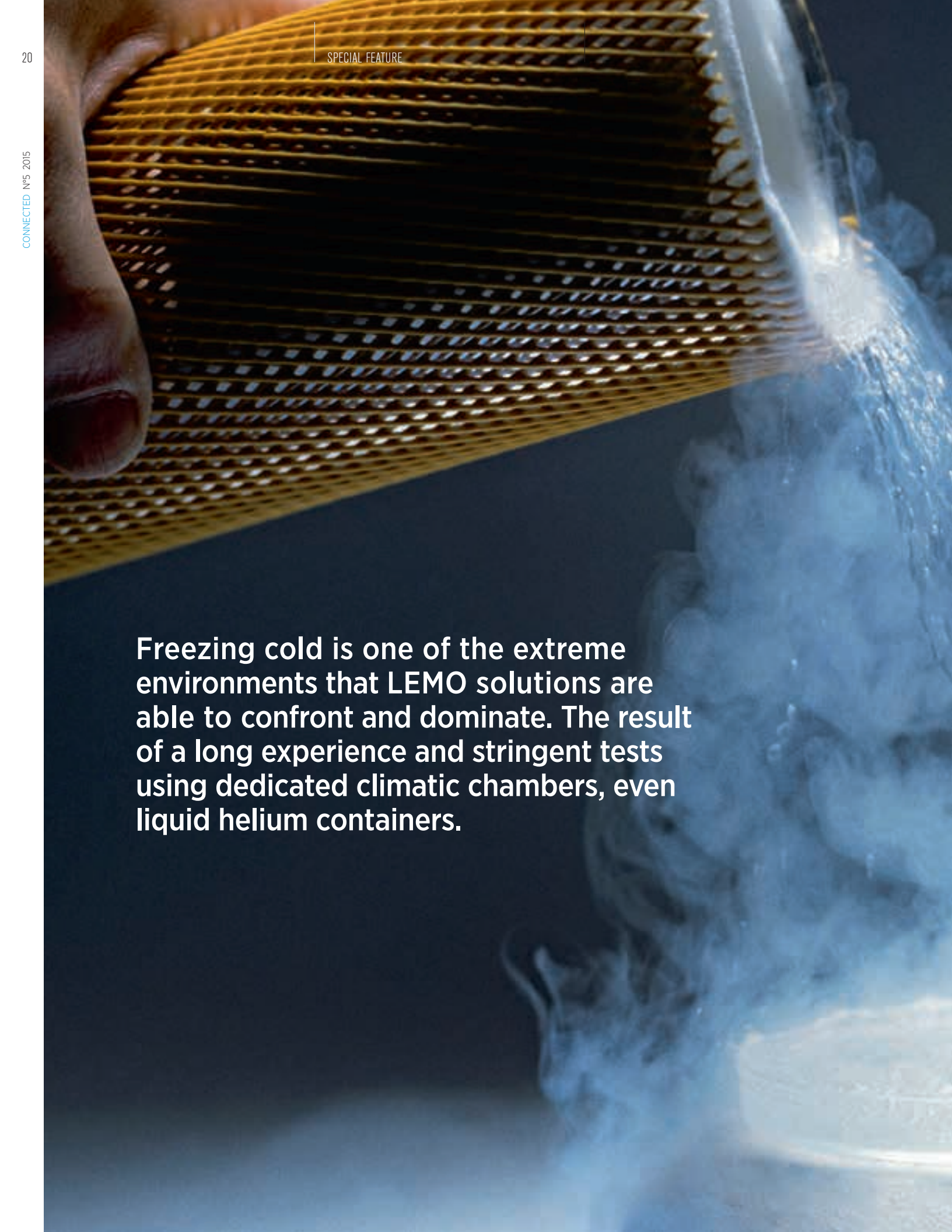




In addition to supplying motor vehicles for expeditions, the company is also specializing in organization, training, assistance and logistics with a staff able to cope with the hardest conditions in the world.





A close-up photograph showing a person's hand holding a glowing orange mesh cylinder. The cylinder is emitting a bright light and is positioned over a source of blue vapor or smoke, which is rising and filling the lower right portion of the frame. The background is dark, making the glowing mesh and the blue vapor stand out.

