Perspectives

2/2020

Maillefer stakeholder magazine

MAILLEFER
A Davis·Standard Company

Under the Spotlight

The Opportunities of Change

Aino Huovio

Change is an opportunity to make something great. For all the reasons, 2020 has certainly been a year of change for all of us. When the comfortable daily routines and rules around us no longer apply, we must adapt and force ourselves to find new ways in dealing with the everyday.

This year has been a learning experience in many ways. Maillefer is in a business founded on long-lasting partnerships. It's a pursuit where success depends on active interaction with people; a never-ending quest for new step changers and new solutions. In this year of change, we have proven that the better business systems you have, and the more solid partnerships and networks you build, the easier it becomes to adapt to the new and to continue the path forward.

We have not only adapted the way we efficiently operate our business and globally communicate with our partners. We have also utilized the window of opportunity, which these different circumstances have laid out in front of us. Forcing us to leave our comfort zones has, in many ways, given us the motivation and the challenges to make our minds exercise innovation.

At the moment, Maillefer is experiencing a great flow in creativeness with new breakthrough technology. A few examples of this are presented in this magazine; the new smart monitoring platform enabling efficiency improvements and operation security on the shop floor; our new artificial intelligence products for buffering lines enabling remarkable line auto control; new irrigation tape emitter lines; and a superior manufacturing solution for HV cable joints.

We wish you rewarding reading moments and look forward to the opportunities to discuss them in more detail.

Lars Fagerholm
EVP

About: Perspectives is Maillefer's stakeholder magazine. It is published bi-annually in English, Russian and Chinese. With this magazine, we would like to provide our customers with new perspectives to the Wire & Cable and Pipe & Tube business and production developments.

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Making the issue

Maillefer

Alexander Chamov
Head of Representative Office - CIS
With more than 20 years with the company, Alexander values true relationships with many customers coming from Russia and former Soviet states. He has a PhD from the Moscow Power Engineering Institute and a Master of Arts in International Business. Alexander enjoys exploring new technologies and is open to innovative ideas.

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Rémy Kohler
Sales Manager
Rémy is equally at ease discussing with clients as he is for negotiating turns on the snow-covered trails during his time off. The skills he acquired since first beginning at Maillefer, has earned him the responsibility of managing client accounts. Three years and one K show later, he is ready to travel. Armed with the knowledge of the Pipe & Tube portfolio, Rémy looks forward to expanding his relationships with clients located far from his alpine home.

To Our Customers and Partners

The current pandemic continues to impact how businesses operate. Measures limit interactions. Our lives are impacted daily. After the first wave of cases, we saw encouraging signs toward a return to the norm. Now, an undesirable climb confirms a second onset and leads to uncertainty for what lies ahead. In view of the current situation, Maillefer decided to cancel its participation at the *wire 2020* venue scheduled this December in Düsseldorf.

Safety for all is our first priority. The unforeseeable conditions do not allow us to envision a secure and safe environment for our visitors and our multi-disciplined team. We recognize the considerable safety measures put in place. However, the crisis is in constant evolution. The health risks in the coming future remain unknown.

Maillefer has long anticipated *wire 2020*. Our team has shown growing excitement for this key industry event. Even with a setback in plans, we feel there are opportunities to present and share the latest Maillefer innovations in equipment, process optimization, smart intelligence solutions, and life cycle services. Expect to learn more about these new offerings soon, both through media interaction and through novel face-to-face mini-events.

We believe that innovation and progress will always take precedence. It is expressed through the many ways people choose to meet and interact. We look forward to greeting you again in the very near future.

The Opportunities of Change

The global cable and tube industries have several great opportunities lying ahead, and technology plays a key role in driving them to success. A sustainability-driven society for tomorrow, a path towards renewable energy generation, and fast-growing demand for higher operational efficiencies that are driven by smart technology are all key drivers for how we will build that future success. These drivers are also playing a central role in today's R&D strategy at Maillefer. R&D through partnerships has proven to accelerate results. Today, we are proud to announce that we are actively strengthening our R&D capabilities by doubling our R&D facilities. A new well-equipped laboratory supports our pilot work today as well as responding to customer demands. There are new pilot lines for low voltage applications, metal tape folding, and factory joint manufacturing. A smart process monitoring center, the world's first autonomous secondary coating line, and a quality lab are completing our capabilities to create and serve our partners. Together we are shaping the future.

HVDC Cable Finds a Way Towards Renewable Energy

Alamy.com

Migrating towards renewable energy generation is driving the need for strengthening the distribution grid. Indeed, reliable access to renewable energy relies on multiple generation sources that extend beyond the local level. HVDC cables make the connections between renewable energy sources and the grid that brings power to you.

Green energy from afar

Renewable energy skeptics and critics are quick to point out that without wind there is no wind power. Though this may be true on the local level, there is always wind power available elsewhere. The power grids just need to be strong enough and be properly interconnected to transport the energy from the source to the consumer destination. There's no wind in the Baltic Sea? No problem. The wind farms in the North Sea, the solar power from Spain, or the hydroelectric plants in Norway come to the rescue. As long as there is green energy somewhere across the grid, reliable and constant access to renewable energy is a very viable option.

Riding the German corridor

Lately, huge steps in pushing the renewable power generation agenda forward have been taken in the form of the German Energiewende, where nuclear power plants in the south are being substituted with off-shore wind farms in the north. Big power generation projects are being realized. The latest step has been to plan and procure the energy highways transporting the energy from the north of Germany to the big population centers and industries of the south. The technology of choice is Extra High Voltage Direct Current cables. These so-called corridor cables extend hundreds of kilometers long.

The HVDC difference

What are these HVDC cables? How do they differ from HVAC cables from a manufacturing point of view? Almost all the same elements are found in an HVDC cable as in a familiar HVAC cable; aluminum or copper conductor, triple-layer insulation, metallic moisture barrier, and a plastic jacket for mechanical protection.

