The magazine for electrical safety

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MONITOR

BENDER Group

New integrated operating theatre at orthopaedic centre

Electricity. Sustainable. Safe. Shape the future with Bender

Preventing downtimes – steel mill JSW Steel

From left to right: Heinz Nowicki (CSO), Monika Schuster (CFO), Winfried Möll (CTO)

Dear readers,

the world as we know it continues to change drastically.
While the Covid-19 pandemic is subsiding, the war in Ukraine is currently dominating the headlines and leading to further supply shortages. We absolutely condemn this war and are strong advocates of peace, humanity and diplomacy. Although we do not have any production facilities or suppliers based in Ukraine, we are actively supporting the Ukrainians affected by the war in a variety of ways, for example financially, by donating required items and by means of our involvement in the job platform Ukrainians Abroad.

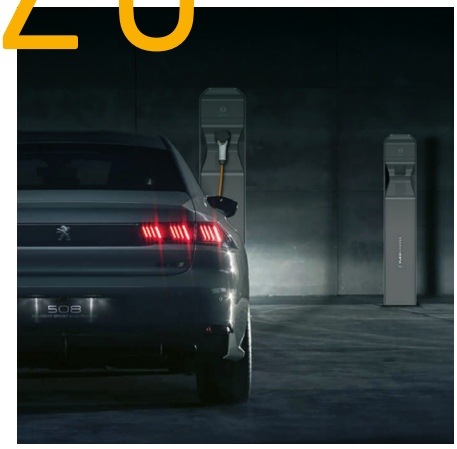
Other large issues are changing the world, and climate change is one of the most urgent examples. The "European Green Deal", for example, has set the objective of making Europe climate neutral by 2050. To achieve this, new technologies need to be developed, while existing technologies must be further improved. Bender has been developing electrically safe environmentally-friendly products for many years. For example, we were involved in developing the first commercially used inverter for photovoltaic systems. We are also a major player in many wind-power stations and hydro-electric installations.

When it comes to sustainability, we place a particularly strong focus on electric vehicles. In line with this focus, we already established our own business unit in this area several years ago and have installed a multitude of charging stations at our offices. As you would expect, we also use these charging stations to gain experience and further improve our electrical safety and charging management solutions. Additional measures such as our research project on electric flight and our train safety solutions play a similar role.

In this issue of **MONITOR**, you can read interesting details and find out all you need to know a bout the work carried out by our enthusiastic and committed team in South America, get to know our new research and development manager even better, and learn how we guarantee electrical safety in steel mills, operating theatres, and in the production of construction machines. This issue introduces a multitude of new products and provides insight into the Bender world.

We hope you will enjoy it.

HEINZ NOWICKI | MONIKA SCHUSTER | WINFRIED MÖLL



Content

Electricity. Sustainable. Safe. How electrical safety protects the environment

The climate crisis is one of the biggest challenges currently facing humankind. The Paris Climate Accords, which were signed by 195 nations in 2015, aim to limit global warming to below 2°C.

One of the main objectives of the European Green Deal, approved in 2019 as a central element of European climate policy, is to make Europe climate-neutral by 2050. These aims can only be successfully fulfilled if new technical solutions are developed and existing technologies are improved. Furthermore, widespread acceptance of climate protection measures needs to be established – worldwide.

No life without greenhouse gases

The Earth is surrounded by a natural layer of greenhouse gases in the atmosphere. These gases include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O) and various chlorofluorocarbons (CFCs). The greenhouse gases absorb some of the heat radiated from the Earth's surface and emit it back. This effect is essential for the survival of humans, animals and plants. Without it, the temperature on the Earth's surface would remain at a hostile constant of around -20 °C. On the other hand, however, too many greenhouse gases lead to climate warming and are then dangerous for humans and the environment.

Too many greenhouse gases would be our downfall

Greenhouse gases such as carbon dioxide (CO_2) are released into the atmosphere when we burn fossil fuels such as natural gas, crude oil and coal. The volume of greenhouse gases emitted has increased dramatically since the Industrial Revolution. The resulting increase in the concentration of greenhouse gases in the atmosphere is causing the Earth's surface to become increasingly warm, with some devastating consequences. Negative impacts of this global warming include the melting of the polar caps, a rising sea level, and an increase in extreme weather such as storms, heavy rain and periods of drought. It is therefore essential that we reduce greenhouse gas emissions as much as possible.

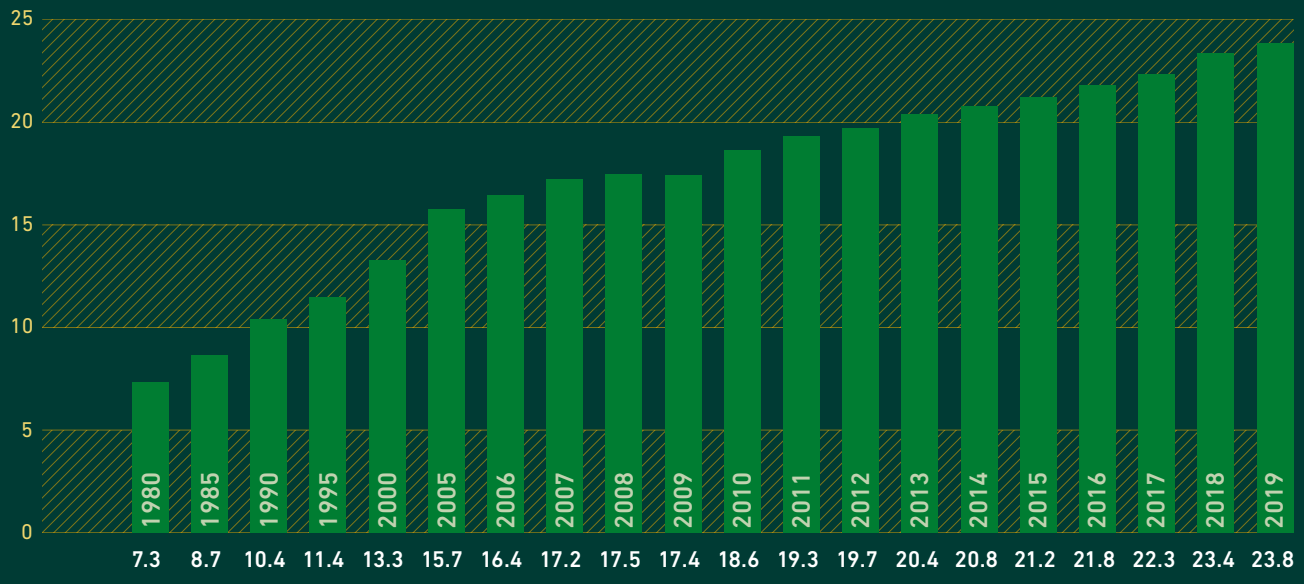
It's time to stop climate change

The easiest way to curb climate change is to produce fewer greenhouse gases and to convert to sustainably generated energy. Depending on the climatic and geographical framework, there are several ways to do so, from solar power and heat to wind and hydroelectric power and right through to geothermal energy and many others. To use these sustainable sources as intelligently and efficiently as possible, we need to develop the power network into a smart grid and ensure sufficient possibilities to store the electricity generated.

Electrical safety enables environmental protection

Furthermore, conscious consumption and energysaving measures can also significantly contribute to limiting climate change. It is important to remember that electricity plays an integral and essential role in the modern world – it secures our standard of living and is a fundamental pillar of our co-existence. From a global perspective, we will therefore require more rather than less electricity in the future. In fact, power consumption in the world more than tripled between 1980 and 2019 alone, despite the fact that, on the whole, electrical equipment has become more energy-efficient and ecological awareness is on the rise in many countries. The reasons behind this increase in consumption include the fact that more and more people are gaining access to electricity and a growing number of end devices, from smartphones to electric cars, are using more power. What's more, electricity is also being increasingly used in more and more locations in the industrial world. As a result, the carbon footprint of companies and humans is continuing to grow.

Global electricity consumption in the years 1980 to 2019
(in petawatt hours)



The future still looks electric: global power requirements have more than tripled over the past 40 years and are continuing to grow.

Status: 2022, Source: Statista

Electricity is dangerous. So is the lack of it.
Alongside the growing power requirements, the need for electrical safety is also increasing. After all, electricity can not only make life easier and help to save lives but also, in the worst-case scenario, have a fatal impact and end lives. The demand for solutions for electrical safety will therefore continue to grow over time.

Another reason for this growth is the fact that a safe and highly available power supply is of vital importance in more and more locations. In addition to hospitals and operating theatres, in which avoiding power cuts is an absolute priority, this now also applies to an increasing number of other areas in which a blackout can have extensive consequences. The cooling of a power plant, for example, can be just as dependent on electricity as companies in the process industry, data centre operators and the entire field of electric mobility.

Making sustainable electricity safe
Bender is the ultimate specialist for solutions that provide protection against both electricity and power cuts. This also, of course, applies to sustainably generated electricity. In most cases, Bender already works hard to ensure the electrical safety of new technologies long before they are launched on the market. Bender's equipment and expertise have not only helped to make the first commercially used inverters for photovoltaic systems electrically safe but are also used in many wind power plants, hydroelectric installations and biomass systems. In 2018, Bender created a division dedicated to the rapidly growing electric vehicle market and is also exploring products for electric aviation. In this area, new approaches are required because standard electrical safety solutions are insufficient. You can read more about Bender's work in this area in the report on page 35.

Climate protection at Bender

This important topic has many different facets, which all come together to build a solid foundation for sustainability and climate protection. Find out more in the next issue of the Monitor.

1. **Innovative products**
   Making sustainable technologies electrically safe and highly available

2. **Maximum quality**
   Producing durable, intelligent and updatable products in the most environmentally friendly way

3. **Sustainable processes**
   Companies and employees actively advocating climate protection in all locations


Although products and solutions from Bender do not directly reduce CO_2 emissions, they certainly make an important contribution to sustainable climate protection.
Innovative solutions
» supporting progress as a development partner
More compact enclosures
» less installation space and fewer material
Increasing energy and material efficiency
» a targeted approach to a sustainable future
Active climate protection
» sustainable economic development in all office locations
Longer-lasting, updatable products
» fewer raw materials and less waste
Intelligent technologies
» guaranteeing electrical safety
Ensuring high availability
» further improving acceptance of environmentally friendly mobility
Electrical safety
» preventing damage and environmental impact

Thinking ahead for hydrogen applications

Bender has a long-standing tradition in developing and supporting sustainable technologies. As an enabler and development partner, Bender conducts important groundwork in research and development. This involves close cooperation with many leading innovative specialists, universities and research institutions. One example of this cooperation is the first research project on H_2 electrolysis in Germany, which examined hydrogen applications in the private and commercial sectors and was supported by Bender back in 2015. Since then, the company has been involved in a multitude of similar pilot projects involving electrical safety solutions. In addition, Bender is actively involved in various boards and standardisation committees and helps to establish new technologies and make them safe to use for all users. Currently, Bender is involved with committees creating basic safety and installation standards.