**Freezing cold is one of the extreme environments that LEMO solutions are able to confront and dominate. The result of a long experience and stringent tests using dedicated climatic chambers, even liquid helium containers.**



# BURNING COLD

By Renzo Monti

Extreme cold hardens even the softest, most flexible materials and turns even the most solid ones fragile. Freezing cold is one of the extreme environments that LEMO solutions are able to confront and dominate, as a result of a long experience. Used in a large variety of applications, LEMO solutions can cope with all sorts of constraints, whether they are mechanical, electrical, climatic, natural or artificially produced. Extreme temperatures are part of these critical environments as they expose connectors (or cables, see page 23) to very specific stress and strain, which can be severe.

"There's no normal temperature limit that our connectors can withstand, whether it is above or below zero" notes Billy Barbey, R&D and New Products manager. It goes from -250 to 300 °C! There is only one thing that is not possible: to move the same connector from one extreme to another within a few seconds. Luckily, in reality no equipment is ever exposed to such a treatment. Even if some customers dream about such a miraculous connector..."

What exactly does it entail to develop connectors resisting temperatures well below zero? "We equip satellites, supply NASA or the European Space Agency, so we have to create connectors that function perfectly in environments where -60°C is still a comfortable temperature!" Space is indeed quite far away. "Our customers prefer to avoid going all the way up there to replace a part !" jokes the engineer.

The same principle applies as everywhere else: the more demanding maintenance is, the more reliable components have to be. This is also valid for connectors that are used in weather stations located in the Polar Regions, for example. They not only have to be resistant, but they also have to keep their properties unaltered almost for ever.

Before arriving at the North Pole or into space, all LEMO connectors must pass through even more extreme terrain: LEMO's walls. Their adventure starts invariably in the R&D office, where, based on the technical requirements received from the customer, the concept is developed and the best possible materials are selected. A prototype or a pre-series product is then produced and submitted to LEMO's test laboratory in Ecublens (Switzerland), headed by Roger Vonlanthen for almost 30 years. A professional torture chamber for connectors, this laboratory has been developed to inflict all possible forms of ill-treatment to them. Even the impossible ones. More than fifty features can be evaluated based on as many different tests. ▶

## "WE EQUIP SATELLITES, SUPPLY NASA OR THE EUROPEAN SPACE AGENCY, SO WE HAVE TO CREATE CONNECTORS THAT FUNCTION PERFECTLY IN EXTREMELY COLD ENVIRONMENTS"

Cold tests are part of the "environmental tests", a series of specific tests that help define the operating conditions and limits, for transporting or storing connectors.

The connector is placed in a climatic chamber and exposed to very low temperatures, sometimes for several days. The R&D laboratory has a number of these chambers with temperatures as low as  $-70^{\circ}\text{C}$ . Once taken out of the chamber, the connector is thoroughly examined: it is submitted to mechanical, electrical and visual tests. All its components are verified.

Microscopes often confirm a technological truth: the most vulnerable elements of a connector – exposed to hot or cold temperatures – are its synthetic parts. Insulators and epoxy resins for example, used in the rear part of sockets, may have fissures invisible to the naked eye. When damaged, these synthetic elements may compromise the sealing integrity of the connector. In case of fissures, the engineers get back to work, until they perfectly control all of the components.

It is not only the lack of resistance to extreme cold that is eliminatory. LEMO systematically eliminates synthetic elements (materials, glues, resins...) that do not comply with strict environmental standards. Even if their resistance to extreme cold is excellent.

Thanks to the precision of these tests and measurements and also to the perfect control of its products and processes, today LEMO has a large base of verified solutions that can meet new demands. Still, as part of technological monitoring, LEMO continues to study new materials to further improve the performance of its connectors.

This extensive experience is coupled with the deep understanding of customer needs. Civil aviation standards are often the same as the ones that apply to military applications, so products are similar or identical. A well-conceived application for an operating theatre may well also end up as part of a race car...

For extreme cold applications, it is products developed for cryogenics that are used as a reference. An example shows very well how important this adaptability is. "For medical applications, we tested the resistance of an FFA.00.250 plug immersed in  $-260^{\circ}\text{C}$ ", tells Roger Vonlanthen. In fact, it had to equip a system capable of measuring the temperature of liquid helium in which test tubes containing biological material are stored. Thanks to our experience and tried and tested technologies, we are able to propose reliable solutions in all fields."

As for the FFA.00.250 plug, it keeps its cool about all these human considerations. It only dreams about all the outer reaches of our galaxy that it will be able to explore with no difficulty whatsoever. |



Space is one of the extreme cold environments LEMO connectors call home. ▲



# THE CABLE THAT KEEPS ITS COOL

by Alexis Malalan

Not only connectors, but cables as well suffer from extreme cold. They lose flexibility, wear more rapidly and need to be frequently replaced.

