



komax

RAILWAY

WIRE PROCESSING & TESTING

RAILWAY

AUTOMATING RAIL CABLE PRODUCTION: MEETING DEMAND AND DELIVERING QUALITY

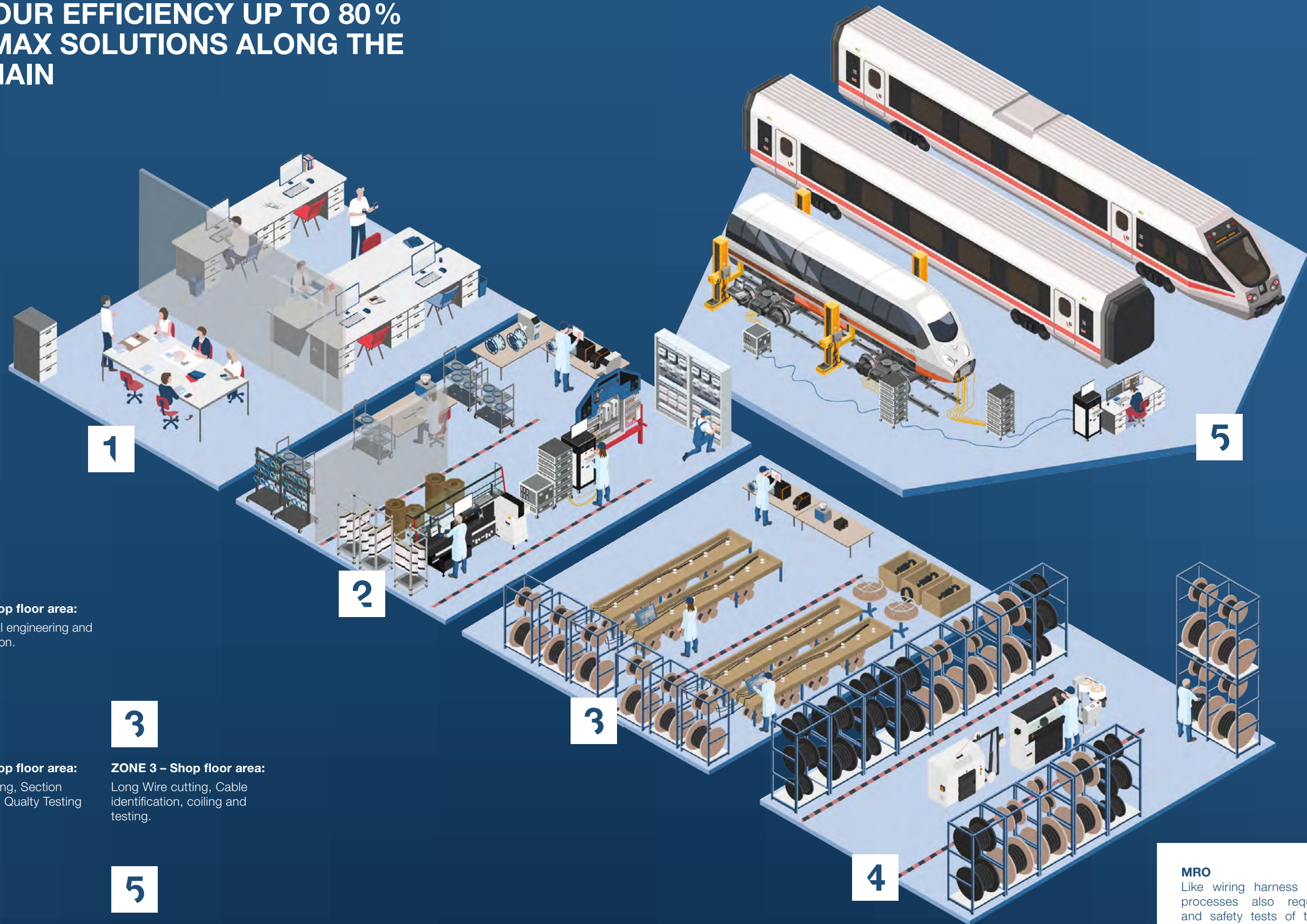
The rail industry is automating wire harness production to address skilled-labor shortages, rising freight and passenger demand, and stricter traceability requirements. As diesel fleets convert to low-emission drives and lines are electrified, more cables must be produced to tight deadlines – while safety, comfort, and connectivity features demand ever-higher manufacturing quality.

Automation solves these challenges at once, boosting productivity, ensuring consistent quality, and enabling production to return to the region. Digitalized preparation and automated wire production – for

example in cabinet wiring – save up to 64% time for batch size 1, and up to 80% in serial production. Modular, interconnected production clusters scale this automation across the entire value chain, even for High Mix Low Volume production.

In-line quality checks embedded throughout the process ensure “quality at the first go”, reducing rework and unit costs, with full traceability for warranty and audit purposes. Looking ahead, machine learning will further optimize production parameters – paving the way toward self-regulating smart factories for the rail industry.

BOOST YOUR EFFICIENCY UP TO 80 % WITH KOMAX SOLUTIONS ALONG THE VALUE CHAIN



1

ZONE 1 – Shop floor area:
Harness digital engineering and
data preparation.

2

ZONE 2 – Shop floor area:
Cabinet Building, Section
Assembly and Quality Testing

3

ZONE 3 – Shop floor area:
Long Wire cutting, Cable
identification, coiling and
testing.

3

4

ZONE 4 – Shop floor area:
Large Gauge Wire & Cable
processing.

5

ZONE 5 – Final assembly:
Electrical system installation
and quality testing.

4

5

MRO

Like wiring harness production, all MRO processes also require final functional and safety tests of the electrical system. Software-based test programs enable automated quality assurance with archived results documentation for traceability.

ZONE 1



HARNESS DIGITAL ENGINEERING AND DATA PREPARATION

Smart Factory Solutions connect the digital harness design directly to the production machine – with no manual re-entry, no data loss, and no ramp-up delay. From the first ECAD drawing to the first physical unit produced, data flows seamlessly through engineering, preparation, and manufacturing. This digital thread ensures that what is designed is exactly what gets built – accurately, efficiently, and right from piece one.



**A design that reaches the machine
without modification is a design that
was done right the first time.**



Digital Harness Engineering

Digital Harness Engineering is the starting point of the digital thread. Komax collaborates with leading ECAD providers – including E3.series, EPLAN, WSCAD, IGE+XAO, SPACAutomazione, and Aucotec – to ensure harness designs are created in a format that machines can directly understand and process. By connecting wire and cable processing machines and testing solutions via standard interfaces such as OPC-UA, Komax removes the traditional gap between engineering and production, laying the foundation for a fully digital, machine-ready design from the very beginning.