The construction appears identical, yet there are significant differences. Manufacturing-wise, segmental conductors are not needed and different insulation material is used which requires different processing conditions. The insulation system with its three layers exhibits major differences compared to AC cables. Here, one strives to minimize the insulation conductivity, where the insulation material behaves differently during the manufacturing process. Those differences must be compensated for during process setup in order to achieve cable quality.

Made on our CV lines

Most corridor cables are insulated on our CV lines. This technology has been used to produce the vast majority of the HVDC cables existing today and will continue to do so in the future. Maillefer's HV know-how and extrusion solutions are helping manufacturers find their way towards a reliable renewable energy future.

Working Hand in Hand for More than 25 years

"Working together since 1993 with Maillefer on manufacturing solutions has allowed us to really understand and develop our capabilities, strengths and capacities, thus allowing Emtelle to become the unrivalled expert in its specialist field and undoubtedly the first high-volume producer in the world of blown fiber tubing". Billy Rae, Chief Operating Officer at Emtelle UK Headquarters, shared his views with us about four years ago. Today, his words never ring clearer, judging by recent news concerning their German operation in Erfurt.

Expansion in Germany

Amid the German government's measures to move towards full-fiber solutions throughout the country, Emtelle GmbH has proceeded with land purchases adjacent to the existing plant, hiring of additional personnel, and the acquisition of additional production capacity. For the later, Maillefer is working hand in hand with Emtelle to supply new state-of-the-art extrusion lines that allow for high-speed, efficient microduct manufacturing at the plant.

The Managing Director of Emtelle GmbH, Ralf Gorontzi speaks about the purchase. "Emtelle has always been driven on delivering the highest quality product and service solutions to our customers across the globe. Our initial investment in the acquisition of Moore GmbH further emphasized our determination to be at the center of the German and European market; but we won't stop there – as the market grows, Emtelle too will grow, and the purchase of the new extrusion lines is a natural progression for the company. It's important that we have the optimum technologies behind our product portfolio to manufacture our solutions in a high-quality way and this machinery from Maillefer allows us to do just that."

Maximum output for premium quality

Philippe Moeschler, Maillefer's VP for Pipe & Tube applications, emphasizes, "We design our extrusion solutions and systems to guarantee perfect stability while processing our customer's products at the highest performance. By supplying such turn-key solutions to Emtelle, a customer who already excels in their manufacturing process, we assist them in expanding the existing range of extrusion lines. We expect to see Emtelle continue maximizing output and delivering premium quality microduct solutions to an ever-demanding market".

This investment comes as part of Emtelle's ever-expanding focus and delivery to the European market. Through continuous development and innovation, Emtelle places itself at the forefront of high-volume production of blown fiber tubing across the globe.

State-Of-The-Art Highlights

/Enter

Enter is a compact quality solution for more sustainable production. It is ideal for those searching for an affordable investment that is easy to start and maintain in different production environments.

New in Cable Solutions

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Longitudinal Tape Forming

The new longitudinal taping technology for aluminium, polyester, woven, non-woven and water-swellable tapes is a smart way to excel in cable quality and to boost sheathing productivity. The technology provides water blocking and mechanical protection for a variety of cable constructions, including high-voltage, fiber optic, and more. Tape application is a vital part of the sheathing process and must be guaranteed fully functional within a production line.

Benefits

- Online efficient and reliable longitudinal taping process
- Possibility to use a variety of tape materials
- Functions with a variety of applications (e.g. high voltage, low voltage and fiber optics)
- Packaged with know-how about tape forming process and tools.

//Extend

Extend is a lean and proven production solution for changing market needs. Its good upgradability and versatile product range guarantee a technical fit for the future.

New in Pipe Solutions

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MPC Puller / Cutter for Medical Tubes

The MPC 14 combines both the pulling and cutting operations into one component. This puller / cutter is ideal for medical extrusion lines producing small diameter flexible tubes. Equipped with a rotating high-speed blade, it cuts tube with a high degree of accuracy and precisely. Depending on the tube produced and its use, desired cut lengths vary from very short sections (e.g. 20 mm) to longer ones (e.g. 4000 mm). Plus, a straight-through feature allows the cutting head to be disengaged when a coiler / reeler is positioned downstream.

Benefits

- Max. tube diameters of up to 14 mm
- Max. line speed 300 m/min.
- Max. cut frequency of 2000/min.
- High speed rotating blade head
- Cut length accuracy of down to ±0.5 mm
- Compact all-in-one unit
- Available as a component and a value package.

///Explore

Explore is the royal road to demanding deliveries with the lowest total cost of ownership. It is a high output solution to explore the market in the front row.

New in Automotive Tube Solutions

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The Multi-Layer Extrusion Head

The ECH 5/50 ML is a versatile multi-layer crosshead for the production of automobile fuel and vapor return tubes. This head is commonly used in a 5- or 6-layer configuration, yet has the flexibility to switch down to a 4, 3, 2, and even a single layer setup. It is available with tooling for downstream corrugation, as well as for a smooth tube. This head features a stripe option too.

The distributors are designed for PA, PA6, PA612, PPA, EVOH, adhesive, PVDF, ETFE, EFEP, HDPE. They fit into each other smoothly and are optimized for easy handling. The head and its trolley support are movable along with a rail frame for fast access and changes to the configuration.

Benefits

- Hundreds of layer combinations
- Rapid layer indexing
- Corrugation, smooth tube, and striping features available
- Convenient connections to the extruder array
- Ease of use for assembly and cleaning.

Multi-Layer Extrusion Head for Corrugated Pipe

Maillefer's multi-layer co-extrusion cell provides the maximum flexibility needed to produce the automotive or technical tubes in demand today, as well as for tomorrow. The key lies at the heart of our five or six single-screw extruder array. The multi-layer ECH 5/50 ML crosshead has the capacity to extrude one, two... up to five, or even six layers. The possibilities explode with tooling adapted for molding the tube into a corrugated one.

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Fit for corrugating

This extrusion head is typically used for the production of smooth tubes found in the vehicle fuel lines, vapor returns, and other technical fluid applications. Certain constructions call for the tube to be corrugated so as to increase flexibility in tight spaces while keeping the integrity of each functional layer. Fortunately, the ECH 5/50 ML adapts nicely to lines that incorporate corrugators. The easy-to-fit corrugation tooling on the head provides a seamless fit to the downstream equipment.