Recognized worldwide for its high quality cables, Northwire had decided to take up the challenge issued by its customers: to design a low temperature cable that is ultra-resistant, flexible, durable and competitively priced. A cable that not only meets the highest requirements of international standards, but can also be available within the shortest time span. It was a major challenge that cable engineers have brilliantly met. Extreme Frigid Flex RIG™ was born.

Northwire, LEMO's US subsidiary, is no novice in the field of "arctic grade" cables. Still, this cable manufacturer dedicated three years (2010 to 2013) to develop Extreme Frigid Flex RIG™.

Northwire's engineers' intuition led them to focus on material, by studying yet unexplored opportunities. Whereas most "arctic grade" and marine cables had used rubber, Northwire chose to focus on thermoplastic elastomer, a mixture of materials that proved to be much more resistant and efficient in very low temperatures.

The result is a low temperature cable that stays flexible and solid way below zero with a life span much longer than its competitors'. Extreme Frigid Flex RIG™ stays flexible within the impressive temperature range of

-60°C to +105°C. In a climatic chamber, it easily passes the 1,000 hour weatherometer limit, which is significantly more than what is required to pass extremely demanding tests for certification according to ABS (American Bureau Shipping), USCG (United States Coast Guard), UL 1309, CSA 245, ANSI, CE, IEEE 1580, REACH and RoHS2.


Extreme Frigid Flex RIG™ offers further advantages that make it an extremely versatile flex cable. Watertight, resistant to flame, weld spatter, UV radiation and chemicals, it is also ideal for offshore oil and gas environments. Its material, thermoplastic elastomer, requires less assembly work enabling much shorter delivery time. Another major advantage for Northwire wire and cable customers.

With its specifications, Extreme Frigid Flex RIG™ is adapted to a wide range of applications. This flexible cable accompanies exploratory and drilling missions in Arctic regions. As an offshore cable, it can also be found on oil rigs and vessels in ice-covered seas. |



Inside the Extreme Frigid Flex. ▲





By Corine Fichter

# PLANNED *NOW-* OBSOLES- CENCE

**At a time when new technologies keep emerging and replacing each other, LEMO provides a rare, even unique, service. In a sector where life cycles tend to shorten due to obsolescence, LEMO offers not only innovative cutting edge products, but also parts and sub-components that date back to decades, whenever necessary.**

00 Series plug and free socket. ▼



Forty-seven million pieces of 30,000 different types of components. This is the actual LEMO stock, at its Swiss headquarters only. To be able to deliver parts and sub-components over several decades requires special infrastructure. We are very far from the rapid or planned obsolescence that characterizes many current technologies.

Maintaining an important stock in order to better serve customers has always been part of LEMO strategy. Even if it requires huge investments in terms of workforce, financial assets and space of course. *"In the early days of LEMO, we manufactured more than what was necessary, mainly to avoid irregular production runs,* explains Josette Martin, who has been managing stock for 42 years. *Customer*

*requirements were irregular and our order portfolio was under development, we had to be able to react rapidly to orders."* Today, this colossal stock provides for the company's "non-obsolescence" strategy.

Nuclear industry is the one sector formally requiring a guarantee from LEMO to provide parts over a period of ten years. However, requests for parts from other sectors are not rare either. *"For example, LEMO USA has recently been contacted for a part number used for test & measurement applications,* says Serge Buechli, marketing manager. *The part number dated back to 1974! The part has of course evolved in 40 years, but our colleagues were able to provide its present part number, which is part of our standard range."*

What happens if a customer requests a part that is out of stock and there are no compatible existing part numbers? *"Given the size of our stock, this hardly ever happens!* Answers Serge Buechli. *If it does happen, we are capable of reproducing the obsolete components."* For this reason, LEMO has kept a few old machines. Moreover, the company has saved drawings of all the parts produced since 1970 in the archives.

These drawings were originally line drawings or made with tracing paper. *"In a few years, we have used four software generations. We have carried out many updates in order to have digital drawings that we can exchange between our factories."* Most LEMO sales companies have their stock of components, but they contact the Swiss headquarters with special requests.