Manufacturing Data Preparation

WIRE Mind is the bridge that turns validated harness designs into production-ready manufacturing data. It enables fast, automated data preparation between any ECAD system and Komax wire and cable processing machines – eliminating

manual transcription and reducing time-to-production. Through flexibility, automation, and full integration, WIRE Mind takes the engineering output and converts it directly into machine instructions, so production can begin immediately after design release, with no interpretation loss between the digital plan and the physical machine.

Production Planning & Monitoring

4Wire|CAO takes the prepared data the final step: onto the machine and through production. It delivers order planning, process control, and full production traceability across cutting, lead preparation, preassembly, and final assembly. By managing the entire production flow digitally, 4Wire|CAO increases efficiency, ensures quality assurance, and creates full transparency – ensuring that the design loaded onto the machine is executed correctly and consistently, from the very first unit produced onward.

ZONE 2

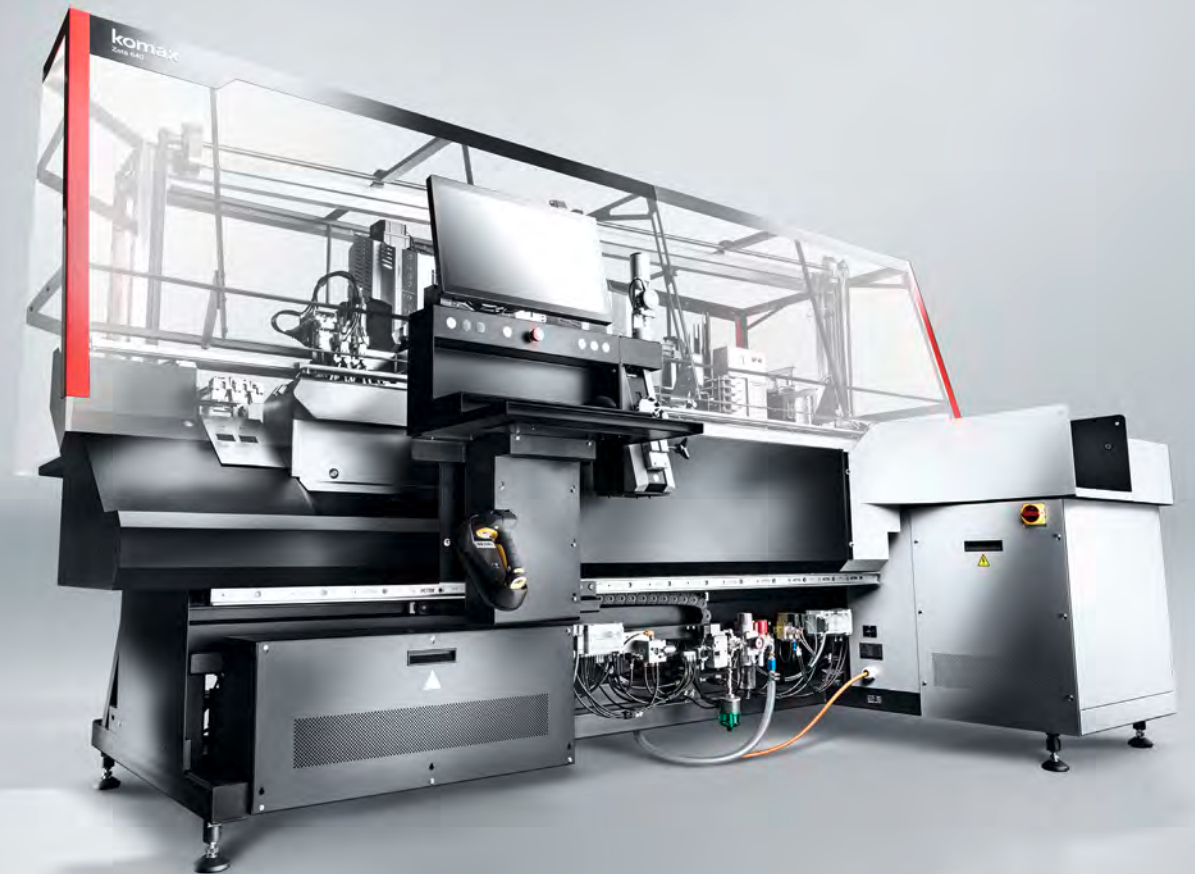
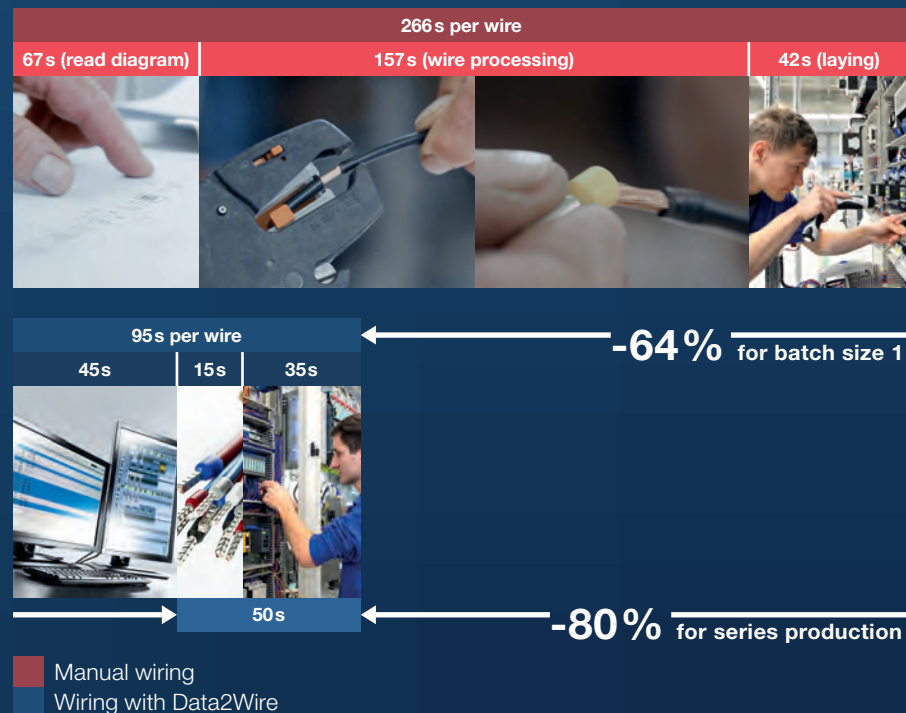


CABINET BUILDING, SECTION ASSEMBLY AND QUALITY TESTING

From fully automated laser stripping to precise contact crimping, this portfolio covers the full range of wire harness production needs. The Komax Zeta 640 delivers up to 70 % time savings through automation, while versatile wire strippers handle everything from multi-core jackets to shield cutting. Semi-automatic cut & strip systems bring the next level of automation with integrated wire ID marking, and reliable crimping solutions ensure consistent, high-quality terminations. Together, these technologies enable efficient, flexible, and future-ready wire processing across a wide range of applications.