That head's flexibility for corrugated and smooth tubes when combined with the possibility of swapping layer positions is giving manufacturers a multitude of choices. Mathematically, more than a hundred combinations are possible with the five-layer head, while multiples more are possible with the six-layer version and with the corrugation feature. The head accepts materials like PA, PA6, PA612, PPA, EVOH, adhesive, PVDF, ETFE, EFEP, and HDPE. Indeed, the options are nearly limitless.

Designed to capture the opportunities

Allowing operators to prepare for the next product run by optimizing set-up and clean operations at the head makes for faster product changes. The head's indexing feature gives the ability to assign layer positions with a simple twist. Reducing the number of layers to be extruded is possible by employing distributors that block or combine extruder flows. The head has an enhanced design and a trolley support that allow easy removal of parts, which is well appreciated during set-up and cleaning operations. The ease at which a product change is made, may define your ability to capture new market opportunities.

Ability to respond

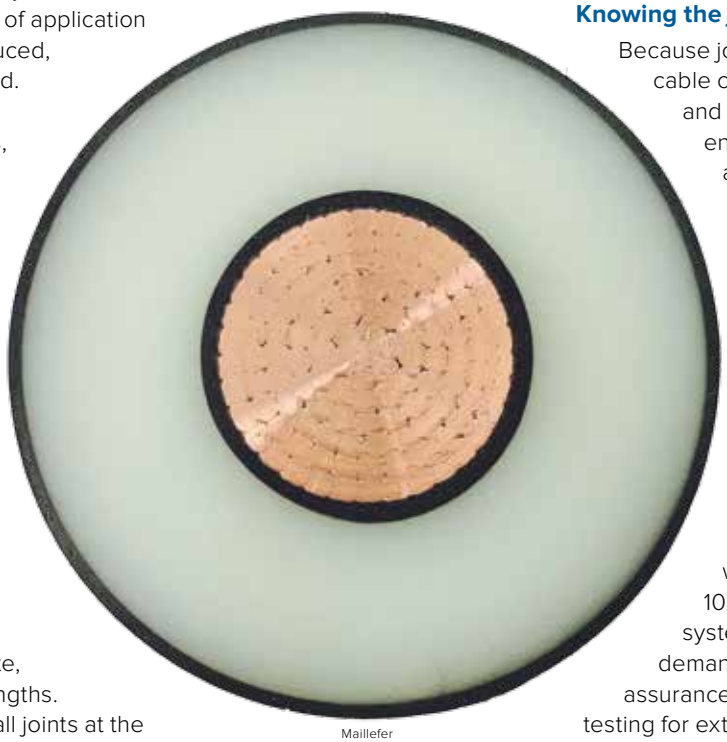
Having options when faced with new requirements coming from the tier 1 suppliers, certainly can play to your advantage. The business in the automotive tube is rapidly changing. Maillefer's automotive extrusion line equipped with corrugation equipment and the multi-purpose ECH 5/50 ML extrusion head helps open up new possibilities.

Key Validation Procedures for Extruded HVDC Cable Joints

Joint connections in any cable system are crucial. Depending on the kind of application and the resulting lengths produced, different joint types are required.

Land cables typically need several premanufactured joints, ready to be installed in the field. The installation length of land cables is limited by the weight of the cable and transport constraints. Cable lengths on land tend to be shorter than in submarine installations.

For submarine cables different factors limit length. They are given by the ability to extrude a quality cable continuously over long periods, as well as the testing and storage capacities. Such factors, under control of the manufacturing site, finally determine installation lengths. Therefore, it is common to install joints at the cable factory itself, using flexible joints (or factory joints).



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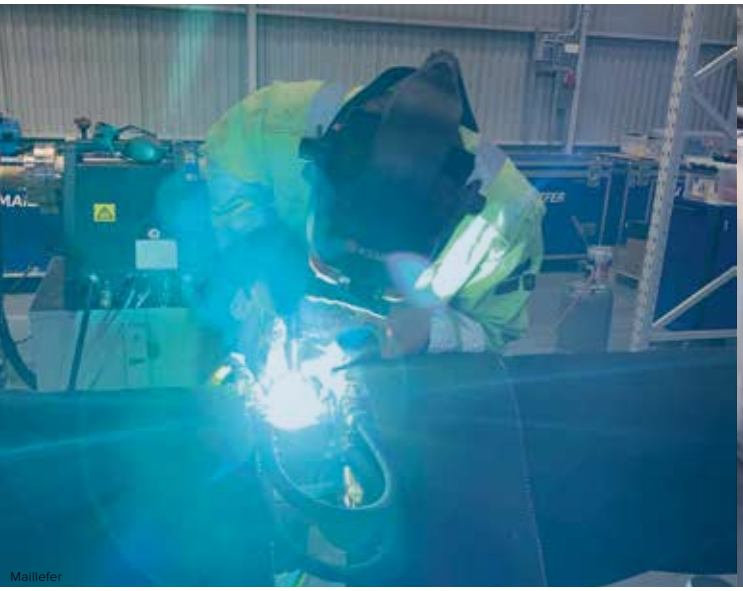
Knowing the joint types

Because joints are a crucial part of cable constructions, their installation, and insulation integrity must be ensured. Design requirements and quality assurance for extruded high voltage AC cables and joints are well established and governed by IEC standards and CIGRE recommendations. For extruded High-voltage DC cable systems, the story is different. Extruded HVDC cables are relatively new technology, with only 20 years of service experience in comparison with the approximately 100 years for paper-oil cable systems. This puts additional demands on design, quality assurance as well as development testing for extruded HVDC cables systems.



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Characterizing the DC requirements

The main difference between AC and DC cable applications is the material parameter governing the electric field distribution in the insulation system. Permittivity controls the electric field for AC, whereas conductivity controls the field for DC. Physical cleanliness (i.e. the number and size of particles in the insulation system) is as important for HVAC as it is for HVDC. A particle will increase the local electric field in the vicinity. Chemical cleanliness, which encompasses peroxide decomposition products, antioxidants, and other additives intended to improve processing, becomes important for DC applications. Any addition tends to augment the conductivity of the insulation.