Sustainably generated power requires electrical safety – Bender helps.

Ever since launching its first inverter back in the 1980s, Bender has been helping to make sustainably generated power safe.

Sustainable roots

There are many reasons for Bender's ecological commitment and use of sustainable technologies, and the company's headquarters in the German town of Grünberg is an impressive example. Unlike some start-up companies based in Silicon Valley, employees at Bender are very aware of the significance and value of nature – because they work right at the heart of it. "For us, nature is not an abstract concept but a tangible reality that we enjoy and that we also want to protect for future generations," explains Dorothea Bender Fernandéz, Chair of the company's Advisory Board. The form of the company also has a direct influence on its sustainable approach: as a locally anchored family establishment, it has a responsibility very different to that of a corporation, the success of which is measured solely based on its next quarterly statement. It therefore comes as no surprise that Bender always leads the way with a breath of fresh air when it comes to sustainable energies. —

Electric aircraft need to be electrically safe for the successful establishment of this technology.

Bender and the Green Deal

Dieter Hackl, Head of Standards and Innovation, and *Roman Schmattloch*, Head of Corporate Development, talk about sustainability, the Green Deal, and the role played by Bender.

To start with a provocative question: Can electrical safety save our climate? And if yes, then how?

D. Hackl: *Yes, it can. Not on its own, of course, but it can play a major role in achieving this goal. Let's look at three examples: In the 1980s, we made the first inverters for photovoltaic systems safer and in turn made an important contribution to sustainable energy production. The second example applies to any of our devices that detects an electrical fault at an early stage and thus prevents a fire. By doing so, it also prevents toxins from being released and plants with high energy requirements from having to be rebuilt. The final example I would like to mention is the construction of DC systems for industrial use. This not only increases energy efficiency but also achieves the same output while reducing the amount of copper used by a third – a huge amount.*

R. Schmattloch: *I'd like to pick up on that point and go one step further: Our products also directly contribute to reducing greenhouse gases. This is partly because they are manufactured with good quality and with a focus on the sustainable aspects of energy efficiency, waste avoidance and the use of raw materials. In addition, and more importantly nowadays, our products simply last a long time and, better still, many of them are updatable too. This means that where other products already reach the end of their life and end up in the bin, we simply install an update and keep them running. This is a prime example of practical environmental protection.*

Dieter Hackl, Head of Standards and Innovation

How and why do you do that?

R. Schmattloch: *I have a 9-year-old son. It's therefore important to me to consider the impact I make with my work and the consequences it may have for the future. This is why I like to help develop solutions that protect the environment and make life better. The Green Deal is a topic that is very important to me on a personal level and motivates me in my work. After all, I don't want to have to explain why I did nothing to stop climate change in 20 years' time.*

D. Hackl: *I have been interested in the topic since as early as the 1980s, when the Green Deal didn't yet exist. Back then, the Club of Rome published a report on "The Limits to Growth", in which it painted a picture of a grim future scenario. Reading this had such a strong impact on me that I have been committed to ensuring that this future never becomes a reality in both my private and professional life.* —

Are you developing a sustainable technology or do you want to make your electrical installation sustainably safe? Feel free to contact me, and I'll be happy to help!

Roman Schmattloch
Head of Corporate Development,
Bender GmbH & Co. KG
roman.schmattloch@bender.de

Solutions for operating theatres

Bender COMTRAXX® CP9xx Control Panel
The innovative theatre control panel is the sleek and sophisticated monitoring and control center of the operating theatre. It delivers audio and visual information as well as alarms.
The anti-reflective glass touch panel incorporates self-explanatory images, clocks, readings and control functions – offering an excellent overview and taking some of the load off the medical staff. By use of a programmable logic controller connected systems such as lighting, temperature and humidity, ventilation and other critical alarm controls can be integrated.

Merivaara Q-Flow™ LED operating lights
The state-of-the-art operating lights come with an elaborate design and provide the best colour rendering, Dynamic Obstacle Compensation (DOC™), as well as a particularly low-turbulence airflow in the operating theatre area.

Thanks to energy-efficient LED lights they reduce the hospitals energy consumption and CO_2 footprint as well as the medical staff's thermals stress during surgery.

Epsom Hospital/UK

New integrated operating theatre delivered at orthopaedic centre

Merivaara's high capacity OpenOR™ integrated theatre solution installed at Epsom Hospital

A newly installed operating theatre at the Elective Orthopaedic Centre (SWLEOC) in Epsom Hospital, South West London is equipped with the latest state-of the art integrated digital theatre technology from Bender UK and Merivaara.

Leading orthopaedic specialists

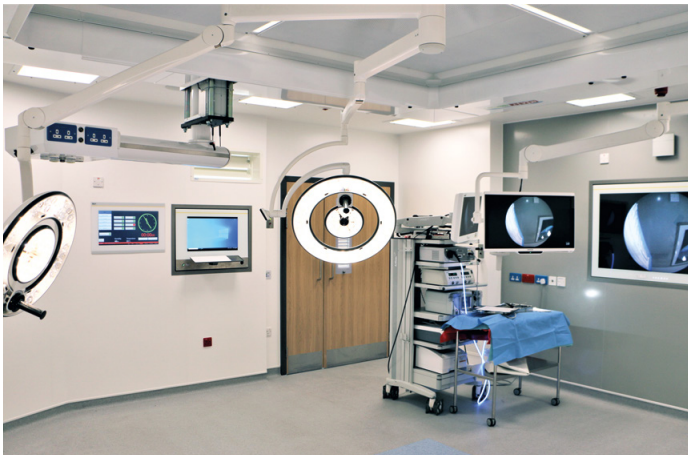
SWLEOC is ranked as one of the best facilities in the country for high quality, efficient, elective orthopaedic services, including inpatient, day-case and outpatient. Performing around 5,200 procedures a year - SWLEOC is one of the largest orthopaedic centres in the UK and Europe. It is also a shoulder surgery specialist centre, with subspecialities in soft tissue, spine, foot and ankle procedures.

The new operating theatre adds a sixth facility to the five theatres already in place within SWLEOC. A key requirement for the teaching hospital was integrated theatre communication, enabling clinical teams to interact and share video with staff and students in an observation area (referred to as 'the fishbowl').

Cutting-edge integrated theatre communication

At the heart of the theatre is the high capacity Merivaara OpenOR™ open architecture management system, which integrates operating theatre devices, data and image management for rapid display of surgical imagery. OpenOR™ is connected with surgical lights, monitors and cameras within the theatre. Any media related to the patient can be stored and managed through the system including footage and snapshots from surgery.

OpenOR™ is a scalable solution tailored to fit the requirements of any hospital. It integrates PACS and hospital systems for patient worklists and data integration, and the system is vendor-neutral, so it does not limit the connection of image sources from specific manufacturers. Video is connected via a simple plug and play function. The over IP-based audio and video management capability provides flexible video routing between sources and displays, allowing live procedures to be viewed and streamed outside the operating theatre to any given location.



Newly installed theatre at the Elective Orthopaedic Centre (SWLEOC), Epsom Hospital, UK

The state-of-the-art operating lights provide a particularly low-turbulence airflow in the operating theatre area

Partners for hospitals: Bender and Merivaara

Bender UK Managing Director Gareth Brunton explains: "With our background in hospital critical care power, turnkey theatre projects and more recently a full clinical product capability in partnership with Merivaara, the OpenOR™ technology has been a natural progression for our hospital business unit team."

Bender UK supplied theatre equipment including the new CP924 glass touchscreen theatre control panel, 24-inch DICOM compliant Bender PACS with glass fascia membrane keyboard, and two 55-inch 4K in-wall glass fascia viewing panels.

Merivaara Q-Flow™ LED operating lights with a wireless HD camera were selected due to the best-in-class colour-rendering and optimised airflow, with unique dynamic obstacle compensation to deliver optimum illumination to the surgical site. The ring-within-a-ring design of the Merivaara lights ensures uninterrupted clean air flow from the canopy - an important requirement for orthopaedic surgery to help minimise the risk of infection.

Step-by-step introduction for hospital staff

Bender UK has an excellent aftersales capability with full training and familiarisation service provided by consultant Steve Coleman who took the Epsom theatre team through a step-by-step introduction, so they were fully conversant with the technology. Epsom Hospital is managed by the Epsom and St Helier University Hospitals NHS Trust along with the nearby St Helier Hospital. Both teaching hospitals play key roles in the education and training of future doctors, nurses and health professionals. The two hospitals work in partnership with St George's Hospital and St George's Medical School in South London to deliver high quality education and research.

Pleased with technology, delivery and service

Ken Macdonald, Electrical Design Engineer for the Trust commented: "We now have a fantastic theatre that I know the client is more than happy with, all the surgeons and the clinical staff too, and that goes right down to us as the Trust engineers.

The system is probably the most up to date and cutting edge. It provides the team with such a better facility, with the ability to record for training purposes, allowing the consultants to talk to 'the fishbowl' during operations. It was delivered with confidence for us as the client. Questions that were asked of Bender during the commission received answers that were exemplary."

Epsom Hospital is one of eight OpenOR™ projects completed by Bender UK in 2021. The theatre was officially handed over for use in July 2021. —

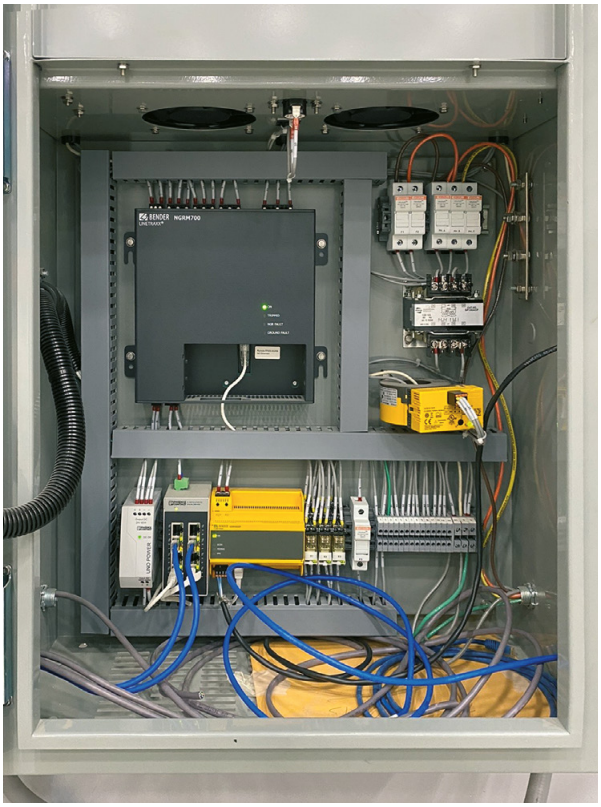
For more information on Bender UK integrated theatre capabilities and products and service for the healthcare sector, visit:

Future-proof and sustainable

Komatsu integrates Bender ground fault solutions for its new manufacturing facility

The Komatsu Group is one of the world's largest manufacturers of heavy-duty machinery. In Longview, Texas, Komatsu Limited has built a state-of-the-art factory where components for open pit mining machines are welded and prefabricated.