During her four decades with the company, Josette Martin has seen special requests of all kinds. *"Some research institutes or military or aerospace customers give us their specs in paper format. Some others send us the requested part, or even deliver it personally!"*

**"GIVEN THE SIZE OF OUR STOCK, IT HARDLY EVER HAPPENS THAT WE CAN'T FIND AN OLD REFERENCE. IF IT DOES HAPPEN, WE ARE CAPABLE OF REPRODUCING THE OBSOLETE COMPONENTS."**

Personal delivery was what a Swiss nuclear research engineer did. *"The component was ancient, but we managed to trace it. The plug was still functioning, so he decided to continue using it and we offered him all the other components!"* The anecdote dates back to some years, but Josette Martin still remembers it perfectly well. *"Happy and satisfied that we were able to handle his request, the customer told me that LEMO was the Rolls Royce of connector components! This kind compliment proves how important this service is to our customers."*



# IN A SOUND ENGINEER'S EAR

By Aude-May Lepasteur

In less than 20 years, Sound Devices has become the leader in the field of sound recorders and mixers for AV professionals. The secret to their success lies in the design of their product and their ability to listen “in high definition.”





*"They have understood that when I'm hanging on a rope in mid-air, half way up a mountain, I don't have the time to keep checking whether my device is recording. On their recorder, the entire display lights up in red!"* For Jürg Lempen, independent sound engineer working for the Swiss television, there's no mystery: Sound Devices has become the "darling" of sound recorders for technicians all over the world, because the company knows how to listen to its customers and to meet their specific needs.

Founded in 1998 in Reedsburg, a small town in Wisconsin (USA), by three ex-employees of Shure Inc., Sound Devices specializes in the production of audio material for AV specialists – documentaries, television series, and movies. Have you been listening to a particularly lively dialogue in "Game of Thrones"? Have you been carried away by the roar of engines and the screaming warriors in "Mad Max: Fury Road"? Have you discovered for the first time the echoes of the sea or the roar of blazing fire in Turkmenistan? All of this and much more are possible thanks to Sound Devices products.

At the beginning, remembers Jon Tatooles, Co-founder and Chief Business Development Officer, *"we knew we had to learn a lot, so we started off with simple products and listened to what the users thought about them."* A simple but winning strategy. Sound Devices has received a number of awards – among them five Cinema Audio Society (CAS) Technical Achievement Awards for its high-quality, innovative, robust and smartly designed products. Sound Devices products are also highly complex. These portable recorders and mixers have replaced carts full of audio equipment used by sound technicians at the end of the 20<sup>th</sup> century.



▲ The emblematic 633, a highly compact and powerful mixer-recorder.

Even more than the honours and awards, positive feedback from professionals is music to Jon Tatooles' ears. *"We are in very close contact with specialists. We want them to know that we would never let them down. Whether it is for a report in Alaska or a documentary in the sands of Dubai, our materials are always there to help them."*

Continually in search of new challenges, the company – engineering and assembling all its products at its U.S. facility – has recently launched 4K video recording and monitoring with PIX-E5 and soon its sister product PIX-E7. A major step forward for the company and the positive impacts have started to be felt.

When asked about the product he is most proud of, Jon Tatooles comes back to his first love, audio material, without the slightest hesitation. *"All our products are our children, but if I were to choose one, it would be the 633 – a highly compact, very powerful mixer-recorder. We offer much more sophisticated products, but a sound engineer will find everything he may need in his daily work and all he may expect from his material in this particular device!"*

Sound engineer Jürg Lempen will absolutely agree: he would never set off for reporting duties without his 633. |

"WHETHER IT IS FOR A REPORT  
IN ALASKA OR A DOCUMENTARY  
IN THE SANDS OF DUBAI, OUR  
MATERIALS WILL NEVER LET THE  
SOUND ENGINEERS DOWN."

# TOWARDS FINELY NUANCED CINEMA

By Alexis Malalan



**By launching its EOS C300 Mark II, Canon has taken a keenly awaited new step in the field of professional cinema. This camera stands out due to its extremely wide dynamic range and state-of-the-art features. LEMO is part of the adventure.**

Canon was founded back in 1933. The Japanese giant is now known throughout the world for the quality of its optical technologies acclaimed by both amateurs and professionals. However, Canon has entered professional cinema only a few years ago. In 2012, EOS C300 marked the first step in a promising success story.

After laying its foundation stone, Canon has built upon this to go higher, further and faster. True to its corporate philosophy, Canon studied carefully the feedback and comments from customers, then got back to work to develop new functionalities to meet the sophisticated needs of its target clientele. The result has just been presented as the EOS C300 Mark II. After only a few weeks of testing, it became apparent that this new generation of cameras has everything to satisfy today's professional filmmakers.