WIRE Mind: Up to 80 % Faster Cabinet Wiring

Wire Mind digitizes cabinet data preparation and wire processing, cutting time from 266 to 95 seconds per wire – a 64 % savings for batch size 1. In series production, savings reach 80 %, since a “digital wire” only needs to be created once in the Wire Mind system, not repeated for every unit.



Komax Zeta 640: Up to 70 % Time Savings in Wire Harness Production

Automating wire harness production with the Komax Zeta 640 delivers major benefits for rail cable assemblers facing tight delivery deadlines. Available in various configurations with different modules, the Zeta 640 adapts to customer-specific requirements – automatically cutting, stripping, and preparing wires so harnesses

are ready faster, cutting wiring time by 30–70% depending on wire count per cabinet. Less material sitting idle means more production space and higher throughput. Quality improves too: 3D drawings, digital production flow, and automated wire printing shrink error margins, speeding up final checks – delivering shorter lead times and reliable quality.



01 The bundler sorts and binds the batches in a single process step.
02 Parallel processing set with 3 shuttles for top performance.



ILC Bench Top for demanding applications

The ILC Bench Top is a versatile solution for demanding applications such as stripping complex cable constructions or out of round wires and cables. Coaxial cables with dielectric or multilayer outer jacket made of composite material are just one example. Creating stripping windows as well as the longitudinal slit function of the ILC BTS version simplify the removal of the insulation of these cables and wires. Once loaded, stripping programs can be selected repeatedly via a menu or by a barcode scan. The stripping program starts automatically when the cable is inserted.



▲ High-precision stripping of a wide range of even the most demanding cable types.



Strip Series B300: Precision Stripping for Safety-Critical Rail Applications

For rail applications where signal and power transmission must withstand vibration, temperature fluctuations, and strict regulatory requirements, the Strip Series B300 delivers unmatched quality control. Combining Automatic Conductor Detection (ACD) and Adaptive Incision Control (AIC), it monitors every cut in real time, flagging any contact with the inner conductor or deviation from cutting depth – ensuring reproducible quality from the very first cut. AIC's automatic teach mode eliminates manual programming when switching wire types, compensating for diameter tolerances to reduce scrap and training time. Available in four models – Core, Plus, Pro, and Ultra – the B300 scales to fit any production requirement, with Ultra purpose-built for the most demanding, safety-critical environments.



▲ A glance at the display of the Schleuniger Strip Series B300 with Adaptive Conductor Detection (ACD) and Adaptive Incision Control (AIC) enabled.



Semiautomatic stripping of stranded, multi-conductor, coaxial and optical fibre cables

The programmable tools of the series B240, B440 and B540 have been developed for stripping as well as for longitudinal, cross and window slitting of special cables with a cross-section of 0.05 – 70 mm² and a maximum diameter of 12 mm. Three rotating blades also prove themselves on insulation such as Kapton and silicone as well as PUR, PVC, rubber, Teflon®, Tefzel® and textile glass braiding. For a pull-off length of up to 50 mm, the B440 cuts linear or perpendicular to the wire axis. Because the blades, centering jaws and gripper jaws can be used universally, there is no need to retool when changing wire types.

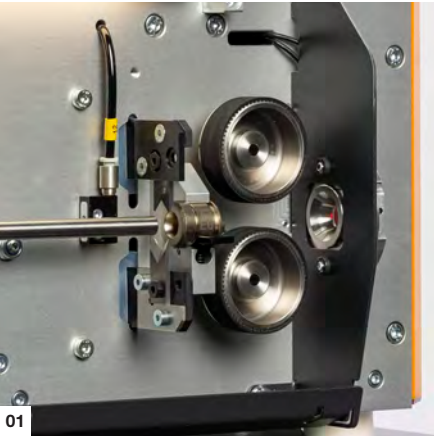
Strip Series B200: Entry-Level Wire Stripping for Railway Applications

The Strip Series B200 is the ideal entry-level solution for railway wire harness production, delivering fast, reliable stripping with minimal setup effort. Designed for simplicity, robustness, and mobility, it enables operators to work efficiently without prior programming knowledge – all parameters are adjusted manually via rotary knobs. Its lightweight, compact design allows flexible deployment directly at the workstation, wherever it's needed on the production line. With ergonomic activation via sensor or foot pedal, the B200 supports fast changeovers and consistent quality, making it a dependable choice for railway manufacturers seeking an accessible entry into automated wire processing.

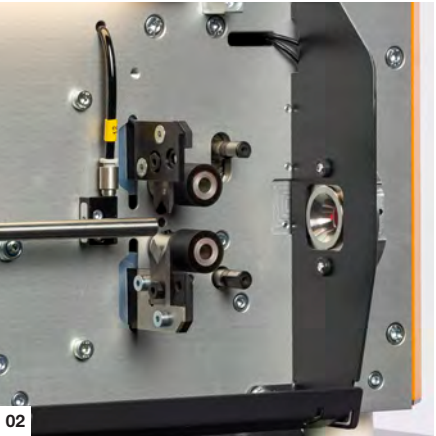


Cut & Strip Family E300: Strong and Fast for Reliable Railway Production

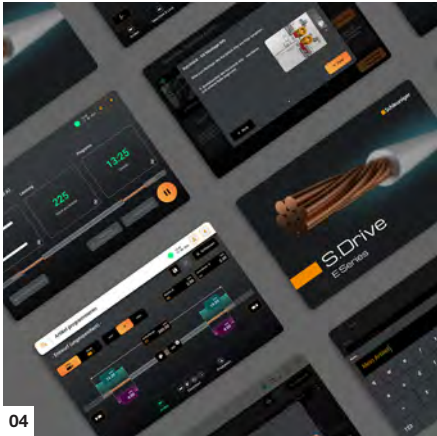
The Cut & Strip Family E300 combines high performance with outstanding process reliability, making it a strong choice for railway wire harness production. Its intuitive touchscreen interface simplifies job creation and reduces setup time, while predefined, verified parameters ensure fast, dependable results — even for operators with limited experience. The “Quick-Run Mode” enables production to start within just a few clicks, supporting efficient changeovers on demanding production lines. Built for speed and consistency, the E300 helps railway manufacturers maintain high throughput and process stability, while remaining compatible with tooling from its proven predecessor model.