Characterizing both materials and processes with respect to influence on the conductivity is paramount for the development of HVDC cable systems. For instance, the ability to measure the amount of peroxide decomposition products with HPLC (High Performance Liquid Chromatography) as a result of curing a particular material and linking this to measurements of the conductivity is a powerful skill. It provides information both on the insulation material used for the joint as well as the curing procedures and the need for degassing that follows.

Launching New HVDC Factory Joint Packages

Maillefer has developed multiple technology packages for extruded XLPE insulated HVAC and HVDC subsea cable factory joints over the years. We offer factory joint technology packages for different voltage ranges, starting from 66kV AC inter-array cables to 245kV AC export cables up to 420kV AC interconnection cables. We have now launched similar packages also for 320kV DC and 525kV DC cables.

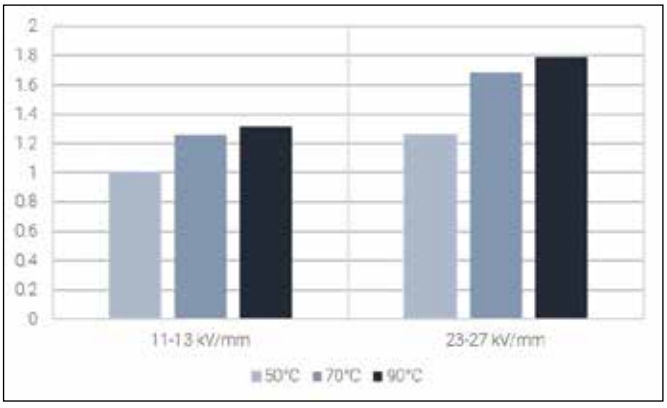

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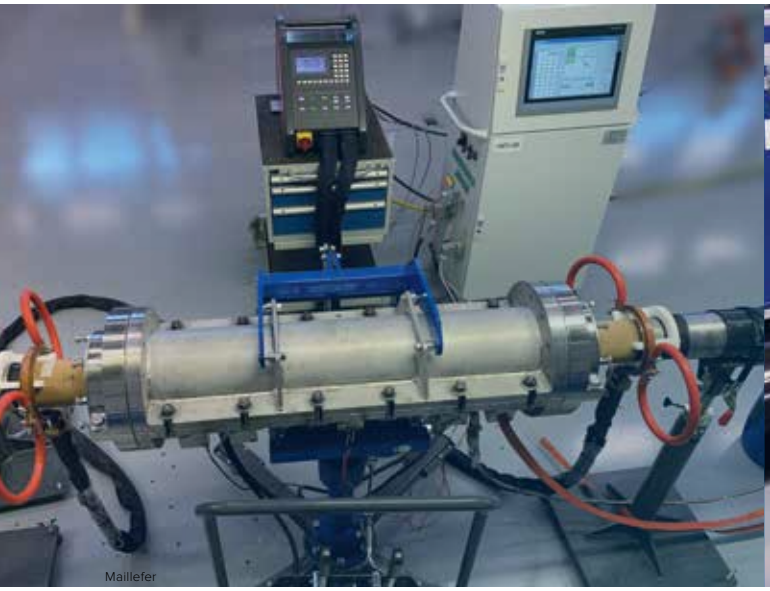
Fig. Relative conductivity in an extruded cable.

We provide comprehensive factory joint technology packages that consist of:

- Training course: theoretical training (3 days) from joint design to manufacturing process and hands-on in-depth jointing techniques training (starting from 10 days).
- Special equipment: welding machine, peeling tools, jointing cleanroom, state-of-the-art mobile vulcanizing chamber (MVC) and mobile degassing chamber (MDC).
- Curing calculation software (JCC) and degassing calculations dedicated for factory joints.
- Consumables: insulation XLPE and semi-conductive tapes, etc.
- Jointing services: manufacturing of factory joints, e.g. 525kV DC joint for T-T or PQ.



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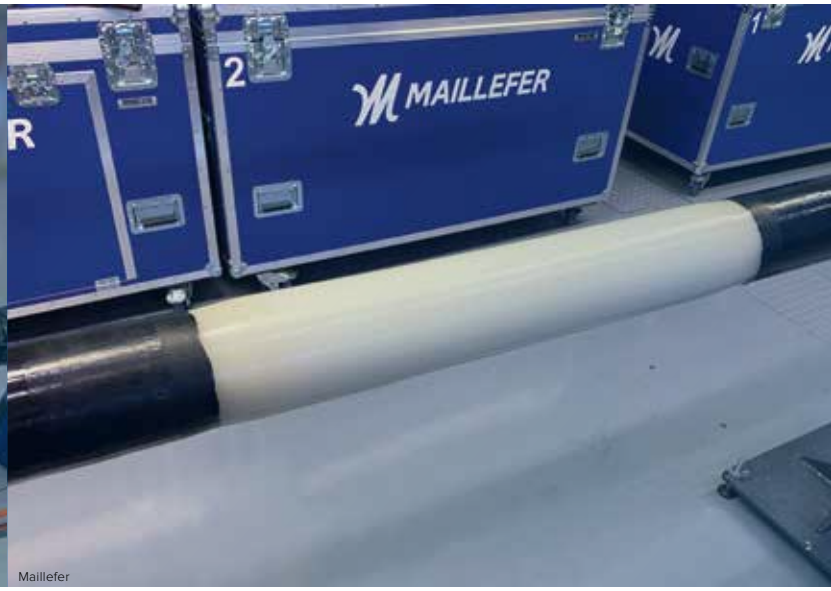

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Tape Completes the Picture

A tape emitter line for manufacturing irrigation laterals is available from Maillefer. The PIL032-TT ///Explore line completes our portfolio for micro-drip irrigation extrusion systems. With it, the full range of needs for smart water usage in agriculture, horticulture and landscaping is covered. Each of the tape line's components is entirely specified, sourced and fully integrated by our dedicated interdisciplinary team.