To set the highest standards in electrical safety as well, Bender Inc., USA, was brought on board as soon as the project began. The ground fault solutions Bender provided have already paid off for Komatsu. In the first year of operation, six ground faults were reliably detected, preventing both downtime and revenue loss.



Three HRG panels to protect each 480 V bus in the manufacturing facility

A complex photovoltaic challenge

Komatsu Limited has been a powerhouse in manufacturing equipment for construction, mining, military and industrial applications for over 100 years. When planning a future facility, an operator at Komatsu requested support for a quality solution to serve Komatsu for the installation's lifespan. Experiences showed that ground faults lead to costly, unplanned interruptions and put a heavy load on maintenance resources, which he wanted to avoid. Initial discussions eventually led to additional webinars with consulting engineers and equipment manufacturers, and they decided to put their trust in Bender.

Like many modern systems, the supply of power to the facility included a renewable energy source. At this point, the PV (photovoltaic) equipment provider stated that its system was not compatible with high resistance grounding (HRG). This hurdle for HRG was quickly overcome by installing an isolation transformer between the bus and PV inverter.

Smart solution for all kinds of grounding

Bender provides products compatible with ungrounded, solidly grounded, low resistance grounded (LRG), and high resistance grounded (HRG) power supplies. In modern applications, it is prevalent to see a mixture of different methods on the same drawing. For example, medium-voltage adjustable speed drives are a popular component consisting of grounded and ungrounded sections. Bender's long experience have allowed the development of products that meet the demands of adjustable speed drives and other nonlinear loads. Tailoring the solution for Komatsu's manufacturing plant needs was possible with the RCMS490, a 12-channel ground fault location relay. Each of its 12 channels can accept different current sensors with the appropriate frequency response for the load.

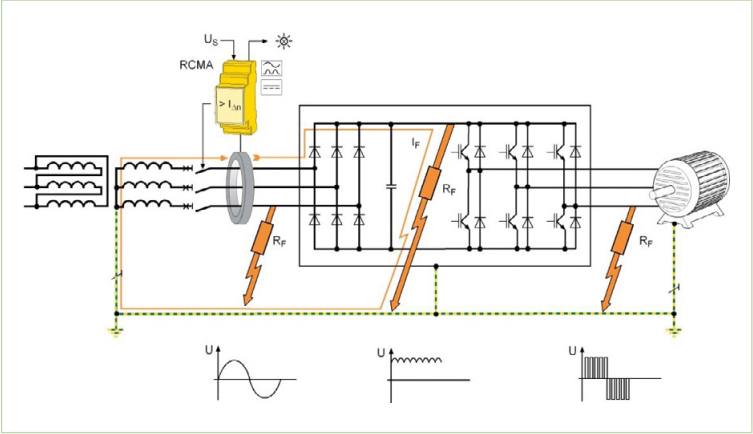
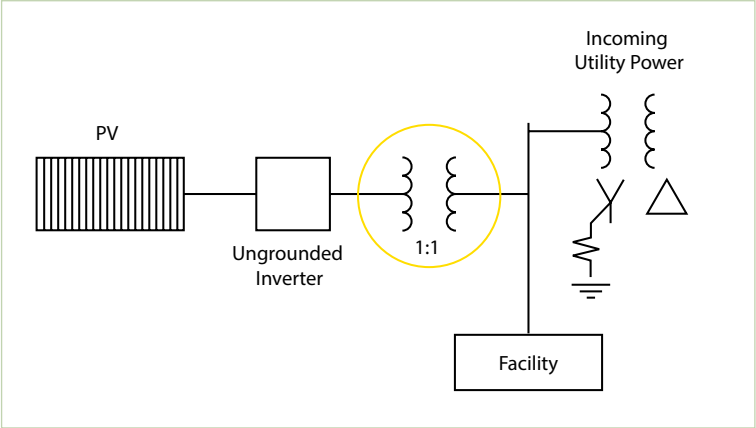


Illustration showing that pure AC, mixed AC/DC and pure DC faults are possible when VFDs are implemented

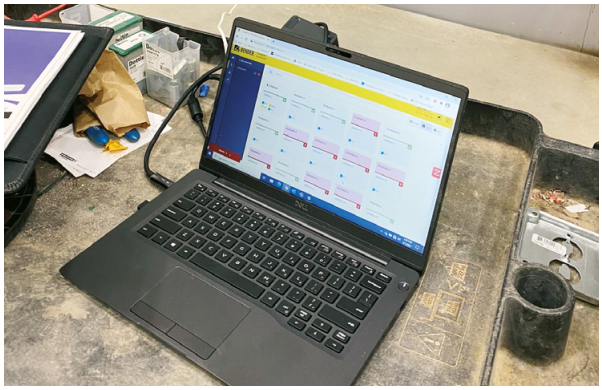
Examining the fault characteristics in Figure 2 can show fault waveforms that will appear with different fault locations. The CTUB-100 series of current sensors enables fault detection regardless of the fault's fundamental frequency. For enhanced preventative maintenance, ground leakage current trends are also possible for accurate measurement from DC up to 400 Hz. The wide frequency response range provides unparalleled protection to nonlinear loads.



A Bender RCMS490 and CTs were installed at each distribution panel to automatically locate faults

The problem with ground faults

Ground faults account for approximately 90 % of electrical faults in a system. This is understandable as insulation breakdown for any reason would typically lead to a conductor contacting metal and making a single-phase-to-ground fault (ground fault). Although it is easy to think that "ground faults likely won't occur at my facility," it is still essential to plan for them accordingly. Samuel Beans, facilities engineer at Komatsu, stated: "The HRG system prevented any major problems from occurring when the ground cable insulation melted and contacted a phase." Komatsu has successfully identified and located six ground faults within the first year of installation of the system. These events could have led to equipment damage, fires and injured personnel without the implemented Bender protection.



A Bender RCMS490 and CTs were installed at each distribution panel to automatically locate faults and display it on the desktop

Remote diagnostic tool included

They say things are bigger in Texas. That is reinforced when you look at the size of the equipment being built at Komatsu's campus-style facility in Longview, TX. Simply walking from one building to another can be a time-consuming adventure. The Bender HRG series 2 solution provided a remote diagnostic tool to help automatically locate faults even when not on site. While leaving a power system running with a single ground fault is an advantage of HRG systems, not clearing the faults in a short period leaves a system prone to phase-to-phase faults. Bender solutions help save time and money and better protect critical manufacturing equipment. —

In addition to unearthed systems (IT systems), resistance-earthed systems (HRG systems) have established themselves in international industry, such as mining and refineries. Especially in territories where the American influence prevails and in Australia, HRG systems are very common.

Bender UK: Thank you for caregivers

Bender UK has given special thanks to those who showed great commitment to the NHS throughout the coronavirus pandemic by providing unique benches designed and built by the English artisan blacksmith Chris Brammall. Five benches were made in total, with three installed so far, at Furness General Hospital in Cumbria, Leeds Teaching Hospital and the Mater Hospital in Belfast, Northern Ireland.

Preventing downtimes in steel mills

Bender India secures steel production at *JSW Steel* with a customised monitoring and fault location system

In the world's sixth-largest steel plant, faults in the electrical system repeatedly caused expensive drive failures. To quickly detect the source of the fault during operation and avoid system downtime, the operator *JSW Steel* asked Bender India for support.

In a major project, Bender experts developed a customised earth fault monitoring and fault location system for the complex plant, which has since significantly increased the reliability of operation of the machines.

A complete solution from a single source

JSW Steel is one of the leading steel manufacturers in India and part of the international JSW Group. In the city of Ballari in the southern Indian state of Karnataka, JSW Steel operates the world's sixth-largest steel plant. To address persistent problems with roller table motor failures in one of the bar rod mills at the facility, JSW Steel turned to Bender India. After analysing the problem on site, Bender India planned and implemented a solution from a single source: an insulation monitoring and insulation fault location system for the multi-axis system has been ensuring much greater reliability of operation ever since. JSW Steel also relies on Bender India for the maintenance and service of its electrical safety systems.

The largest long-product plant in India

The Ballari plant manufactures long products (LP). Its long products (LP) facility consists of one wire rod mill (WRM) and two bar rod mills (BRM 1 & BRM 2), which produce wire rod coils and thermos-mechanically treated (TMT) bars from cast billets received from SMS 2 and SMS 3. The LP facility at Ballari is currently the largest long-product facility at a single location in India. The bar rod mill is designed to manufacture the company's full product range of TMT bars and uses High-Yield Quenched and Self-Tempered (HYQST) technology to produce sizes ranging from 8 mm to 40 mm in diameter.

Complex fault location for multi-axis systems

The BRM-1 bar rod mill in Ballari has seven drive sections made by Siemens, which are operated in an unearthed system (IT system). Sections 1 to 5 have an input voltage of 33 kV, while sections 6 and 7 receive 6.6 kV. Each section contains 415 V and 720 V multi-axis systems connected via transformers and AC/DC converters. The stationary motors are controlled via 720 V motor drives while the roller table motors are controlled via a buck-type converter with 415 V motor drives. In recent years, drive failures in BRM-1 repeatedly caused mill downtime and additional costs, as shown in figures 1 and 2. The main reason for the drive failures was a failure of the roller table motor module. Even after the installation of an ISOMETER® from Bender, the fault location in the mill's drive inverter system was still very difficult due to a common rectifier feeding multiple invertors.