01 | 02
Different feed belts and coatings of the rollers ensure optimum transport of the cables. The contact pressure on the feeding unit is programmable. The E300 is equipped with a two-in-one quick-change feeding unit suitable for roller drives, including a short piece kit for the processing of short cables.



03



04

03
The E300 cut & strip machine can be combined with many peripherals to form an automatic processing line. Existing Schleuniger peripherals are compatible.

04
Minimal training effort and extremely short commissioning thanks to S.Drive software.

Crimping Machine CR 03: Precise and Flexible Crimping

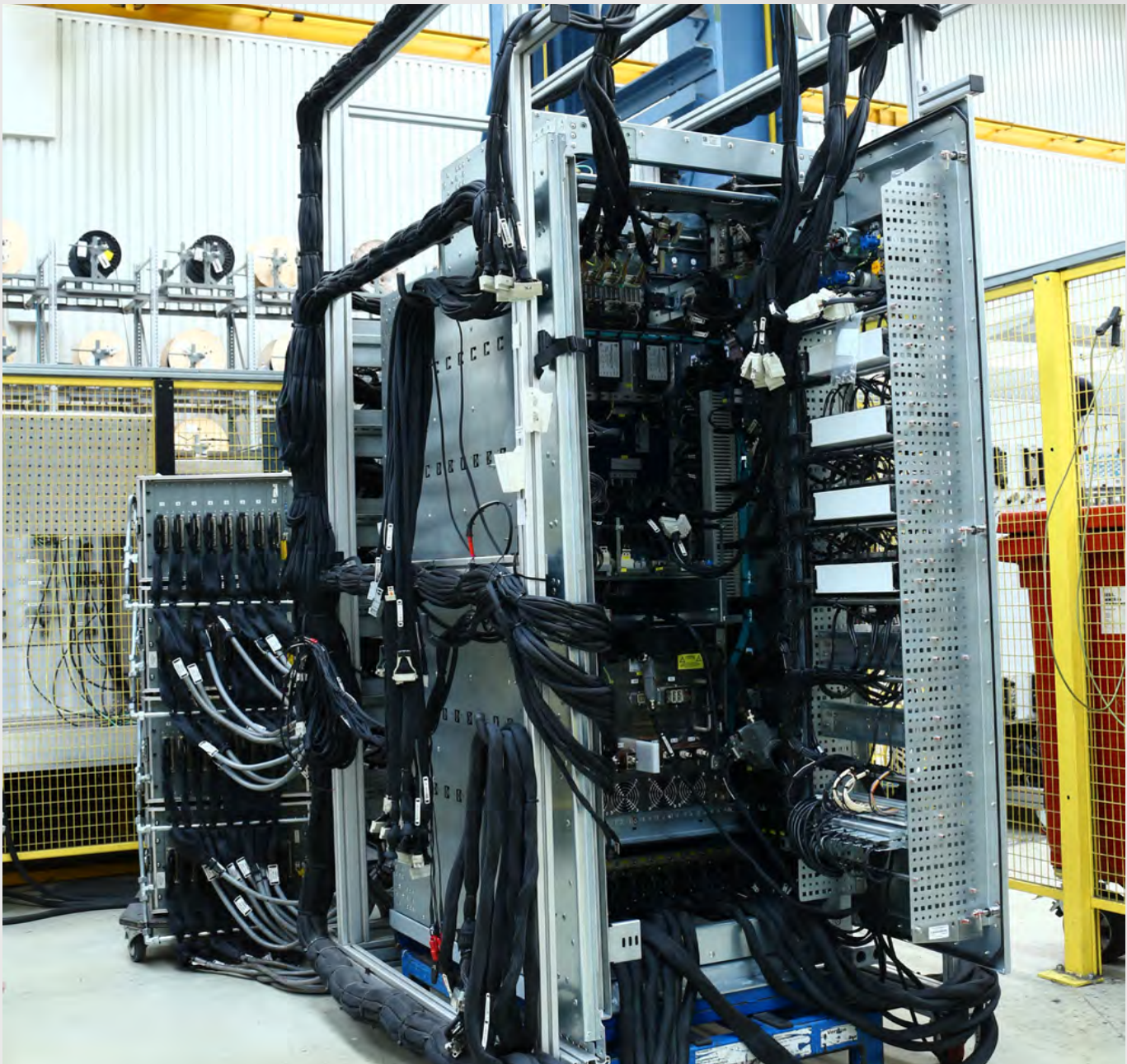
The CR 03 is a versatile, electropneumatically driven crimping solution designed for processing loose turned contacts. Easily adaptable through interchangeable tool kits, it accommodates a wide range of contact types while ensuring consistent, high-quality crimps. Foot switch activation enables straightforward operation, and optional crimp force monitoring adds an extra layer of process reliability for demanding production environments.



NT 700 – NT 600's big brother

The NT 700 enables continuity, short-circuit and component tests in higher test voltage ranges than the NT 600 (see page 31), such as low voltages up to 250 VDC or dielectric strengths up to 6,000 VDC / 5,000 VAC. In addition, it offers features such as the insulation test up to 6,000 VDC, the high current connection test up to 2 ADC and the protective conductor up to 25 AAC.

The function test also allows active components of the test item to be controlled/activated. The modular NT 700 can be expanded in many ways. To gain important insights, the NT 700 can be connected to a database to centrally manage and evaluate the result logs.



OWP03 Test Probe: Fully Documented Open Wire Testing

The OWP03 test probe from adaptronic ensures reliable, fully documented testing of open wire ends and terminals in control cabinets and switchboards. Operating personnel benefit from intuitive, mobile handling thanks to simple display and control elements built into the handle housing, plus integrated work area lighting. Two interchangeable test probes allow checks on both wire ends simultaneously. All results—wire information, connection points, and precise measurements—are documented in the integrated NT Control software, with wiring lists imported directly for intelligent program creation. On request, test solutions can be digitalized end-to-end, loading data directly from the planning tool onto the tester.