Ability to respond

"We are extremely pleased to have a tape line included into our program", states Thierry de La Harpe, Irrigation Product Manager at Maillefer. "It broadens our ability to respond to the variety of irrigation demands coming from all around the globe. The tape has the advantage of being a cost-competitive thin-wall construction which is ideal for closely spaced seasonal crops."

"Single-use laterals mean that plastic consumption costs during production must be kept at a minimum," continues Mr. de La Harpe. "Plus tape relies on the continuous extrusion of the emitter profile as the lateral is produced, rather than depending on injection molded emitters with their specific set of sourcing and manufacturing requirements. In other words, material economy, supply flexibility and drip spacing are determinant factors when considering tape technology."

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Know-how from the start

Maillefer's irrigation portfolio is backed up by a dedicated team having strong interdisciplinary skills. They exhibit the responsiveness requested by customers looking for the best fitting micro-drip solution. Consultation services may even include computer modeling, simulation and iterative improvement cycles in order to optimize how emitters flow and how finished laterals function in the field.

Flexibility in every type of drip

Maillefer's tape line is engineered to produce DN 12 to 36 PE laterals with wall thickness ranging from 0.13 to 0.40 mm. It includes options to add identifying stripes and has adjustable drip spacing features. Specific components include the upstream tape extrusion and labyrinth rotomold in tandem with a single layer tube extrusion section, followed by a mechanical slitter and a fully automatic dual reeler. The slitter operates at up to 3 000 cycles per minute to access drip pools positioned at regular predetermined intervals. The user-friendly production line is easy to operate. Start-up mechanisms and functions ensure repeatable product quality, every time.

A complete portfolio

Maillefer provides extrusion lines for a variety of applications. Our entire micro-drip irrigation portfolio covers thin and heavy wall constructions, single to triple layers, use of recyclable material, options for striping and skin coloring, flat and round emitters, and various tape emitter designs.

A New Dynamic R&D Platform Offers Success

Maillefer

It has been six years since we began promoting activities in our R&D Center. We have welcomed hundreds of customer visits coming from all branches of the Wire & Cable industry. At the same time, we have heavily invested into the laboratory facilities to help make those visits most productive. Our main goal to create a dynamic development platform for different W&C applications continues.

The R&D Center is open for our customers, material suppliers and other stakeholders who want to explore the manufacturing limits in a real production environment. Development projects move quicker when one can test the production limits and make an analysis immediately afterwards. The R&D cycle is significantly accelerated. We have observed that offering both efficient test and measurement resources creates a spiral of innovation and success. Therefore, we have decided to expand our R&D Center and offer new areas of exploration.

New R&D platform

Application areas for R&D collaboration:

- The unique vertical pilot line for HV and EHV cables with inline dosing capabilities
- High speed buffering line with artificial intelligence based process control
- Test platform for manufacturing flexible factory joints (both AC and DC) up to 525 kV
- Extruder laboratory (60 mm, 80 mm, 120 mm)
- LV jacketing line with taping accessories
- State of the art laboratory for analyzing the test runs.

Together towards innovation

Collaboration helps reduce the costs associated with innovation by removing research and development from its traditional isolated silos. Working in collaboration with partners from the supply chain allows an organization to leverage shared resources and to drive innovation forward. The financial risk associated with such projects is shared by multiple parties. Simultaneously, the quality and quantity aspects of collaborative innovation mentioned above have the potential to create higher top-line revenue performance.

Smart Buffering Brings Production to New Levels

The productivity of optical cable manufacturing can increase with higher line speeds. However, the higher speeds call for more precise process control. The manufacturing process contains several parameters that the line operator controls during the production. The state of the process is both controlled and estimated by process parameter adjustments and observations.

Sensor data is difficult for humans to analyse in detail, especially in real-time during production. Interpreting the sensor data is difficult due to complex interactions throughout the manufacturing process. Also, the wear and tear of equipment causes drift in absolute sensor values. The ideal process state window, originally defined by process sensor values, shifts over time.

We have developed an Artificial Intelligence based automated process assistant (patent pending) that analyzes the buffering process in real-time and is able to optimize the process automatically during production.

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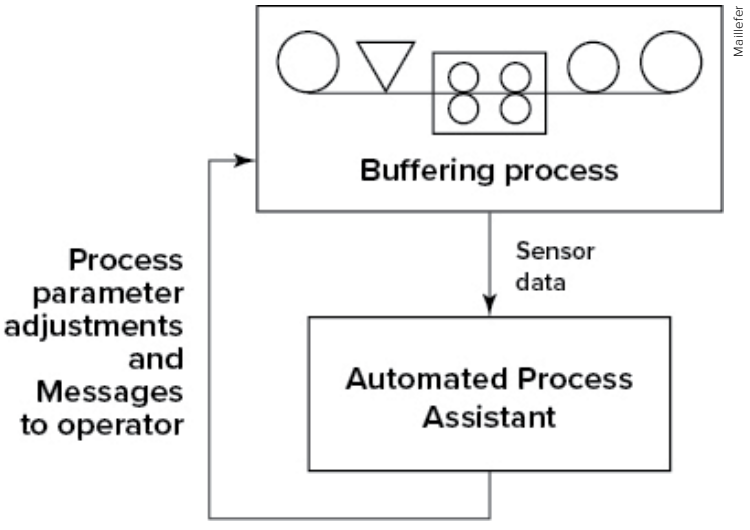
Our Smart Buffering process assistant uses stream processing to process the raw sensor data into information. It then utilizes that information together with process state models and quality prediction models to control the clinching and the buffering process.



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We have successfully applied the Smart Buffering process assistant to a secondary coating line's buffering process running at 800 m/min with dry PP product. Abnormal process conditions, such as coupling and slipping, easily led to inferior end-quality products. Smart Buffering detects such abnormal situations and optimizes the process back to a quality production state.