Figure 1: Downtime due to drive failure

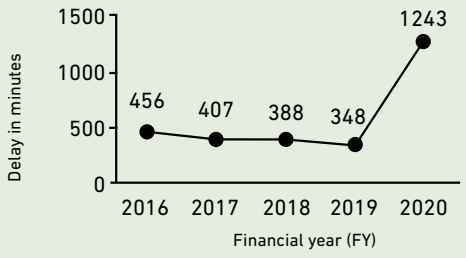
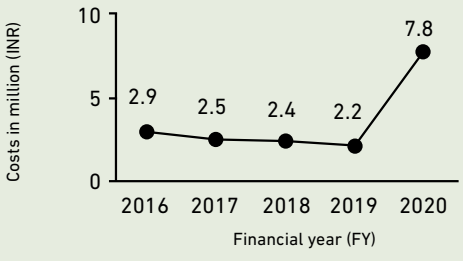


Figure 2: Cost indurred



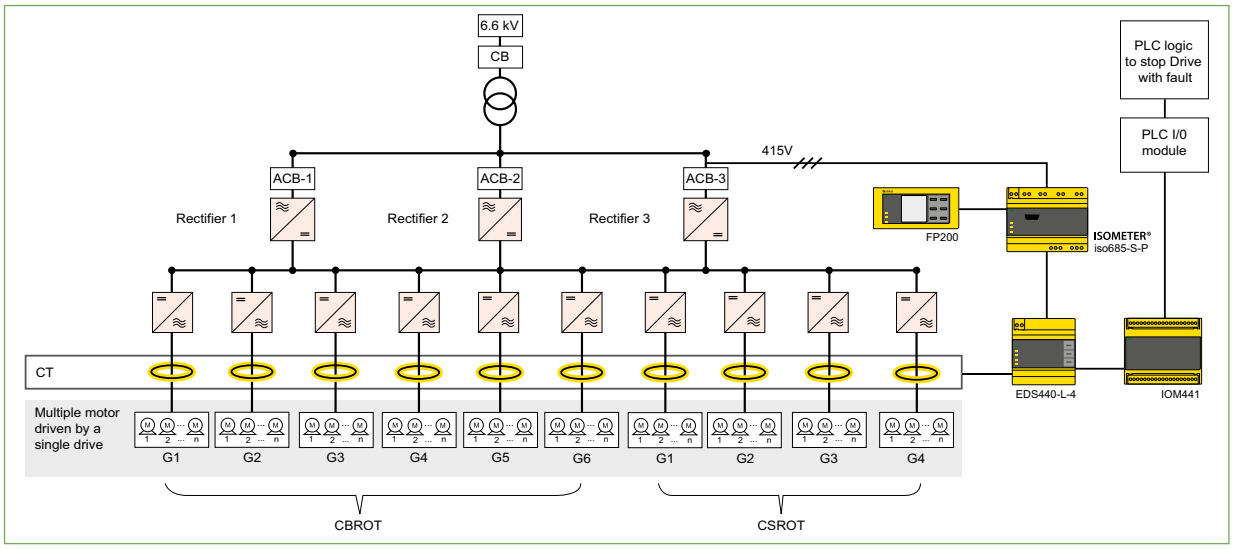
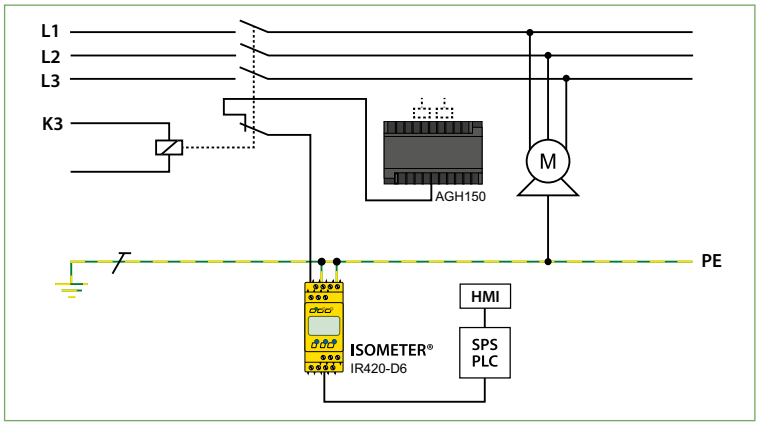


Figure 3: Bender relay network in section 7

Buck-type converters: detecting faults at an early stage

The experts at Bender first took a look at the 415 V buck-type converter and developed a solution to prevent it from failing. In an IT system, it is crucial to detect the first fault location and to clear the fault because the constant occurrence of faults deteriorates the insulation and results in drive failure. Such failures can be minimised either by modifying the motor design or via early detection of the fault location in the drive system. However, modifying the motor design involves costs, takes time and requires available capital. Fault location and the immediate clearing of faults directly avoids drive failures and involves less capital expenditure. Bender India therefore proposed using a Bender insulation monitoring and fault location system.

Figure 3 shows the drive network of section 7. The ISOMETER® from the iso685-x-P series was installed to monitor the insulation resistance of the unearthed system. Its output is connected to the PLC (4–20ma). This insulation resistance (IR) value is displayed on the HMI. The EDS440-L-4 insulation fault locator is connected to the I/O module of the PLC via the IOM441-S relay module to report the channel that has located the fault to the PLC. The EDS is connected to the current transformers of the different cable channels. The main function of the relay module is to identify the fault location and specify which drive has an earth fault. The PLC controller stops the respective drive, thus preventing drive failure. The ISOMETER® iso685 therefore provides the IR value of the system. If this value falls below a certain limit value, a pop-up is displayed to alert the operator, and the IOM441-S detects the drive in which the fault has occurred. Once the insulation fault has been cleared, the fault reset has to be carried out manually. The configuration shown above has already detected insulation faults multiple times and has therefore reliably prevented drive failure.



Offline-ISOMETER® IR420-D6

Classy-type motor drive: fault location with an ISOMETER® network

For the classy-type motor drives (720 V) controlling the stand motors, the company faced a completely different problem. A Bender ISOMETER® iso685 was already installed in the main motor-drive section of the rolling mill and showed the IR value on the HMI. However, if the IR value drops, it is not possible to determine which motor module caused it to decrease due to the common DC bus drive configuration. The previously mentioned method using individual core current transformers (CBCTs) was not feasible here due to the huge size of the individual busbars connected to the motors.

Against this background, a solution was developed using an ISOMETER® network of ISOMETER® iso685 and ISOMETER® IR420-D6 insulation monitoring devices for deenergised loads. The ISOMETER® iso685 is connected for the online monitoring of the insulation resistance

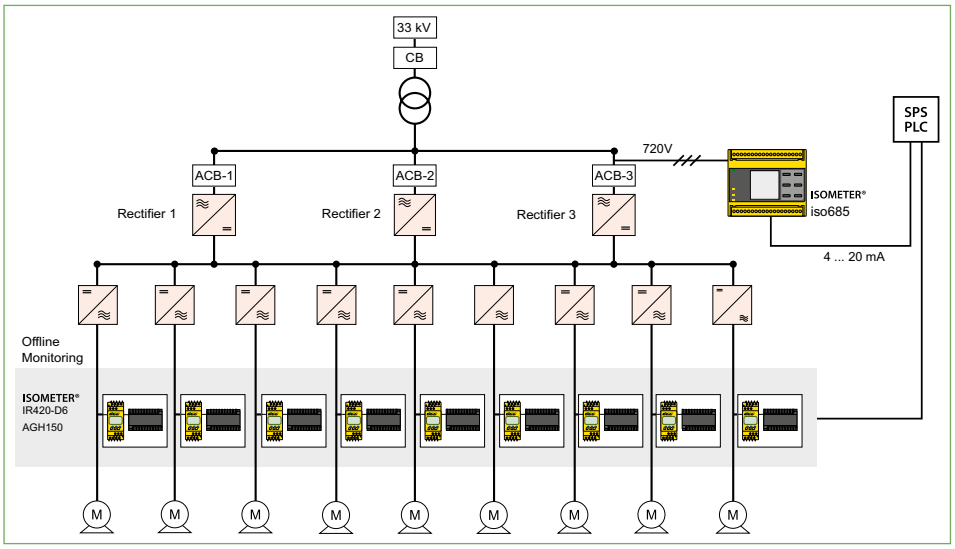


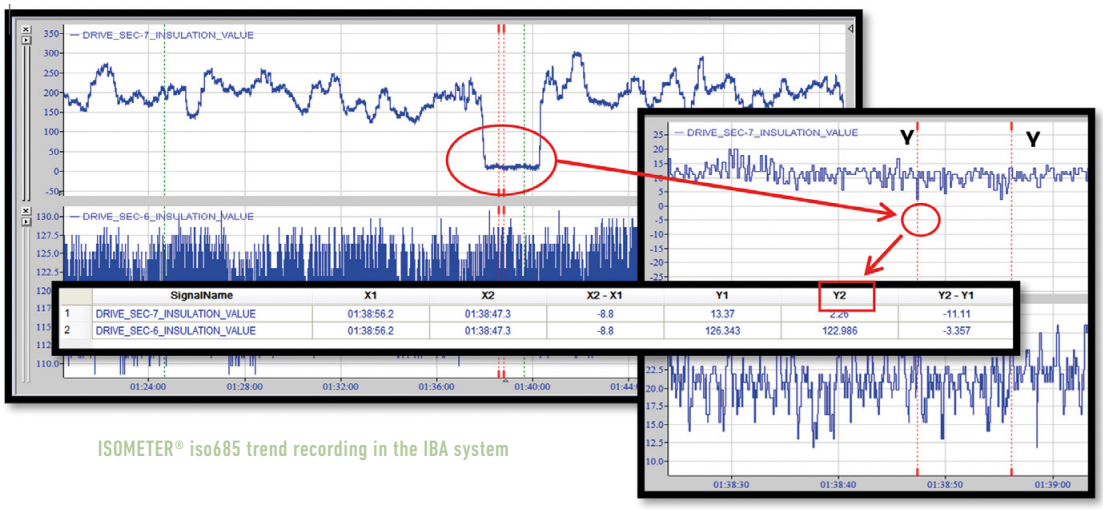
Figure 4: ISOMETER® network in section 1 to section 5

values of the 720 V motor drive. An offline ISOMETER® IR420-D6 is installed for each motor module through a potential-free contact operated by a digital output controlled by the PLC. When the drive is running, the contact is open and therefore disconnects the IR420-D6. When the rectifier is switched off, however, the test button on the HMI lights up. When the test button is pressed, the contact closes and the IR420-D6 offline monitoring device measures the IR value of each individual motor. A record table on the HMI displays the last two values and also the present IR values of each motor for comparison. The AGH150 coupling device is connected to extend the nominal voltage range of the offline ISOMETER®. Figure 4 shows the ISOMETER® network from section 1 to section 5. With this fault location method, JSW was able to drastically reduce its system downtime. —

The ISOMETER® iso685-P monitors the insulation resistance of the unearthed network; the IR value is shown on the display.

Authors:

Mr. Sreejith Kumar, Mr. Ajit Vasant Tatwawadi & Mr. Suresh Songara JSW Steel Ltd., Bellary, Mr. P. K. Bhattacharyya & Mr. Raghavendra Sajjan, Bender India



ISOMETER® iso685 trend recording in the IBA system

Remote Service
Rapid assistance precisely when it matters

Experiencing commissioning problems? Incorrect parameter settings? Software update required? When an electrical safety device stops working, solving the problem is usually an urgent matter.

Ensure availability at all times

Be it an ISOMETER®, a current transformer or a transfer switching device, anyone who uses Bender products relies on their dependability and rightly expects rapid assistance in the event of a problem. Bender solves 4,000 to 5,000 service tickets every year via telephone or e-mail alone. Sometimes, however, a problem may prove to be more complex or a diagnosis more difficult to make. In such cases, remote service is a good, rapid and cost-effective alternative to a visit by a service technician. "We know how important the maximum availability of our devices is for our customers. This is why we do everything we can to offer help as quickly as possible at all times – even without being on site," explains Klaus Böning, Head of Bender's Service division.

Receive quick responses

In its simplest form, remote service involves reading the fault memory and carrying out a remote diagnosis. Service specialists use online tools to access the customer's device or installation and analyse the problem. Depending on the fault, it can be advantageous to communicate with the customer simultaneously, for example, to visualise the problem, transmit additional information, or give instructions as to how to solve the problem. When providing this service, Bender uses a variety of communication tools ranging from telephone conversations to video streaming and right through to apps and service platforms. Another simple task for which remote service is used is monitoring faults. Alarm messages are automatically sent to the customer or service partner via text message, e-mail or telephone call to initiate corresponding measures.