ZONE 3



LONG WIRE CUTTING, CABLE IDENTIFICATION, COILING AND TESTING

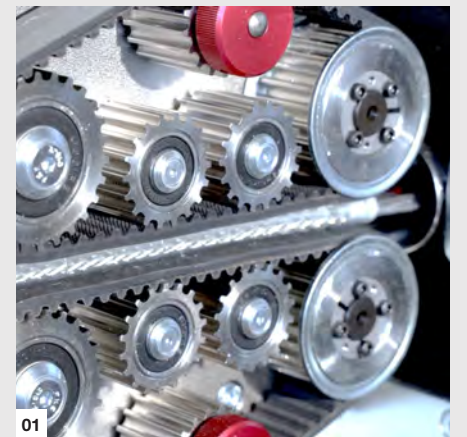
Rail cable production demands precision, flexibility, and reduced manual effort at every stage – from processing large-diameter cables to identification, coiling, connectorization, and final testing. The following overview highlights solutions engineered to meet these exact challenges: enabling high-precision cutting and stripping for demanding cable cross-sections, eliminating coiling downtime, and ensuring reliable, fully documented testing – including cables terminated with connectors where required. Thorough in-line testing is essential at this stage, as wiring errors that go undetected here are typically only discovered during final testing once the train is assembled and the cables are already installed. At that point, correcting even a single fault can take anywhere from 3 hours to 3 days, disrupting production schedules and adding unplanned cost. Together, these technologies reduce manual processes while maintaining the flexibility required to meet tight rail industry deadlines and strict quality and safety standards throughout production.

Every untested cable is a bet on the final test. Lose it, and a five-minute fix becomes a three-day delay.



PowerStrip 9580: High-Precision Cut & Strip for Demanding Rail Applications

For rail cable production requiring maximum reliability across large wire cross-sections and complex multiconductor applications, the PowerStrip 9580 delivers high-precision, high-output processing – handling stranded wires up to 70 mm² (2/0 AWG) and shielded cables with ease. The modular, retrofittable design adapts to changing production requirements, while the SmartBlade system enables blade cartridge changeovers within seconds. The optional SmartDetect quality monitoring system checks the entire stripping process in real time, detecting any contact with the inner conductor to prevent defective cables reaching the end product – critical for rail's demanding safety and reliability standards. Toolless guide changeovers and intuitive operation ensure fast, flexible production without compromising quality.

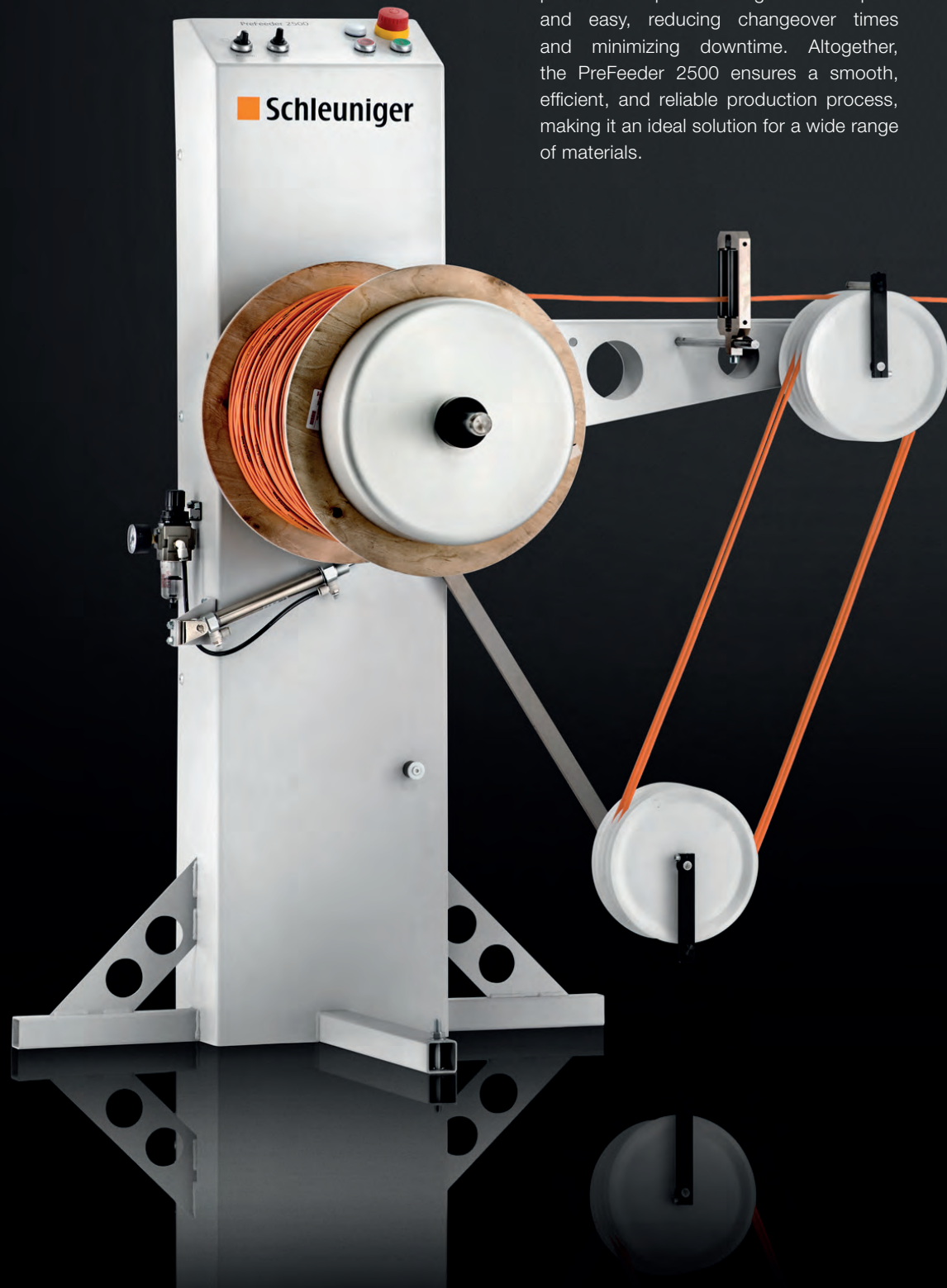


01
Quick Feed Rates Ensure High
Production Output

02
Quick and Toolless Changeovers for
Reduced Downtime

PreFeeder 2500 – Gentle Material Feeding Made Easy

The PreFeeder 2500 is the perfect accessory for feeding wire, cable, and tubing smoothly into downstream processing machines. Its variable feeding speed keeps stress on the material to a minimum, enabling downstream units to achieve the highest possible processing precision. Spool changes are quick and easy, reducing changeover times and minimizing downtime. Altogether, the PreFeeder 2500 ensures a smooth, efficient, and reliable production process, making it an ideal solution for a wide range of materials.