The automated process assistant removes the "gut-feeling" of knowing good process parameter values. Instead, the automated process assistant system automatically adjusts the process parameters until the sensor values correspond to those expected by the internal process models.

Automated feedback based process adjustment leads to a more predictable operation of the line, which eventually leads to a more stable process and better end-quality for the product. Finally, the result is improved production efficiency and considerable material savings.

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Expertise from humans remains essential. Their knowledge is invaluable when operating the AI system and handling all the abnormal situations, such as wear and tear of machinery, material abnormalities, etc. Human knowledge is also required to initialize the system after line maintenance.

The Smart Buffering system signals the need to perform line maintenance when detecting a process that cannot be fully optimized. In these cases, the system generates a list of items to check before further line operation.

The end-quality feedback mechanism optimizes the process to a desired EFL target value. In order for the system to operate at full potential, the end-quality feedback mechanism must rely on external information about measured end-quality of produced reels. This can be only done by skilled professionals.

The automated process monitoring and process assistant guidance leads to more stable process and better product end-quality. It monitors the process constantly and allows the line to produce at full potential. Smart Buffering is an invaluable tool that leverages the buffering line's operation and efficiency to new levels.

Benefits

- Good and stable end product quality
- Reduced scrap and improved productivity
- Constant monitoring and automatic control
- Operator feedback and guidance
- Downtime is reduced.

Factory Optimization by SimFactory

Are you interested in developing your cable production facility? Do you struggle to achieve process performance targets? Are product lead-times, utilization rates, or overall efficiency in need of improvement? Do you have a vision to enable new business by a production expansion? Do you face challenges in evaluating the feasibility of equipment investments or new arrangements in the production? Maillefer's SimFactory may provide the answers to your questions and more.

SimFactory is a comprehensive toolbox that helps find ways to improve your production and earn more. It is based on a systematic optimization process and 3D plant simulation software. Simulation mimics the behavior of a defined system and is based on a model that describes the system at an appropriate level of detail.

Maillefer has developed a simulation platform with a specific configuration considering the needs of cable manufacturing. It allows flexibility in the means of production principles, for example, bulk vs. individual or push vs. pull production control. Every process and resource is modeled with real parameters. They can be monitored for productivity, efficiency, cost, etc.

Simulation is used today in many industries, especially in the unit goods industries and serial production. Many of the leading companies in the world do not implement production improvements without first running simulations. Tests and simulations in a stress-free virtual environment help to identify the possible issues and needed improvements before costly implementation.

DMAIC in action

Our optimization process is built on the well-accepted Lean Six Sigma road map called DMAIC (Define, Measure, Analyze, Improve and Control). DMAIC is a data-driven improvement discipline for improving, optimizing, and stabilizing of business or production processes and designs. Every successful development project is based on good teamwork. Therefore the team pools together experts from both customers and Maillefer. This generates the kind of commitment needed to succeed from key persons participating in the process.

The Define phase sets the scope of the project, identifying what specifically needs to be improved and why. During the Measure phase, data is gathered, all processes mapped and an intelligent model defined in the 3D plant simulation software. After this, the right metrics (eg. lead-time, quality, utilization, etc.) are chosen and the plant initial capability is measured. The calculations use the standard deviation of the measurements compared to the specification limits. Well preparing these first two phases enables the best results during the following steps.

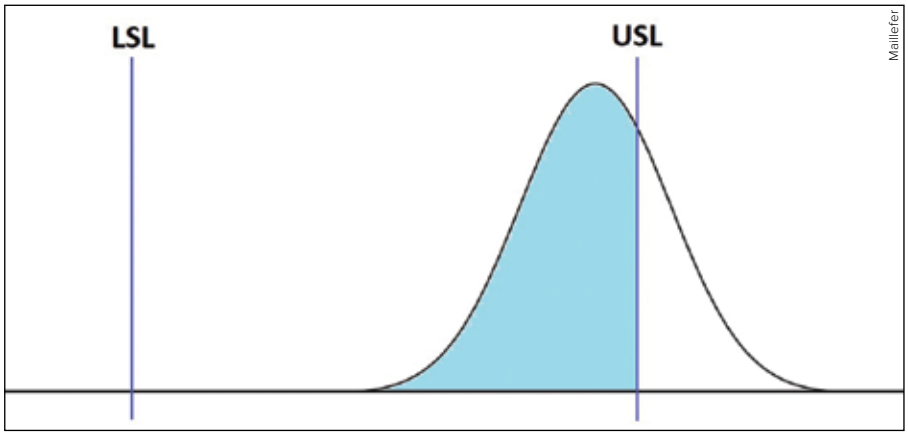

Figure 1: Example of plant initial capability. The process main metric (eg. lead-time, quality, utilization, etc.) is out of range of defined LSL (Lower Specification Limit) and USL (Upper Specification Limit)

Analysis	Metric	Description
BUFFER RATE	Buffer Rate	Discovery of bottle-necks
OEE	Availability	Planned production time vs. actual production time
	Performance	Line speed [m/min]
	Quality	Defects [/cable km]
LEAD TIME VARIATION	-	Comparison of lead times
VALUE-WASTE	-	Value-waste chart

The Analyze phase serves to identify the potential for improvement through dynamic 3D plant simulation that uses input parameters and a chosen production plan. Metrics reveal problems and inefficiency, like bottlenecks that prevent your manufacturing capacity from performing optimally.

The simulation is an iterative process involving multiple steps. It is run by adding constraints and complexity step-by-step. This way the current state is gradually analyzed. The target is to find the processes where there is unused potential and which will benefit most of the improvements.
During the Improve phase, the improvements are introduced to the simulation model and the metrics are used to indicate the results. All potential for possible upgrades and replacements are considered.

After the bottleneck process is found, the production flow can be improved within the limits of processes upstream and downstream. When the improvements in flow are insufficient, equipment needs to be modernized, replaced, or increased. The plant improved capability is defined with simulation verified results. At the end of this phase, Maillefer delivers a report including current state analysis, before and after scenarios, and a comprehensive optimization plan that details short-term and long-term improvement actions.