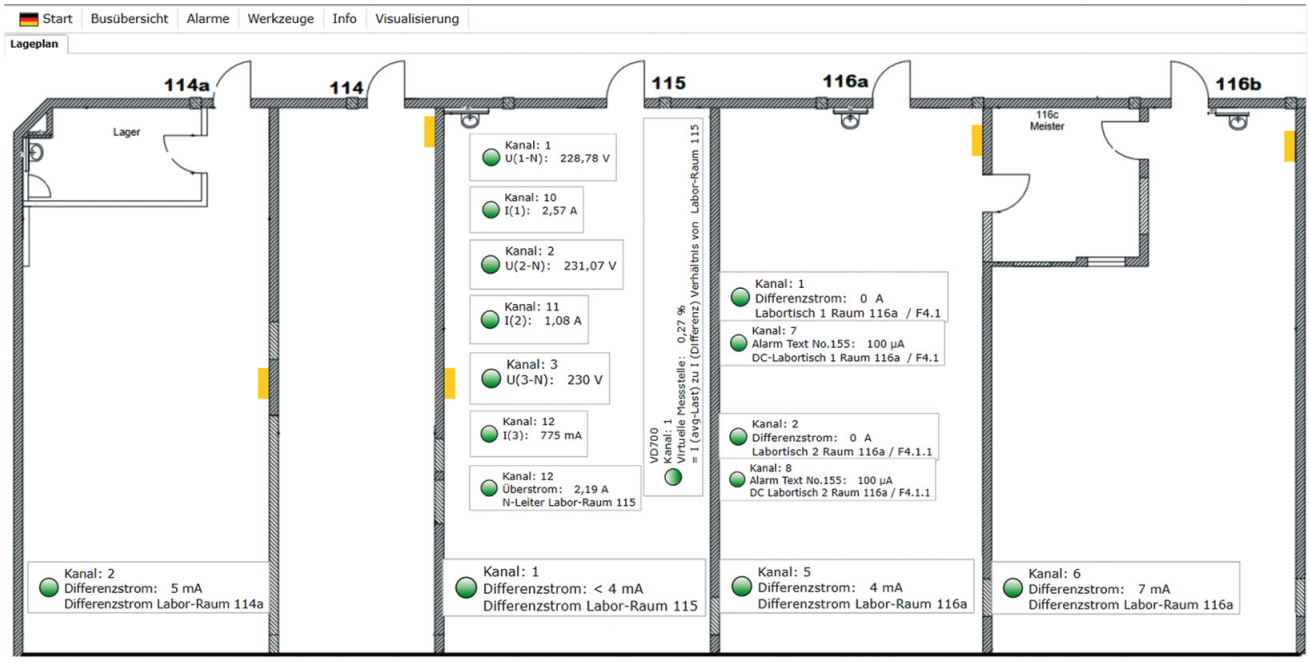
The 1st and 2nd-level support team handles up to 5,000 tickets per year, mostly via telephone or e-mail.

Solve more complex tasks remotely

In addition to these simpler activities, Bender also offers a multitude of other options for the remote maintenance and repair of devices and installations. These options range from reading individual system parameters to conducting complete system checks. Remote service can also be used to install software and configuration updates in order to guarantee stable fault-free operation. What's more, Bender can also carry out proactive maintenance work via remote access. This can help to identify problems at an early stage and avoid impending failures. "The best service is always the type you don't need," explains Daniel Rothgerber, Head of the 1st and 2nd-Level Support. "With our proactive maintenance services, we are able to avoid a large number of future failures and thus save our customers time, money and stress."

Competent, reliable and customer-oriented

Every fault current is different, and each installation and industry has its own special characteristics. For this reason, working in close cooperation and ensuring smooth communication between 1st, 2nd and 3rd-level service specialists play an important role in successful remote service. "We carry out our work as a well-oiled team. Everyone knows whom they consult if they can't find an answer to their question. This is not only good for our service but also, and above all, for our customers," states Klaus Böning, explaining the open communication and cooperation between service technicians, product managers and developers.



Even more complex tasks such as remote parameter setting can be reliably completed using the professional remote connection app. Here an example of a Plan in German.

Security is always the top priority

When Bender employees need to access individual devices or an entire installation within the scope of a service case, they do so using a browser-based approach, via app or by means of VPN (virtual private network) access linked to an external service provider. Regardless of the type of access used, data security is always guaranteed. Customers grant access in each individual case and terminate it once the work is complete – either via the app or using a link that they receive via text message or e-mail. Only once the customer has approved the access can the specialists carry out work such as checking functions and changing settings.

Bender Guided Service

When it comes to more extensive services, Bender works with the tried-and-tested industry portal Adtance to offer a so-called "Guided Service". Once a customer has logged into the portal or launched the app on their end device, they receive a code to pass on to Bender. The specialists are then granted access to the corresponding end devices, for example smartphones or laptops. When providing remote service, the technicians can use microphones and cameras to receive further information and communicate with the customer's on-site technician and give instructions where necessary. This Guided Service is always a good solution when a fault needs to be resolved as quickly as possible. An advantage for sensitive areas such as hospitals is that each service session is logged, thus allowing for retrospective checks on which tasks were carried out, which settings were made and which parameters were changed.

It is important to receive the right service quickly and easily, be it over the phone, on-site or, as is becoming increasingly common, via remote service. Bender offers its customers rapid assistance across all channels: via telephone and e-mail, using the app or with the help of professional online tools.

Industry-tested solutions

For comprehensive remote service activities, Bender uses the industry-tested platforms Talk2M and EWON. Both platforms require a gateway that allows VPN access. Bender can use the providers' server, which meets the highest security standards, to access the connected end devices and, for example, set the parameters of an ISOMETER® iso415R, configure a CP900 panel or conduct a BUS analysis. Depending on the customer request, the platforms can be used with a browser-based approach or via a remote connection app.

Technical remote highlights

In recent years, the opportunities provided by remote services have changed just as rapidly as the willingness to use them. The Adtance Service Platform, for example, offers a live translation function for both spoken and written language. Another highlight comes in the form of special data glasses designed to be used by on-site technicians. These enable Bender's service specialist to see precisely what the technician can see and, therefore, provide better guidance for implementing the service measure. What's more, the Bender expert can also project additional information, data sheets, adjustment values or diagrams onto a small screen. This represents an initial step towards an augmented reality that will also become increasingly prominent in the service area in the future.

Welcome to the
Bender Service portal!

The limits of remote service

When it comes to cost and time savings, the advantages of remote service are plain to see. That said, it is important to remember that for many tasks, on-site service technicians cannot be replaced, for example carrying out prescribed connections. "We expect the proportion of remote service cases to continue to increase and also develop to become a segment of hybrid service cases. These are service orders in which part of the service can be performed remotely, and Bender's field service team then only handles a required acceptance procedure. An example of such hybrid cases is setting the parameters of devices with an active switching function, when a physical test also needs to be conducted by an electrically skilled person on-site after the parameters have been set," states Klaus Böning, explaining the prospects of the service. —

The data glasses transmit precisely what the on-site contact can see and also offer Bender the opportunity to project information such as data sheets etc. onto a screen visible to the contact

Flexicharge NL

How the charging station supplier Flexicharge is using smart charging technology from Bender to drive the mobility transition

A 100 % CO_2-neutral electricity supply by 2050: the Netherlands has set ambitious climate targets and is tackling the energy transition with a determined approach.

When it comes to meeting these objectives, smart charging technologies and the switch to electric mobility play a central role. Bender Benelux accompanied the Dutch company *Flexicharge* as it grew from a start-up into one of the leading specialists for charging stations and charging points. Its products use intelligent, updatable charge controllers that support a variety of networks, enable reliable charging of electric vehicles and efficiently control smart grids.

All systems go for an ambitious energy transition

In 2018, the Dutch government announced a complete turnaround in its energy policy, declaring that it planned to stop extracting gas from its own gas field in Groningen by 2030 and achieve a completely CO_2-neutral electricity supply by 2050. To meet these goals, the Netherlands also needs to drastically reduce its coal and oil consumption. Since the announcement, the Dutch have been working at full steam to further develop the country's wind and solar power facilities. At the same time, mobility in the Netherlands is also undergoing a fundamental transformation: in line with its new focus solely on electric mobility, it will ban sales of vehicles with combustion engines from 2030 onwards. Thanks to strong governmental reward programs for the purchase or leasing of electric cars, the electric mobility sector is already booming. In 2021, electric vehicles even achieved a market share of around 25 % of all new cars registered for the second year in a row.

Smart charging as the key

Raymond Vergouwe, Technical Sales at Bender Benelux, believes that electric mobility will play a key role in the success of the energy transition in the Netherlands: "In the future, our energy should predominantly be obtained from wind and the sun. To make optimal use of these renewable energies, we need to generate, store, and distribute them intelligently. To achieve this, we need to use appropriate technology such as smart grids, micro-grids and other smart solutions in combination with electric vehicles." These form part of the smart grid and can be used for energy storage. For this to occur, charging stations need to offer smart charging technology that not only simply charges electric vehicles with electricity but also does much more: for example, communicating with the vehicle bidirectionally, intelligently connecting to (Home) energy management systems and managing and installing updates via remote access.

A dynamic market and high demands

The charging infrastructure in the Netherlands is currently undergoing rapid expansion. "The market is attractive, extremely dynamic and highly competitive," explains Raymond Vergouwe. One of the country's suppliers of charging infrastructures, which works in close cooperation with Bender, is the company Flexicharge. The start-up was launched in 2015 with the vision of developing a charging station that brings together attractive design, maximum safety and reliability, and future-proof functions. When searching for a partner for its charge controllers, it soon established contact with Bender Benelux. "Our conversations were excellent and extremely cooperative right from the start," states Vergouwe. "They were looking for a sophisticated technical solution, and we had the answer that ticked all the boxes: initially our intelligent CC612 charge controller and now, since 2020, the successor CC613."

More than a technical partnership

These initial discussions led to the start of an extremely successful business relationship. "Right from the start, we never felt like a supplier but always like a partner working together with the customer to achieve progress. We initially provided Flexicharge with intensive support and technical training, and now the company is able to offer first-level support itself," declares Vergouwe, explaining the development of the cooperation. Flexicharge is constantly increasing its share in the Dutch market and opened two new production sites last year. It now has a total of three manufacturing facilities that produce electric charging stations for private households and companies and charging solutions for large car parks with 20 to 40 EV charging spaces. Up to now, the company has only supplied AC charging stations, but it plans to introduce its first DC stations at the end of the year. Bender Benelux has also been commissioned to supply the charge controllers for these fast-charging stations.

»Let's charge the future together!«

At the heart of charging stations

Charge controllers form the core of charging stations because they determine the performance of the station and how it is connected to other components. Dynamic load management, which ensures that the energy available is intelligently distributed and a stable power supply is guaranteed at all times, is becoming an increasingly important demand for all charging stations. The charge controllers from Bender used by Flexicharge feature integrated dynamic load management that enables them to be flexibly adapted to suit different power sources and outlets without a subordinate system. With their multi-level load management, they enable larger charging parks with more than 250 outlets to offer automatically optimised charging. What's more, they also offer a multitude of other intelligent applications such as enabling individual charging stations or vehicles to be prioritised based on requirements or coordinating charging times, for example so that vehicles are charged during working hours.