CableCoiler 1300: Zero-Downtime Coiling for Maximum Efficiency

The CableCoiler 1300 fully synchronizes with cut and strip machines, coiling round cables up to 12 mm in diameter across two separate stations. While one coil is unloaded, the other continues coiling – eliminating downtime entirely. Flexible coiling diameters (110 – 230 mm) and weights up to 10 kg support diverse production needs. Easy touchscreen operation and minimal changeover settings make even small batch sizes productive, boosting throughput without compromising simplicity.





The Iota 330 is a universal cutting machine that precisely cuts endless products – including shrink-fit tubes, compressed-air tubes, wires, and plastic straps – up to lengths of 1000 m.



The JacketStrip 8400 automatically strips jackets or insulation from a wide range of cables – from thin, round cables to difficult-to-process power cables – with an outer diameter of up to 26 mm (1 inch).

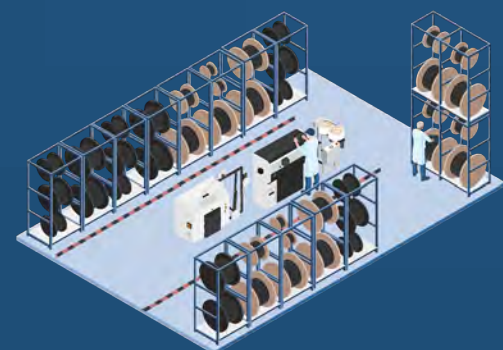


The Z+F CR03 offers precise 4/8-indent crimping of turned contacts, covering a wire gauge range from 0.08 – 6 mm² (28–10 AWG).



The 8100 is a practical, capable wire harness tester with small, compact, non-intrusive units that expand to match your required number of test points. Easy-Wire software enables fast, efficient test setup.

ZONE 4



LARGE GAUGE WIRE & CABLE PROCESSING

Processing large-gauge cables reliably starts with efficient spool handling and smooth material flow. A complete large-gauge cable and wire processing line combines heavy-duty storage racks, robust feeding, precise cutting and stripping, and reliable coiling – ensuring smooth, high-volume production even with the heaviest spools and largest cable diameters used in rail applications.

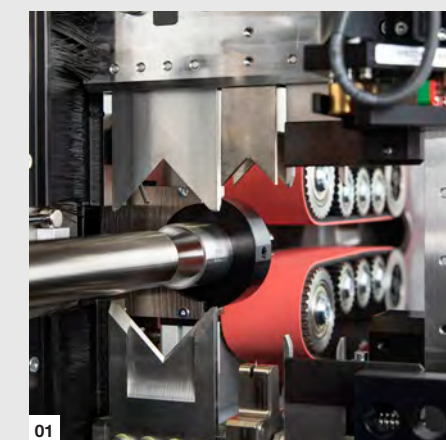
Automating every touchpoint between spool and coil turns large-gauge cable handling from a manual bottleneck into a continuous, reliable flow.



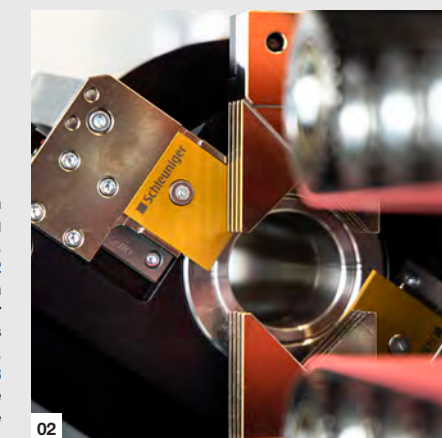
MegaStrip 9680: Maximum Flexibility for Large-Diameter Rail Cables

The MegaStrip 9680 offers an exceptional processing range for larger-diameter cables common in rail applications, with two configurations: the M version featuring a freely programmable indexing multiblade head, and the MR version adding a rotary cutting unit for precise shield cutting. The SmartBlade system enables quick

changeovers via exchangeable cartridges, while the optional SmartDetect quality monitoring system ensures reliable, waste-minimizing production. Powerful servomotors, toolless guide changeovers, and an intuitive S.ON interface with extensive preset libraries maximize output and simplify programming – supporting the demanding, high-mix production needs of rail cable harness manufacturing.



01



02



03

01 High-precision cutting unit with SmartDetect quality-monitoring system.

02 The rotary cutting unit is based on cutting-edge Schleuniger RX technology and enables maximum precision.

03 Modular interfaces for an extensive range of accessories and the connection of peripherals.



Installed Rack

The installed rack provides centralized, stationary storage for large cable drums, keeping multiple spools organized and readily accessible for continuous production. This fixed configuration minimizes spool handling time, keeps the production floor organized, and ensures a steady, uninterrupted material supply to downstream cutting and processing equipment --ideal for high-volume environments with consistent production needs.

EFFICIENT MATERIAL FLOW FOR LARGE-GAUGE CABLE PRODUCTION

Mobile Rack: For Small Spools

The mobile rack offers a flexible, space-saving storage solution for smaller cable spools. Mounted on casters, it can easily be repositioned around the production floor to match changing workflow needs, making it ideal for facilities with limited fixed floor space or frequently changing product mixes. Its compact, multi-tier design keeps materials close at hand while maintaining an organized workspace, supporting fast changeovers without the footprint of a permanent installation.

Cable Cut & Wire End Processing

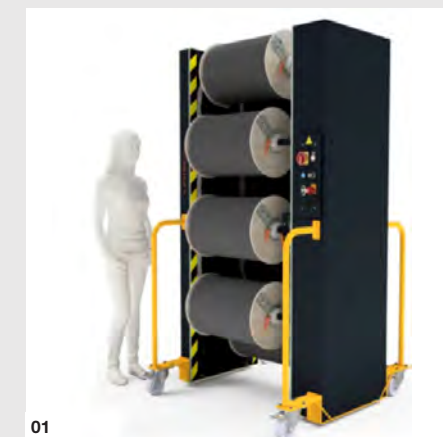
This stage delivers high-precision cutting and end processing for large-gauge cables, ensuring accurate, repeatable results across a wide range of applications. Designed for demanding production environments, it combines speed and precision to keep pace with the large-diameter cables typical of rail cable harness production without compromising on quality or consistency.