The final Control phase includes one or two follow-up workshops. The first takes place within two years after delivering the report. The recommended actions taken are reviewed and the results verified against expectations.

Maillefer accompanies clients in continued improvement cycles through further reviews, new scenarios, and updated simulations with fresh results. It is through tools like the SimFactory that you can best focus your efforts towards the continued optimization of your factory.

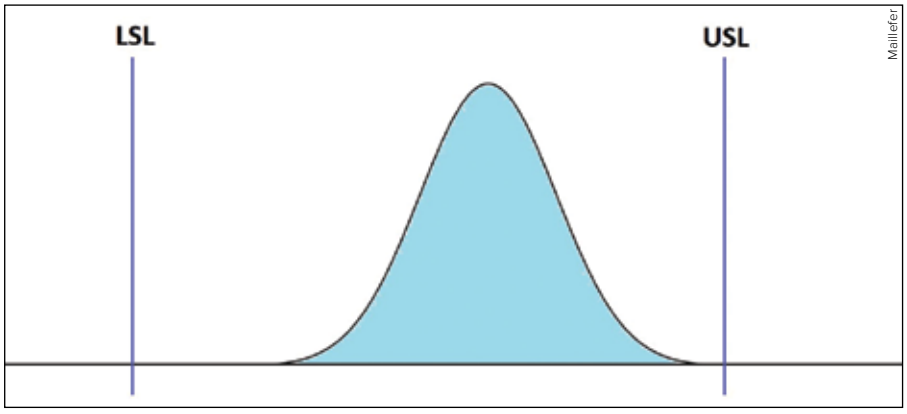

Figure 2: Example of plant improved capability. The process main metric (eg. lead-time, quality, utilization, etc.) is in the range of the LSL (Lower Specification Limit) and USL (Upper Specification Limit)

Improvement Level	Metric	Improvement
Process Level	Line speed	Process/Machine upgrade
	Fail rate	Process/Machine upgrade
Logistical Level	Number or personnel	Correct number of personnel
	Number of trucks	Correct amount of trucks
	Storage sizes	Optimized storages sizes in layout
	Locations	Optimized locations in layout
Production Planning Level	Production scheduling	Optimized scheduling procedure
	Production overlapping	Correct overlapping sequence
	Batch sizes	Production in balance

Getting Proof from Irrigation Piloting

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Consultation manifests itself in many shapes and sizes. This time it's about proving finished irrigation products thanks to a pilot line at Maillefer's facility. It is yet another example of how Maillefer is more than a classic equipment provider. Know-how, value, and relationships extend beyond hardware in each and every Consultation case.

Drip emitters make a strategic difference

Most manufacturers of micro-drip irrigation laterals rely on exclusive access to drip emitter technology and proprietary flow designs. There are two dominant technologies on the market for micro-drip laterals, emitters formed into extruded tape or individual ones made via injection molding.

Whether tape or injection molded, the choice on emitter type means more or less independence from outside sources. Both types remain the key component to control the water flow out of a lateral. A successful flow design is often protected intellectual property, veiled in secrecy, subject to licensing, and tightly controlled by those who own it. As a provider of extrusion solutions for the full range of micro-drip laterals, Maillefer facilitates access to the technology for its customers.

Accelerated by pilot tests

Our micro-drip irrigation pilot line offers sufficient flexibility to produce a variety of micro-drip irrigation laterals and is configurable for a variety of emitter formats. We collaborate with market players that come from the micro-drip lateral side or the emitter side of the industry. Both benefit from the advantages of having access to Maillefer's resources to advance with their development projects.

Proven flow to success

In this particular consultation case, a producer of thin-wall laterals identified a business opportunity to start promoting the tape solution in his geographical market area. Maillefer assisted by providing the extrusion capacity fitted with rotomold technology, and with consultation services for proving the customer's initial flow design. After several process tuning iterations, which involved profile redesigns with advice from experts, computer simulations, and multiple trials, the laterals were proven to meet top quality expectations. The satisfied customer got the industrialized production line that he was looking for. Plus, Maillefer's team of specialists had given him the needed support to achieve an optimum tape lateral that incorporated his own design.

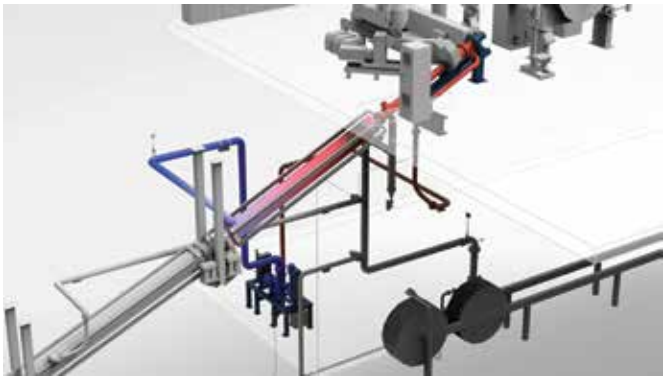
Another case involves an important producer of quality injected molded parts for different industries. They recognized micro-drip irrigation as a breakthrough innovation and immediately began working on their own emitter designs. Maillefer provided them with the testing grounds during several cycles of development. Each visit to our plant brought this customer closer to a unique emitter product that offers plenty of benefits to the end-user. Laterals produced on our pilot line and fitted with these emitters were then proven on our in-house flow tester. More than 10 visits later, the produced laterals moved from testing at Maillefer to field tests. The partnership formed through these consultation services allows this injection molding company to accelerate into the future of micro-drip irrigation.

Relationships that withstand time

Calling upon an outside source to get expertise represents a courageous and visionary step. Customers have shown their loyalty to us for years, some even for decades. We back up our services with NDAs when necessary. Consultation strengthens those bonds that lead to success, together as partners in the extrusion world.