The European Green Deal

One of the measures adopted by the European Union to combat climate change is the "Fit for 55" package. This package contains clear guidelines on how net CO_2 emissions should be reduced by 55 % by 2030. One development planned to achieve this target is the rapid expansion of the charging infrastructure for electric vehicles. By 2025, for example, the EU has set itself the target of providing an EV charging station every 60 kilometres on the most important motorways throughout Europe.

Offering future-proof solutions

Particularly in the case of such young and dynamic markets as the charging station market, it is important to offer future-proof solutions that will still be able to be used when individual parameters change. Frank Mehling, Business Development from Bender's business unit eMobility, addresses this requirement, explaining that: "When developing our charge controllers, we consciously focused on ensuring that they are updatable. As a result, they can be easily adjusted to meet future requirements via software updates, without needing any replacement hardware or work to be carried out on the charging station itself." The charge controllers also offer a wide variety of communication solutions ranging from Ethernet and WiFi interfaces to integrated 4G modems. This enables them to be easily linked into back-end systems and makes them suitable for remote maintenance. The integrated powerline communication between the vehicle and the charging station in accordance with the standard ISO 15118 additionally facilitates easy implementation of plug & charge solutions. "Our charge controllers are smart, flexible and future-proof. And with our technical support, our partners such as Flexicharge can make the most of strong background support whenever they need it," states Frank Mehling, summarising the success story.

Marcel Vriens and *Reinier van den Berg* are the founders of Flexicharge, one of the leading providers of charging stations in the Netherlands. Their success is based on a solid foundation that they have built with their eye for good design, instinct for finding future-proof solutions, and knack for dynamic markets.

What was your vision when you launched the company Flexicharge?
We wanted to create a product that is different to those already available: a charging station that works perfectly and is also so attractive that people are happy to install it on their property.

How did Bender impress you as a partner?
At the start, we had a multitude of questions – and Bender always had the right answers. The charge controllers are technically superior, and Bender was always a reliable supplier, even under difficult circumstances. This is important for us because our customer demand is growing rapidly, and we want to meet it with reliable deliveries.

The development of charging stations is an extremely dynamic field. How do you remain fit for the future?
We always offer our customers state-of-the-art technology. This is why Bender's flexible, updatable solutions are ideal for us. We can quickly respond to new developments and easily integrate them into our charging stations via an update. —

Innovative Products

Merivaara

Bender has been the exclusive sales partner of the Finnish medical technology manufacturer Merivaara in Germany since the beginning of 2022. Merivaara's portfolio includes high-quality operating theatre and examination lights, operating tables and wall and ceiling-mounted pendants for operating theatres and ICUs. As a result, after the proven cooperation with Merivaara in the UK, we now offer electrical safety and top-quality medical technology from a single source in Germany and many other regions.

Charge controller ICC1324

The ICC1324 is a fourth-generation charge controller. Its PCB design makes the installation in charging stations or wallboxes even easier and more flexible. What's more, the integrated power supply unit and state-of-the-art hardware design combine even more functions in a very small space. The charge controller supports Dynamic Load Management (DLM) and therefore ensures the intelligent distribution of the current provided among the electric vehicles connected at charging stations with several charging spaces. The new Bender charge controllers are available in four variants for public, semi-public and private wallboxes and charging stations.

Control and information centre CP924 Essential

Medical staff in operating theatres often require the same alarm functions and equipment controls. The CP924-E is a control and information centre that contains all important functions: a clock, stopwatch, countdown, air-conditioning controls, lighting controls, monitoring of the electrical system, and monitoring of the medical gases. Its operation using a clear one-click concept is extremely simple and supports medical staff with their complex tasks.

Measuring current transformers CTAS

The CTAS series measuring current transformers are both robust and highly sensitive. They can be used in connection with Bender residual current monitoring systems and for insulation fault location in IT systems. The CTAS sensors are round, split-core type and available in three variants with an internal diameter of 50, 80 or 120 mm. They are particularly suitable for installation in existing electrical systems.

Voltages:	**up to 720 V**
Nominal current:	**up to 250 A**
Frequency range:	**42-3000 Hz**

Neutral Grounding Resistance (NGR) Monitors NGRM550 and NGRM750

These two devices of the NGRM product family were designed for use in low resistance grounded systems (LRG) in industrial power supply systems. They identify ground faults and grounding resistance failure. The power range reaches up to 25 kV and 2,000 A. The NGRM 750 can additionally be used at extreme heights of up to 5,000 metres.

NGRM 550

NGRM 750

Seminars and exhibitions

At seminars and the following trade fairs, you are invited to exchange ideas with the electrical safety experts in person. Find out about the current events in the respective regions online:

Exhibitions, trade fairs and events:

Europa Webinars (in English):

America Webinars:

Seminars and Webinars (in Spanish):

SmartDetect

Bender's latest generation of electrical safety equipment has been given the name SmartDetect. It stands out due to innovative features that set new standards for Bender monitoring devices, for example a compact design (with some elements just 18 mm wide), simple and intuitive operation, more interfaces, and the possibility of setting and reading measured values via the Bender Connect App with NFC.

Currently available:

Insulation monitoring device ISOMETER® iso415R

Residual current Monitor LINETRAXX® RCM410R

iso415R

RCM410R

Remote alarm indicator CP305

With the COMTRAXX® CP305 remote alarm indicator, Bender is setting new standards when it comes to monitoring IT systems in hospitals. The modern user interface of the 5" touch display ensures easy operability. Faults in monitored isolated power systems (IPS) are reported with audible and visual alarms. The fault messages can be customised, and handling instructions can be added. The CP305 can additionally be controlled, parameterised, updated and serviced via remote access. The device is the successor to the successful MK2430 alarm indicator and test combination. It has the same dimensions and can therefore be quickly and easily installed in existing wall openings.

The Clean Sky program

IMITAES (Insulation Monitoring for IT Aircraft Electrical Systems) is a sub-project of the EU's Clean Sky programme, which develops innovative technologies to reduce aviation-related emissions within the framework of public-private partnerships. The main objective of IMITAES is to conduct a feasibility study and set up a laboratory for Technology Readiness Level 4 for an insulation monitoring device that works in electric aircraft to enable safe electric flight. The project is coordinated by the University of Sheffield, UK. The aircraft engine manufacturer Rolls Royce compiles the catalogue of requirements in its role as Topic Manager, while Bender develops the necessary technology.

Making electric aircraft safe

With electric drives, the air traffic of the future can be quieter, more efficient and more climate-friendly. To achieve this, however, a great deal of basic research is still needed. With its unique expertise in the field of insulation monitoring of IT systems, Bender is an industrial partner in the EU project IMITAES. In cooperation with the University of Sheffield and the engine manufacturer Rolls Royce, the project is researching electrical safety in electric aircraft.

Bender develops a new insulation monitoring solution

Given that all-electric and hybrid aircraft engines require significantly higher voltages and much greater amounts of power than gas turbine aircraft, they pose a major challenge for developers. As a fail-safety expert, Bender is researching a new insulation monitoring device designed to suit high-voltage networks of up to 1,500 V/DC and powers in the megawatt range. The use of IT systems and the new insulation monitoring device enables electric aircraft to continue to fly safely until landing, even in the event of an insulation fault.

Awards

For Bender, 2021 was not only the year of its 75th company anniversary but also a year full of prizes and awards. We would like to thank everyone who nominated, rewarded and voted for our company!

01 M&K Award

Hospital engineering: Bender is nominated for the M&K Award

In October 2021, the specialist hospital management publication Management & Krankenhaus nominated the COMTRAXX® CP9xx remote alarm indicator and operator panel as a finalist for the M&K Award 2022 in the category of "IT & Communication". The international award will be presented for the eighth time in 2022. Only extremely special products and solutions for applications in inpatient health care made it through to the final selection.

You can read more about the nomination here:

02 eMove360 Award

E-mobility: winner of the eMove360° Award 2021

In mid-November 2021, the iONiX DC charging station from Bender and Silver Atena was presented with the eMove360° Award 2021 in Munich. The charging station, which was launched in September, impressed the jury with its performance and design in the category of "Charging & Energy".

You can find out more about the award here:

03 LANline Award

IT: best provider of "Measurement Technology for Wiring"

At the end of 2021, the readers of the specialist IT publication "LANline" selected Bender as one of the three best providers of the year in the category of "Measurement Technology for Wiring". LANline claims to be the market's leading German specialist publication for IT, networks and data centres.

04 MINT
Hard work pays off!

Germany's best STEM employers
In June 2021, Bender was selected as one of Germany's most attractive STEM employers. In a widespread study, the publishing house Heise Medien GmbH & Co. KG and the Institute for Management & Economy Research (IMWF) evaluated the areas of digitalisation, innovation, corporate culture, career opportunities, salary and employer reputation. Bender achieved an impressive total of 70.3 points. A total of 385 companies from nearly 60 different sectors were awarded the coveted title of Germany's best STEM employers for achieving a total of at least 60 points.

05 IF Design Award iONIX
Fit for the future and attractive to boot: iONiX charging stations win the IF Design Award

The iONiX charging stations have won another design award: the IF Design Award 2022. "Future-proof DC charging never looked so good", "the slim form blends beautifully into any surroundings" and "impressive design" were some of the comments made by the jury as it praised the design of the iONiX charging stations 25 and 50 and presented them with the IF Design Award 2022 in the category of "Automobiles/Vehicles".

An international symbol of good design
The Industry Forum Design Award is a prize given to honour outstanding product design. It has been presented annually since 1954. In 2022, 75 design experts from 23 different countries presented awards to design achievements in all kinds of disciplines in the categories of Product, Packaging, Communication and Service Design, Architecture and Interior Architecture, User Interface (UI), User Experience (UX) and Professional Concept. The award-winners received their prizes and celebrated their success at an "Award Night" held at the Friedrichstadt-Palast in Berlin on 16 May 2022.

More about the award:

25 kW

50 kW

Bender India
A Bender Group member for 11 years

Bender's business activities in India have a long-standing history that dates right back to the 1980s. Bender India has been one of the 14 official subsidiaries of the Bender Group since 2011. The company therefore looks back on over a decade of successful commitment to electrical safety.

Indian roots

In 2008, P.K. Bhattacharyya initially took over the liaison office that had catered to the Indian market in the northern Indian state of Maharashtra as an extension of the former company Dipl.-Ing. Walther Bender GmbH & Co. KG from Navi Mumbai as its fully authorised representative. Before the takeover, the company's business activities had been handled by an owner-managed trade partner, which had already attracted the attention of the Indian nuclear authorities with a project for a nuclear power plant back in 1985. To give the business new growth impetus and provide customers with more effective support, Bender India Private Limited replaced the liaison office as an official trading organisation in mid-2011. It has been catering to the needs of the Indian market and the markets in the neighbouring countries of Sri Lanka, Bangladesh, Nepal, Bhutan and the Maldives ever since. P.K. Bhattacharyya was appointed as the company's Managing Director.