What is so attractive about it? Not its 4K capability, which is already the standard, but its extremely wide dynamic range. The camera can capture a very large brightness range – from the dimmest light conditions to the most exposed images. The secret of this dynamic range lies in the brand new super 35 mm Canon CMOS 8.85 megapixel sensor. Specially designed for video recording, it offers very high image resolution and extreme sensitivity. This is coupled by another critical factor: the integrated Canon Log 2 system that captures a maximum range of colours, up to 15 stops of dynamic range. The combination of these two technological miracles guarantees extraordinary creative freedom to all experienced or future filmmakers.



The new camera may well revolutionize postproduction, making it possible for the operator to select practically any type of contrast and brightness.

Among other technological improvements, EOS C300 Mark II can record videos in 4K resolution on the internal memory and the external storage device simultaneously, which improves both the production flow and backup capabilities. |

#### LEMO ON BOARD

In designing EOS C300 Mark II and in order to meet the needs of its customers, Canon has relied on LEMO for its extreme reliability. LEMO supplied specific connectors for both the camera and the supply system.





# A *QUIET* BATTLE FOR A *QUIETER* WORLD

By Nicolas Huber

The quality of life and the health of millions of people are impacted by the noisy environment of modern cities. Danish company Brüel and Kjær's solutions help authorities and companies to keep control.

## HIGH COMPLEXITY REQUIRES HIGH RELIABILITY

Brüel & Kjær's most advanced data acquisition systems are capable of capturing sounds or vibrations in high definition through more than 1000 different channels simultaneously. An example of such a system is used to monitor the conditions on passenger aircraft and may involve up to a thousand cables. With this high level of complexity comes the requirement for high reliability interconnects, as fault finding within this myriad of cables could take several days. To avoid such problems, the Danish company entrusted LEMO to supply the connectors.



Stress, sleeping disorders, tinnitus, cardiovascular or cognitive impairment: noise pollution can be a very real threat to people's health. A British survey published in the European Heart Journal, has even proven, for the first time, the undeniable link between urban traffic noise and deaths and strokes.

There is an enormous risk: estimated by the World Health Organization, over half of the European Union's population lives in areas that do not ensure acoustical comfort to its residents.

*"The awareness of the impact of noise on the quality of life and health has risen only lately, but its importance has been growing at a remarkable pace", notes Alun Crewe, Brüel and Kjaer's Vice President for Strategic Marketing. This is particularly due to urban development: residential areas have grown closer to each other, encompassing even major sources of noise, such as airports."*

Noise is something that Brüel & Kjaer are fairly familiar with: the company is the global leader in sound and vibration measurement solutions. They supply everything from transducers to data management. They are located in Naerum, a quiet little town in a green setting near Copenhagen. Their headquarters employing 450 of its global staff of 1250 is just a stone's throw away from the garage where Per Brüel and Viggo Kjaer started the business in 1942.

The Danish company has been helping NASA test vibrations that their Mars landers are subjected to during launch; Ferrari find the best roar for their engines; Airbus design lighter and more resistant structures; Lockheed-Martin reduce the sonic signature of their fighter aircraft. However, 25% of their activities are now focused on environmental noise impact.

*"Regulations to measure and control noise impact are getting stronger and stronger, explains Alun Crewe. It has also become more difficult to comply with local authority requirements."* In the European Union, for instance, cities with a population of 250,000 or more have to implement a noise monitoring system. *"What systems should be installed, how to organize data recording and processing? This hasn't been specifically set out."* This is where Brüel & Kjaer's expert knowledge and solutions come into the picture.

It is a more complex mission than it seems to be and requires cutting-edge technology. Noise is in fact a chaotic concert composed of a multitude of sounds coming from everywhere. The noise under investigation has to be isolated, its quality evaluated, its intensity measured. Data need to be compiled, analysed and processed in real time and noise maps have to be sketched, often combining other factors (geography, weather).