Performance Review Services

For more than 50 years, Maillefer has delivered, commissioned, and provided machinery and services for over 4 000 production lines globally. Thanks to our users who have allowed us to develop the production processes, provide innovative solutions, and improve maintenance practices over time. Today we offer the accumulated knowledge and experience through various Consultation services to all our Wire & Cables and Pipe & Tube customers. One of these Consultation products is *Performance Review Services.*



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What do we offer

Performance Review Services is the right tool to find out the bottlenecks and improvement potential in your production lines. Based on a comprehensive study and detailed analysis of the current situation, we provide a detailed action plan on how to improve and establish the best performance and to reach your targets. Here are the four different product offerings within this family of services:

1. Line Equipment Assessment (LEA) focuses on maintenance and availability
2. Technical Inspection (TI) targets equipment condition and reliability
3. Process Survey (PS) looks at the process and product quality
4. Line Performance Review (LPR) evaluates the equipment and process performance.

Your Benefits

The immediate effects with this combination of services include:

- A better understanding of the actual situation and how to improve it
- Increased productivity after implementation of agreed actions
- Savings in material and resource usage
- Technical understanding of the line condition and its needs for upgrading and maintenance.

Today global companies are making strategic moves concerning factories with their individual product offerings and capacities. In many cases, certain sites specialize in specific cable types. This may result in an increased need for capacity, which then requires a balancing of equipment between their global locations. In these kinds of situations, when you need to understand the limitations and opportunities of your existing lines, the Performance Review Services offers you the decisive answers.

Recent Market Example

The Prysmian Group, the world's largest company providing Wire & Cable solutions to customers around the globe, saw the need to move capacity from one factory to another inside Spain. Prysmian's technology leader, Carlalberto Ferrari, contacted us to help him plan and determine resources for this challenging line move. The co-operation worked smoothly and after a few weeks of preparation on both sides, it was time for a site inspection. The aim was to check the true condition of the line and to confirm the required technology and parts for the move. Only then could the real work begin.

Mr. Ferrari gives us an update in the midst of the installation, "The work with Maillefer has been going very well... they have really supported us with valuable knowledge and information that is needed when you plan to move production lines".

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Picture 1. The team from Maillefer and Prysmian inspecting the site

Like Prysmian, you may be considering a series of upgrades or for an important shift in line capacity. What are your plans? Contact Maillefer Services for a tailor-made support package that fits your needs.

Stay Smart with Smart Monitoring

Data gathering and data monitoring is a clear trend in the process industry. It is the way to truly know what is happening in the line in real time as well as having all the background data stored for future use. Smart Monitoring gives you many benefits and a leading edge with your end customers.

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The Concept

Maillefer is offering a unique opportunity with this new smart product, where customers begin real-time monitoring of the performance of entire production lines or certain machines within a line. This monitoring can be the key process parameters from one line or from several lines producing the same quality, even lines from different suppliers. There is also clearly a market need to monitor certain quality related parameters. In this case, various measurement gauges are connected for real-time data collection, storage, and analysis to secure end quality.

Manufacturing Floor Data

Within the Smart Monitoring family, Manufacturing Floor Data is the first of the two different product offerings. This product stores relevant data tags (i.e. data fields) from production for an unlimited time. You can assign tags to a Maillefer line, another supplier's line or any machine or smart sensor. The goal is to make data available to analyze whenever needed. The storage is basically unlimited yet determined by disk capacity and a wise backup strategy. The analysis tool is the familiar Historian Client, where tools for Trending, Reporting and direct Query of the data are included. You may choose

Illustration of various possibilities

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A tailored home page for your needs

to collect either the standard 500 tags or opt for a bigger package of 5000 tags. The standard is well suited for cases where you need to gather certain quality related parameters from all lines and you have similar measurement gauges (e.g. diameter gauges). When you are dealing with bigger, more complex lines having multiple parameters (e.g. a full energy cable production line), selecting 5000 tags would be a wiser choice.

Manufacturing Floor Excellence

This second package offers powerful analysis and accelerated decision making features. The highly visual, informative and custom-tailored dashboards bring a wider understanding into the manufacturing process. Its introductory configurations offer easy solutions for management and production personnel. It also includes machinery maintenance functions through Preventive Maintenance. Indeed, a PM module integrates the maintenance tasks schedule, descriptions, and engineering documents. Personnel get direct access to the right information to oversee and realize maintenance jobs.

With Manufacturing Floor Excellence your maintenance team is kept up-to-date about the tasks in the production line for all components. They are able to easily plan their activities weeks ahead for the next production shutdown. You are provided with access rights for modifying and adding tasks that you know are vital for certain machines and where you need to guarantee long term operation.

Future Offerings

Maillefer is constantly increasing the amount of intelligence available for its production lines. With Smart Monitoring, user understanding increases. It becomes faster and easier to make the right decisions about changes in operations and processing. Smart Monitoring offers the tools to maximize line output while minimizing scrap and material usage. The system goes beyond usual line sensors to include vital readings coming from other sources like vibration, temperature, and power consumption gauges, plus more. All this relative information feeds into Smart Monitoring seamlessly, thus allowing this tool to extend and evolve with you and in the years to come. Join Maillefer as we step into a new era of monitoring to help you reveal the true potential of your production equipment.

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Dashboard listing maintenance schedule for several lines

Master Your Potential

Stop by our booth at any of the events or follow us at blog.maillefer.net

Date	Exhibition	Location	Type
2021			
March 25th - 27th	Wire India	Mumbai	W&C
April 13th - 16th	Chinaplas	Shenzen	P&T
May 10th - 13th	Interwire	Atlanta	W&C
May 17th - 21st	NPE	Orlando	P&T
June 2nd - 5th	Plast Expo	Morocco	P&T
June 8th - 11th	Wire Russia	Moscow	W&C
June 28th - July 1st	DKT IRC	Nürnberg	P&T
September 22nd - 24th	Wire Southeast Asia	Bangkok	W&C
October 5th - 7th	Wire South America	Sao Paolo	W&C
October 31st - Nov 3rd	IWCS	Orlando	W&C
December 6th - 10th	Irrigation Show	Long Beach	P&T

Due to the COVID-19 pandemic, exhibition organizers may decide to postpone or cancel their event. Please refer to their respective websites for the most up-to-date information and check our events schedule at www.maillefer.net.

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