Bender's first power plant projects

Bender's origins in India actually extend back to a much earlier point in time: In 1985, Bender was awarded the first major contract of the Nuclear Power Corporation India Limited (NPCIL), for which Bender developed an insulation monitoring and fault location system. Since then, all power plants in India have been fitted with products and solutions from Bender. At the time, P. K. Bhattacharyya worked for the NPCIL as a design engineer and was responsible for the implementation of the Bender solutions for planned nuclear power plants. In this role, he came to Grünberg to complete a training course in 2002, where he met the Export Manager at the time, Hans-Ulrich Lampe.

From the authority to Bender

When the owner of the former trading organisation decided to go into retirement and resign from the business in 2006, he recommended that Bender found its own company in India. When searching for a suitable managing director, Bender contacted P.K. Bhattacharyya based on his excellent cooperation with the company in the past. After careful consideration and a great deal of convincing, the Bender technology expert decided to give up his highly paid position and many privileges at the Indian nuclear authority and join Bender. He has been the central figure behind Bender India ever since.

Bender India in 2011 – how it all began

Rapid development and current challenges

The business developed rapidly and with outstanding results and has since increased its initial annual sales of approx. € 50,000 to around € 1.4 million. Its total number of staff also grew to 11 employees. At the same time, Bender India additionally progressed with the expansion of its distribution network throughout the country. We in the Bender Group are pleased that Bender India has been providing electrical safety solutions in this important region for more than a decade. —

Since the 1st of June, we are pleased to welcome G. Srinivas Rao, our 2nd Managing Director at Bender India, alongside P. K. Bhattacharyya. Together they will further expand the business in India. P. K. Bhattacharyya is responsible for Power, Renewable, Oil & Gas, Marine, Mining, Cement, Fertilizer and Hospital sectors. G. Srinivas Rao takes over responsibility for eMobility, Data Center and Railway sectors, and the development of new product portfolios.

Anniversary year 2021: what was, what is and what's here to stay

We can now look back on the year of Bender's 75th company anniversary with a smile on our face and a strong sense of pride and would like to take this opportunity to say a huge thank-you. Thank you for a wonderful celebration despite the lack of an actual party. Thank you to our customers for their loyalty and constructive, cooperative feedback.

Thank you to Bender employees all over the world, who helped to shape our anniversary, brought it to life with their ideas, actions and enthusiasm and shared their own personal moments with Bender. And finally, thank you to all of our friends and partners who supported our celebrations, especially our donation campaign for SELAM.

More than just a celebration

Bender's anniversary year was officially launched with an online event in March 2021 and quite literally turned the Bender Group on its head: after all, who could forget the regular headstand exercises of our company founder, Walther Bender?! Under the motto "Make an Impact", we pulled out all the stops to celebrate the company anniversary in a fitting way, with the jubilee edition of MONITOR declaring that it was "Time for celebrations". Our successful commitment to the children's relief organisation SELAM was probably our most sustainable impact.

Given that nothing functions without electricity, a statement that will become even more applicable in the future, we continued to work tirelessly to develop new solutions and realigned our approach to meet our customers' needs in our anniversary year, for example with our new "Customer Service Solutions" business unit. What's more, we also looked back on fond memories of the origins of our company and launched special sales promotions for specific products. —

Anyone who wants to take a look back at Bender's anniversary year should check out the jubilee edition of the MONITOR, which stands out against MONITOR traditions with its refreshing design and content.

The commitment of the Bender Group has always been, still is and will continue to be as follows:

"Like our jubilee motto states, I want to make an impact. I want our solutions to make a difference in this world. I want to do more than make a change; I want to achieve a real improvement. There is still so much for us to discover that we know absolutely nothing about in the present day. This is what makes Bender so exciting. And this is my driving force."

Dorothea Bender Fernández

SELAM
Making an impact for self-help

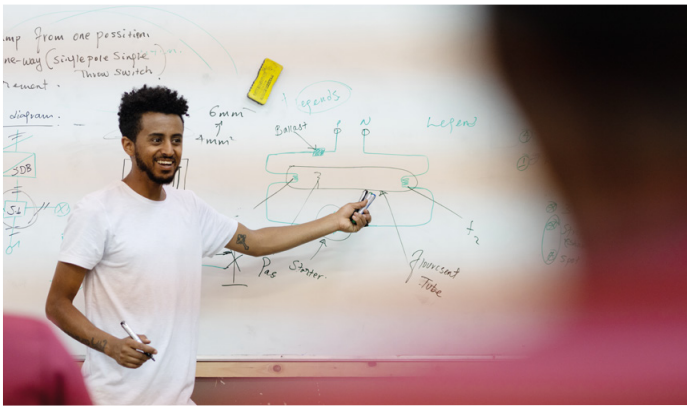
SELAM – is a name that was already mentioned in the jubilee edition of the MONITOR last year. Can you remember what it is all about and above all, what Bender has to do with SELAM? How did SELAM find Bender, or actually, how did Bender find SELAM?

Responsibility right from the word go

The anniversary year celebrating "75 Years of Bender" was based on the motto of "Make an Impact". This motto describes our commitment to making a difference with our work – for our customers and the world as a whole. Walther Bender laid the foundation for this approach back in 1946. From the moment the company was founded, he was a strong believer that social responsibility is an integral part of personal life. Bender is still very much aware of this responsibility in the present day and is deeply committed to upholding it.

SELAM – aid for children and young people in Ethiopia

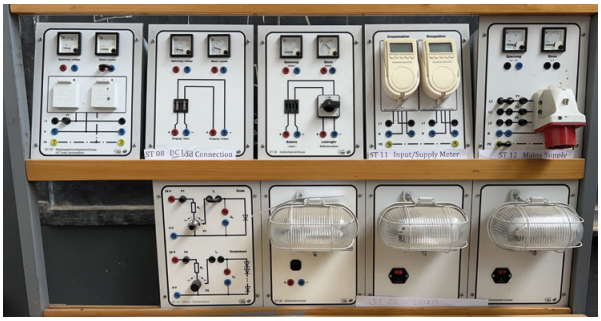
Seventy-five years after its foundation, Bender is a globally active company with more than 1,100 employees worldwide. It no longer only takes social responsibility on a regional level but also with an international approach. This is why Bender initiated its partnership with SELAM. Its project partner is the Swiss association "Äthiopische Kinderhilfe SELAM e.V.", a humanitarian aid organisation that supports and promotes children and young people in need in Ethiopia. The association stems from and is named after an orphanage that was opened by the Ethiopian adopted daughter of its founding family in Addis Abeba in 1986. The work of the aid organisation is based on four pillars: children's homes, schools, vocational training and mutual aid. SELAM now has four locations in Ethiopia.



has already been secured. The programme was initially scheduled to begin in November 2021, but due to the Covid-19 pandemic and new government requirements, the start of the training had to be postponed for a year.

Funding secured thanks to widespread support

Bender is also supporting a short-term training course held over several months, which began in April 2022. This course provides participants with occupational skills in the field of electrical systems. This project also has a solid financial foundation thanks to the many donations to SELAM made by employees, customers and business partners during Bender's anniversary year. As a result, the company was able to collect a five-figure sum that can now be used to additionally support the funding of the vocational training. SELAM provides active help so that people can help themselves – the most sustainable way to commit to social responsibility and make a real impact! —



Praxisgerechter Unterricht

A future career with Bender@SELAM

On the occasion of its 75th company anniversary, Bender created the social-electrical project Bender@SELAM in cooperation with SELAM. The project aims to enable 20 young people to complete training as electricians and electronics technicians and support them in setting up their own business for a future career. Bender@SELAM will launch in November 2022 with the start of its three-year-long vocational training programme in Electrical Engineering. Funding for the programme

You can find out more about SELAM.

Agents Corner
Passion and creativity for electrical safety

Wherever you are in the world, electricity is electricity, and the dangers involved are always the same. How electrical safety is ensured in each location, however, varies greatly from country to country.

From Mexico to Patagonia

Around 30 years ago, Bender began to push its initially tentative involvement in Latin America. It started in Brazil and then gradually expanded the business further afield. In 2012, Sergio Julián took over the management of the region as Head of Bender LATAM. His mission: to establish Bender as the top name and leading partner for electrical safety throughout Latin America. The Bender LATAM team is now well on its way to achieving this objective. In addition to the current HQ in Madrid, the branch in Chile and the two sales offices in Mexico and Peru, 17 Bender sales partners operate in 11 different countries.

Other countries, other requirements

Based on his experience, Sergio Julián can confirm that the diversity of the cultures and temperaments in Latin America is reflected in the requirements for and demands placed on electrical safety by local companies, for example in the case of safety standards: "Some countries work with the European IEC standards, while others use the NEMA standard from the USA. When a new customer or application comes along, one of our first questions is therefore usually: 'What regulations do we need to comply with?' The budgets of companies and government bodies in many Latin American countries are also smaller than in Europe: "Let's take the operating theatre in a hospital, for example.

"For me, globalisation and working in international markets means being open to other people and cultures: you never stop learning. And you have to be prepared for technical solutions that stray from the European standards."

Sergio Julián, Director Bender LATAM

In Europe, there is a standard for such facilities, and they also have to comply with strict and generally recognised standards and requirements for electrical safety. Many hospitals in Latin America, on the other hand, simply cannot afford to meet such requirements. We then have to develop flexible and even creative solutions to ensure the best possible electrical safety nonetheless, without neglecting compliance with regulations," states Sergio Julián, explaining the special challenges faced by the subsidiary.

"Here in Peru, mining is one of the most important markets. Our main application involves high-resistance monitors for neutral earthing resistance."

Alfredo Quezada, Sales Manager Bender Perú

Together with his ten-strong team, Sergio Julián looks after more than 25 countries for Bender Latin America (LATAM). In this position, he often has to find creative and flexible solutions without losing sight of safety.

Imparting knowledge with passion

With great passion and motivation – which, according to Sergio Julián, are typical for Latin America – the Bender LATAM team works to achieve a higher degree of electrical safety throughout the continent, especially in its poorer countries. These locations often lack not only the money but also the electrotechnical knowledge and technical experience to work with and apply electrical safety measures. In these cases, Bender LATAM starts at the very beginning: "We are expanding our network of distribution partners step by step, always with a focus on the long term. We explain what Bender does, introduce our technology and accompany them very closely. After about two years, these new partners have usually acquired enough comprehensive expertise to be able to advise and support customers all on their own." Furthermore, Bender offers its sales partners and customers from Latin America plenty of chances to get to know each other and make the most of networking opportunities. One example of such opportunities is the Latin America Conference planned to take place at Bender's headquarters in Madrid in July 2022. The event will welcome around 25 participants from seven countries and teach them more about Bender and electrical safety.

"We are proud that since being founded in 2015, the Chile branch has developed into one of the most efficient Bender subsidiaries in the world. We put our heart and soul into working to continue this achievement day after day."