The hum of traffic is regularly present in debates over noise pollution, but it is often airports that create more tension. Unsurprisingly, over 200 of them have been equipped with a remote noise monitoring system designed by the Danish company. The collected data are centralized in a "Noise office". *"We combine them with radar observations and are able to tell in real time, whether there was a violation and if so, which aircraft was involved."*

Measurements are often published directly on the web site available to the community living around the airport. In case of doubt, the public can have peace of mind within a short time. Transparency is also beneficial on the longer term: *"Communities that feel listened to and consulted tend to object less to airport development projects."*

These efficient, successful solutions, combining sensors, software and communication tools, can be transferred to other applications as well. *"We have developed a similar system for an application that we call 'Noise Sentinel'. It's intended for any large facility with the potential of producing a lot of noise that could impact local communities."*

Noise sentinels have been deployed on construction sites – the noise and vibrations generated by urban building sites (e.g. subways) present a certain risk, especially for historical buildings. Noise sentinels often monitor infrastructures such as the Stade de France in Paris, hosting football matches and concerts. They are used in ports as well, where they control the noise produced by vessels and by loading and discharging. Sometimes, they monitor mines, when they are located close to residential areas.

Brüel & Kjaer can actually implement their solutions *"wherever noise can become an issue for the communities"* concludes Alun Crewe.

The future of the battle against noise pollution will come about through solutions that seem to come from science fiction. Brüel & Kjaer's engineers are looking at integrating sound cancellation technologies in busy traffic-filled streets. Based on the principle of destructive interference, similar to the technology used in headsets: emission of a sound wave with an inverted phase of the ambient noise.

Thanks to these solutions, maybe one day it will be possible to walk, sleep and live more healthily in overcrowded areas of Shanghai, Mumbai or New York. |





# 1995 A NEW START IN F1

By Brigitte Rebetez



**Exactly 20 years ago, LEMO launched the F Series receiving positive and immediate acceptance within the Formula 1 sector. Today this happy story continues: F Series connectors accomplish their mission in a large variety of highly demanding applications in other sectors.**

We are back in the early nineties. Faced with increasingly high speed and vibrations and the need for fast reliable connectors, Formula 1 teams are looking for connector solutions to these new requirements. LEMO reacts by launching an extensive customer survey in England, where the most prestigious F1 and other sports cars are designed. What do designers appreciate about LEMO products, what improvements do they expect, what are their exact needs? The survey, the first of its kind for the Swiss company, proved rather instructive.

The bar is set very high. LEMO's engineers set to work quickly. In only 6 months, they develop a brand new connector range, which will be named the F Series. They don't have to wait long to see whether they have won the bet: the first prototypes met all expectations. *"Formula 1 teams were eager for them, remembers Richard Thomas, LEMO UK's Managing Director at the time. They wanted to place orders immediately, even if the solution wasn't really finalized yet!"*

In Formula 1, the characteristics of each component are crucial. Their weight, to start with: in order to maximize performance, racing team engineers ensure load distribution to the gram.

F Series products, based upon LEMO's proven latch system connectors, combine crucial specific features: made of high performance alloys for strength and low weight, they are shorter (to save space and weight), environmentally sealed, fully screened for minimal electromagnetic interference and designed to withstand shock and vibrations. In short: they are robust, lightweight and reliable. Moreover, they are equipped with standard plugs in 8 sizes and a wide selection of contact configurations. *"Formula 1 racing is a highly demanding field, where it is possible to build a new race car in just a few weeks, says Richard Thomas. Meeting these requirements successfully was an exciting challenge!"*

Over the years, LEMO has enlarged the F Series with many different housing models and contact configurations, giving designers a huge choice to find the exact connector to meet their needs. Some connectors bigger, others miniature-sized, such as the tiny 6mm diameter FF version for example: its small size enables the cable assembly to be fed down through the centre of F1 cars' suspension struts.

Other ranges have been launched thanks to the development of the F Series, such as the M Series, featuring a ratchet-coupling system and protected against corrosion by a special nickel-Teflon coating which is future-proofed against the new environmental regulations (RoHS2 and REACH 2017). The M Series is a micro-version of MIL specification connectors offering considerable space savings and better performance, both necessary requirements for today's electronic systems which are becoming ever smaller. Reflecting this, both the F Series and the M Series currently feature on the F1 Electronic Control Unit used by all the teams.

Today, 20 years after their launch, F series connectors continue to face the most difficult application challenges. They are dust, water and corrosion proof, lightweight, reliable and high performance, which characteristics are greatly appreciated far beyond Formula 1. They can be found for example on the equipment of combat soldiers, on mine detectors produced by Kawasaki and on drones. They are also used in Broadcast, communications, aerospace and biotechnology. |



▲ A vintage catalogue from 20 years ago





Who said high-end connectors  
have to be grey?





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