Pre Feeder: For Heavy Spools

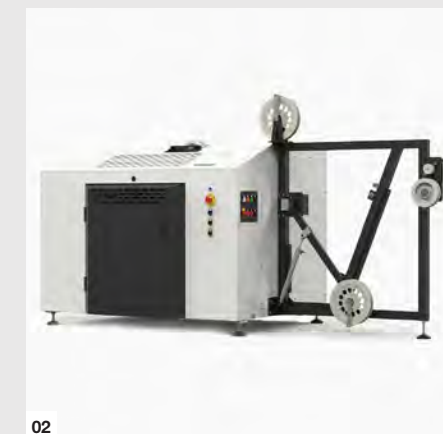
The pre feeder ensures smooth, consistent material delivery from heavy cable spools directly to the processing machine. Built to handle large, heavy reels without manual pulling, it keeps production running at a steady, reliable pace. By automating the delivery of large-gauge cable, the pre feeder reduces manual handling, prevents cable damage, and supports uninterrupted downstream processing.

Coiling and Tying

The final stage neatly coils and ties finished cables, preparing them for storage, transport, or further assembly. Synchronized with the cutting and processing equipment, this step ensures a smooth, uninterrupted production flow while delivering well-organized, ready-to-use cable coils reducing manual finishing work and supporting efficient, high-throughput production of large-gauge rail cables.



01



02



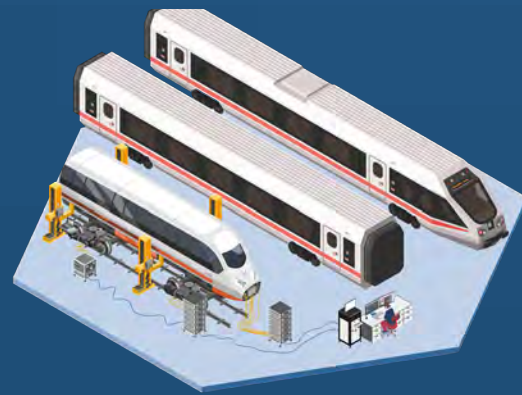
03



04

01
Mobile Rack
02
Example: the PreFeeder 4850
03
Example: the MegaStrip 9680
04
Example: the CableCoiler 1450

ZONE 5



ELECTRICAL SYSTEM INSTALLATION AND QUALITY TESTING

As rail vehicles become increasingly complex, thorough electrical system testing is essential to ensure safety, reliability, and compliance before coaches enter service. Whether validating new builds or overhauled vehicles, efficient final testing helps reduce production time and lower costs while maintaining the highest quality standards. Scalable test solutions adapt to vehicles of any size, minimizing cabling complexity and simplifying setup on the shop floor. From initial assembly checks to comprehensive end-of-line testing, a well-designed testing approach supports faster turnaround times, greater flexibility, and long-term confidence in the electrical integrity of rail vehicles throughout their operational life.

NT 800 turns complex, large-scale cable testing into a scalable, single-platform solution – cutting adapter cabling by up to 60% while meeting the highest standards of safety and quality.



NT 800 is a universal test system for cable and electrical assembly testing. With its high-voltage capability up to 5000 VAC / 6000 VDC, the system meets the requirements of EN 50155 & EN 50343 and is therefore suitable for applications with increased electrical safety and quality demands. NT 800 combines compliance, flexibility, and efficiency within a single system platform.

Four factors reduce the costs of series production:

The high degree of automation during test program creation, the space saving due to the miniaturized hardware as well as the reduced number of adapter cables and their length by up to 70%.

NT 800 the solution for large test objects

The NT 800 test system meets the special requirements for test environments of very large unit under tests (UUTs) during pre-assembly and final assembly in accordance with standards. The test system consists of a central base unit with control software and measurement electronics as well as several TPUs (Test Point Units) for off-site test points. The NT 800 is highly scalable thanks to its modular design and wide variety of application-specific plug-and-play test interfaces.



NT 800 with Active Termination Adapters (ATA)

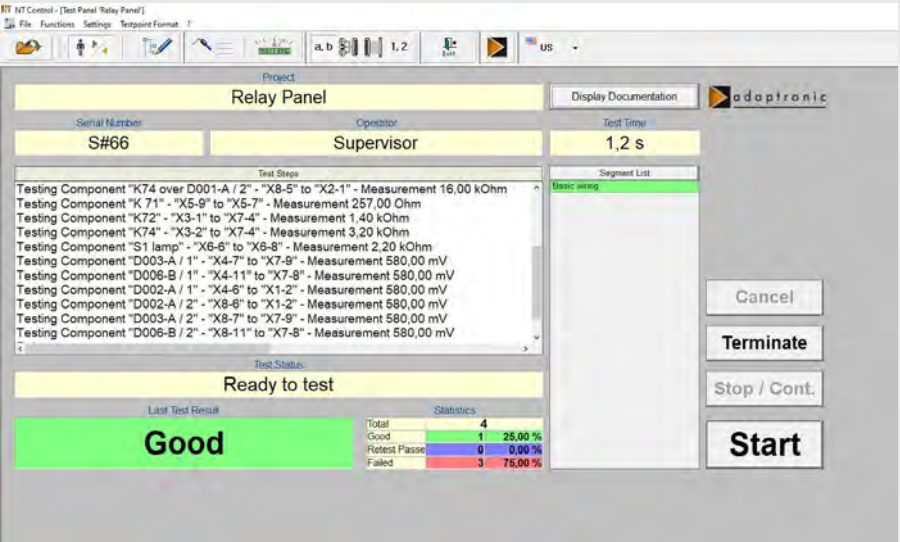
The NT 800 test system can be equipped with Active Termination Adapters (ATA). These significantly reduce the number of required adapter cables by enabling flexible and intelligent signal termination directly at UUT Cable.

This solution results a reduction of required adapter cables by up to approximately 60 %, significantly lowering costs due less system complexity and setup times, while increasing overall flexibility and efficiency of the test setup.



Control of NT systems for quality assurance

The NT series test systems are predestined for application-specific function and safety tests of wiring and assemblies in the rail industry. They have already proven themselves thousands of times. A wide variety of test applications, including individual ones, are operated and programmed via an intuitive user interface. Existing test programs and CAD data in third-party systems can be converted and applied. The NT Control software also offers multimeter and pin probe functions. Meaningful error history lists and detailed error displays help the operator to locate and correct errors easily and quickly. The final test report can of course be adapted depending on the content and layout!