Mónica Moreno, Administration & Logistics Dep. Bender Chile

Markets: from mining to electric mobility

The sectors and industrial fields that Bender LATAM serves in the individual countries are also as diverse as the continent itself. One of its core segments is mining, but oil and gas production are also important business areas. At present, data centres, the food and beverage industry and the process industry are additionally becoming increasingly important. Although sustainable technologies such as electric mobility and photovoltaics are not yet all that prominent in Latin America, it is important that Bender is already preparing the market for this development. Sergio Julián is certain that this is the right approach: "Ultimately, we want to be at the front of the pack when things really take off with these two areas as well." —

Customer Experience Center Bender Iberia / Bender Latinamerica

"Bender has only been represented in Mexico since 2016 but has already established a very good reputation in the field of electrical safety in hospitals. We are involved in many interesting projects. The potential growth in an economy as strategically important as ours offers us the opportunity to become a leading country within the Bender Group."

Manuel Arroyo, Sales Manager Industrial Bender México

Right on track with fire protection and a future-proof approach

Bender ISOMETER®s certified according to fire protection standard EN 45545

A short circuit starts a fire in a train full of passengers. The train is stuck in a tunnel, and there is no way for the passengers to escape – a catastrophe ensues.

To avoid such scenarios, railway vehicles are subject to the highest fire protection standards. All materials used to build trains, electric tramways and underground trains must comply with the fire protection requirements stipulated in the EN 45545 standard. Bender ISOMETER®s for railway applications are also certified according to this standard.

Effective fire prevention

The EN 45545 standard was introduced in 2013 and established preventive guidelines for fire protection in railway vehicles throughout Europe. The standard aims to ensure that all materials and components used in the vehicles are designed so that a fire cannot occur. If a fire does, however, break out, the spread of fire and smoke and further short circuits must be prevented as effectively as possible so that the train can continue along the track until it has reached a safe position for the evacuation of passengers. "The EN 45545 is a pure material testing standard," explains Dieter Hackl, Head of Standards & Innovations at Bender. "This means that materials can only be installed in railway vehicles if they pass the rigorous tests stipulated by the standard." The standard applies to all materials and components used in a train, from the undercarriage to the seats and from the air-conditioning system to the smallest electronic component. The tests focus on aspects such as the spread of flame according to ISO 5658-2, heat release according to ISO 5660-1 and smoke generation and toxicity in the smoke chamber according to ISO 5659-2.

All Bender railway products certified

Approval in accordance with EN 45545 is an essential criterion for railway vehicle manufacturers and their suppliers, as is confirmed by Matthias Rohner, Market Segment Manager Railway at Bender: "The certification is a critical aspect for the operational readiness of components. This is why we placed great importance on achieving certification for all relevant products for railway vehicles in the last few years." These include the ISOMETER® isoRW685W-D insulation monitoring devices and the LINETRAXX® series of residual current monitors. Bender supplies these devices both directly to railway vehicle manufacturers and also to their suppliers, for example manufacturers of inverters and other electrical components. The certification enables the components to be installed in train control cabinets with no additional protective provisions. "Individual considerations that were previously required or additional fire protection enclosures are no longer necessary. This simplifies planning work and saves our customers both time and money," explains Rohner.

Complex tests in Bender's own test laboratory

The certification of the railway products also involves other complex test series. The devices were tested with regard to their response to vibration and shock and their electromagnetic compatibility (EMC) in accordance with standard specifications. Such tests are conducted in Bender's own outstandingly equipped test laboratory in Grünberg, where test specialists have been putting products through their paces to determine their resistance since as early as the 1990s. In the case of the ISOMETER® isoRW685W-D, preliminary considerations with regard to the standard EN 45545 led to a redesign of the ISOMETER®.

Trouble-free certification by TÜV SÜD

Following this change, the certification of the Bender railway products by the technical inspection association TÜV SÜD went as smoothly as expected. The process involved examining the individual parts of each device in various units: approved sub-components, classified materials and distances between other materials all had to be observed, and the remaining combustible

mass defined. For devices without a permanently installed display, the measuring instrument, the separate display and the interconnecting cable were assessed separately.

A new course both in Germany and worldwide

ISOMETER®s and other Bender products are already used in many ICE high-speed trains run throughout Europe by the German railway company Deutsche Bahn. Matthias Rohner is confident that the successful certification of the products according to EN 45545 will open more doors for Bender in its Railway business area. “Fire protection, for example, is a very important topic among sleeper train manufacturers. We can now impress customers in this area by offering even more safety.” Although its validity is spatially limited, the EN 45545 standard is also used as a guideline and reference in many countries far beyond Europe. As a result, Bender’s railway products can also be used safely, reliably and without any problems worldwide.

Gathering speed at a future-proof pace

The certification represents an important step on Bender’s journey towards further establishing itself as a competent and reliable partner for electrical safety in the rail sector. Rohner is also looking beyond this objective and into the future, towards the impending challenges of the energy transition: “We have already come up with innovative solutions for new drive concepts such as battery-operated and hybrid trains. As you would expect, we also offer our customers solutions that are both sustainable and fit for the future, as well as reliably meeting all fire protection requirements in this area.” —

ISOMETER® isoRW685W-D devices monitor the unearthed IT power systems in many ICE high-speed trains run by Deutsche Bahn.

Kim Listmann

Vice President Research & Development

Professional background:
Kim Listmann comes from the German town of Lauterbach. After completing university studies in Mechatronics in Dresden (Germany) and Canada, he went on to receive a doctorate from the TU Darmstadt university in Germany for his thesis on the synchronisation of dynamic systems. He then worked in Germany and Switzerland, including ten years at ABB, where he was involved in the areas of electric mains supplies, robotics and automation technology in the company’s research division. He was most recently responsible for ABB Future Labs, the disruptive innovation centre at the company ABB Schweiz AG. Listmann joined Bender in June 2021.

My electrical safety experience:
I once wanted to repair my electric chainsaw. As you would expect, I first unplugged it, but I forgot about the residual voltage in the capacitor and got a nasty shock. That certainly taught me what electrical safety is all about and above all, how it feels when it is lacking.

Progressing better together

Using old strengths and breaking new ground with trust and independent decisions

Mr Listmann, you've now been working for Bender for a year. How have you settled into the company?
Very well. I previously worked in research for many years and was looking for a challenge that would allow me to make a big impact on a practical level. This is what I've found at Bender. And what's more, the site in Grünberg is located close to my old home town of Lauterbach.

What are your tasks and responsibilities at Bender?
As Vice President Research & Development, I am responsible for product development. In this role, I mainly consider myself to be a coach and communication hub. I bring together people and knowledge, provide ideas and impetus and structure processes so that we can work together to advance our projects.

What does that mean in concrete terms?
Bender has completely restructured its organisation. I want to use the freedoms resulting from this development and establish them as an integral part of our development activities. To this aim, I support my team and help its members to grow into their new tasks and responsibilities.

How are you involved in product development?
I have a multitude of recognised experts in my team, and they know all there is to know about applications, standards, customers and their demands. I use their expertise as a basis and contribute my methodological skills so that we can establish innovation-friendly structures that facilitate a technological transition.

What technological transition do you mean?
The world of electrical safety is changing. Bender has become big with IT systems and mining solutions. These are all based on the idea that a current has to be run through sensors in order to ascertain whether there is a problem or everything is as it should be. This model is currently changing due to new technical possibilities.

And how do they work?
To put it in a nutshell, many aspects that were previously considered to be a challenge in terms of measurement technology will be solved using algorithms and software in the future. This is quicker and easier but also represents a technical paradigm shift that requires us to rethink our approach. Bender has already paved the way for this future, which is why half of my team is already involved in the corresponding software development.

What challenges await Bender in the future?
On the one hand, we are embarking on the technological transition I mentioned before and on the other hand, the world itself is currently undergoing a fundamental transformation. Against this background, securing supply availability is an important issue for companies. In the past, everything was available immediately, whereas nowadays, supply bottlenecks are becoming more and more of a problem for us. As a result, second-source suppliers need to be used to make supply chains more diversified. What's more, we also need to find new approaches in terms of technology.

Do you have an example?
Yes, of course. Let's say we are building a charge controller for a charging station, and a component is unavailable. We can't just turn around and say: "Sorry customer, you'll simply have to wait until we have the part back in stock." Instead, we have to find a different solution that will enable us to meet this need, for example by redesigning the product to achieve the same goal with other technical means. In the future, we therefore need to consider alternatives for our customers as early as during the product development stage.

How do you view Bender's customer structure?
That's a fascinating topic. Bender is actively involved in at least two major customer worlds. One of these contains customers such as hospitals, which need a highly specific device that precisely meets the requirements of a standard and often remains the same for many years. The other world has more and more customers with a completely different dynamic, for example in the field of electric mobility. These customers are exploring innovative approaches and need increasingly rapid solutions. Our development team has to manage the balancing act between these two worlds.

How do you plan to master this task?
By trusting in the competence of my team and working together with its members to develop fast, flexible and above all safe solutions. To achieve this, we also need to grow more in terms of staff numbers, and we want to recruit more than 20 new employees this year alone.

Complete the following sentence: For me, Bender is …
… the opportunity to rethink monitoring systems for electric currents day after day – for availability and safety when using electric energy. —

HOW TO MAKE AN IMPACT!

Thinking electricity further

Insights and outlooks by Dorothea Bender Fernández, Chair of the Bender Group advisory board.

Today, Bender has over 1000 employees worldwide. Given the size of the company, would you still call yourself a family business?
Definitely yes! We are a family business and we want it to stay that way. The most important thing in a family business is not that we all actively work in the company. What matters to us is to pass on a stable and successful company to the next generation. Family businesses think in the long term.

The company keeps growing and growing. Are Bender products so good that they are sort of ripped out of your hands?
Our mission is: Where there is electricity, there is Bender. We live in a world that is becoming more and more electrified. This means that new opportunities are bound to come our way. We hire more developers every year because new areas of application are constantly emerging. If you want to stay ahead in your field, you inevitably have to grow.

Where do you see Bender in ten years' time?
We want to sell networked and intelligent complete solutions that, simply put, tell the customer: „Watch out, something could happen here, take a closer look". That is the field in which we want to develop further. This is already the case with the charging stations, for example. We do everything from the payment system to the guarantee that the electricity flows properly and safely. That's what customers want. —

"I studied electrical engineering. I've been interested in it since I was a teenager. I always thought soldering was cool. It evolved like that. At some point it was clear that I wanted to study electrical engineering."

Dorothea Bender Fernandéz, Chair of the Bender Group advisory board

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info@bender.de
www.bender.de

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BENDER Group

Bender GmbH & Co. KG
Londorfer Str. 65, D-35305 Grünberg
Fon: +49 6401 807-0
info@bender.de
www.bender.de

With its headquarters in Grünberg/Hessen, the BENDER Group has over 70 representative offices and 14 subsidiaries with over 1.100 employees worldwide. Find your regional contact partner at www.bender.de/en.