MRO

MAINTENANCE, REPAIR AND OVERHAUL (MRO)

Maintenance, repair, and overhaul (MRO) of electrical systems play a critical role in keeping rail vehicles safe, reliable, and in service throughout their operational lifetime. As trains age and components require inspection or replacement, having the right combination of manual, semi-automatic, and mobile testing solutions ensures repairs are carried out efficiently without compromising quality. Because MRO environments often involve lower volumes and highly variable tasks compared to new production, flexibility and portability are essential. From routine inspections to in-depth diagnostics, effective wire processing and testing solutions help MRO centers minimize vehicle downtime while maintaining the highest standards of safety and traceability.



KT236 the lightweight and mobile wiring tester

Extremely robust, mobile and flexible in stand-alone operation, the KT236 supports quality assurance with up to 512 freely selectable test point interfaces. Simple and multilingual, the device manages all test programs and provides meaningful result reports for continuity, short-circuit, component and up to 1.000 VDC insulation resistance testing.



NT 600 – the modular tabletop tester

The NT 600 modular wiring tester enables the user-friendly editors to adapt the test programs in the NT Control software to the requirements of the respective continuity, short-circuit or component test.

The tester can perform high voltage tests up to 1,500 VDC and dielectric tests up to 1,060 VAC. Thanks to its modularity, the test points can be expanded from 1,024 in the NT 600 basic unit to up to 5,120.



OWP – Open Wire Probe

The OWP probe enables the measurement of open wire ends and connections in control cabinets, control panels and in pre-assembled wire bundles.

Using the test probe, the system logs all line information and connection points together with all measurement results, such as the continuity and component test (switches, resistors, diodes) or AC/DC voltage measurement.

NT control editors for customizing link lists and components as well as data import of open wires from wiring lists make OWP easy to integrate into any test sequence. An info screen guides the operator through the respective test steps.



KOMAX GROUP SERVICES

THE BEST EQUIPMENT DESERVES
THE BEST SERVICE

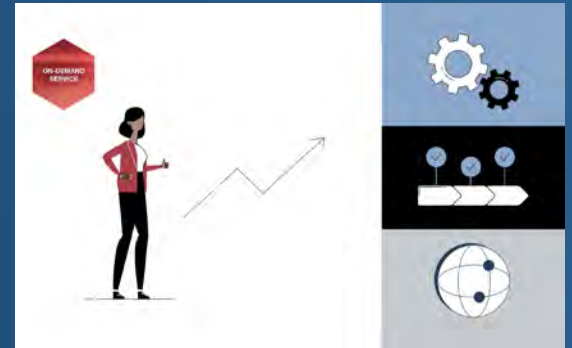
CARE Service Agreements

Our CARE Service Agreements are attractive service packages tailored to your maintenance and service demands, offering scheduled annual checkups and comprehensive support. With yearly inspections, calibrations, and maintenance services provided by our technicians as well as warranty extension and educational services for your operating and technical personnel, your technology assets are set for longevity and flawless production.



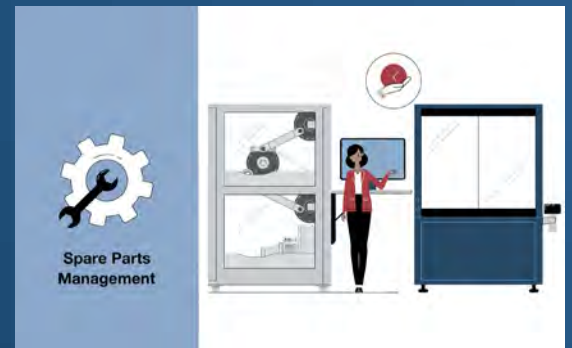
ON-DEMAND Services

Our ON-DEMAND services are tailored to meet the needs of our customers and are designed to support flawless, uninterrupted production with consistently high-quality results. Our service technicians assist you in your daily operations, making the setup of new machines, asset maintenance, and even relocations and emergencies hassle-free.



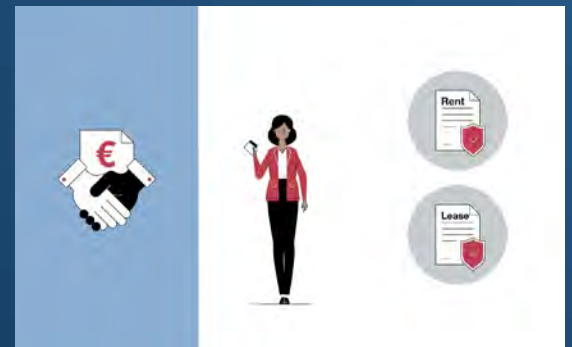
Original Parts Services

Using original wear and spare parts for your technology assets ensures high compatibility and longevity of your machines, resulting in flawless, uninterrupted production of high-quality output. To ensure that your Komax Group assets are maintained with the exact original parts they need, we offer our Original Parts Service.



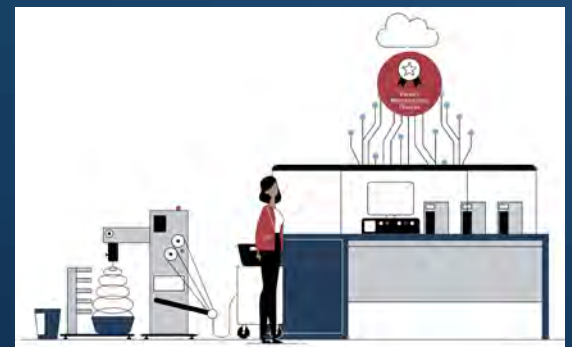
Financial Services

Having the latest technology, a diverse equipment mix for automated wire production, and custom assets can give you a competitive edge. We support your investment in the future by offering financial services, including payment options such as leasing in cooperation with Siemens Financing Services or any other local provider.



Digital Services

Our technology is IoT-ready and comes with DIGITAL SERVICES that provides insights and control over your machines, systems, and production data. With the annual licensing your applications are always up-to-date. Getting real-time production data statistics and alerts when standard deviate have never been easier.



WELCOME TO THE KOMAX GROUP

komax

 **Schleuniger**

 **adaptronic**

CIRRIS

Di.IT

 **HOSVER**

WUSTEC

Komax – leading the field now and in the future

As a pioneer and market leader in automated wire processing, Komax provides its customers with innovative solutions. Komax manufactures series and customer-specific machinery, catering to every degree of automation and customization. Its range of quality tools, test systems, and intelligent software and networking solutions complete the portfolio, and ensure safe, flexible, and efficient production.

Komax is a globally active Swiss company with highly qualified employees and development and production facilities on several continents. It provides local support to customers worldwide through its unique sales and service network and offers services that help them get the most out of their investments.

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