

#1 | 2015

NEWS

CUSTOMER MAGAZINE

40
YEARS
CUTTING
EDGE



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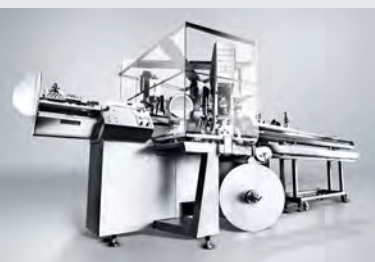
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WITH A BRIGHT FUTURE

komax WIRE



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DEAR READERS

The year 1975 marked the beginnings of what is today a successful global corporate group. It was 40 years ago that company founder and eponym Max Koch opened a small engineering office near Lucerne, which changed the world of wire processing. Even in those early days, its business success was based on a pioneering and innovative spirit.

The company grew steadily over the past four decades through organic growth as well as acquisitions and the founding of numerous subsidiaries and branches. Today Komax Wire is the global market leader, trailblazer and driver of innovation in all areas of wire processing.

One thing that has remained unchanged over all these years is the consistent focus of Komax Wire on our customers; on them and whatever their concerns happen to be. Success in this context is based on a close partnership. This partnership enables us to develop products and solutions with you that precisely meet your needs. We share your high quality standards without compromise. That explains our joint success.

We also have our more than 1,300 employees to thank for our success. Together with them we have succeeded in anchoring the pioneering and innovative spirit from the early years deep in the corporate culture of Komax Wire and in preserving it down to the present day.

The myriad products we launch each year are proof that Komax Wire continues to be imbued with a pioneering and innovative spirit. In this issue of our customer magazine, we present our innovations to you, provide you with informative insights into various issues at Komax Wire and, as innovator, show you where the current trends are in the wire processing industry.

Have fun reading this latest issue!

Marc Schürmann
Vice President Marketing, Sales & Service



40
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NEW CEO OF THE KOMAX GROUP



Matijas Meyer has been the new CEO of the Komax Group since May 2015. He also continues to be at the helm of Komax Wire.

Matijas Meyer holds an engineering degree from the Swiss Institute of Technology Zurich. Along with this credential, he earned an MBA at Cranfield School of Management in the United Kingdom and took advanced training in strategic marketing. Matthias Meyer joined Komax in 2007 when he became managing director of the Komax subsidiary in Rousset, France. In 2010 he took over as Head of Komax Wire and transferred from France back to Switzerland and the headquarters of Komax Holding in Dierikon. Prior to Komax, he had worked at Tornos SA in Moutier and Unaxis/ESEC in Cham.



KOMAX WIRE AND WIEDENBACH APPARATEBAU STRENGTHEN THEIR PARTNERSHIP

Wiedenbach Apparatebau, a leading supplier of continuous inkjet marking systems for industrial use, and Komax Wire are continuing their successful partnership by signing a new long-term agreement. Wiedenbach develops and produces marking solutions for Komax Wire that are geared to the requirements of Komax Wire systems and that add considerable value for customers.

Komax Wire and Wiedenbach Apparatebau GmbH began their collaboration back in 1997. Following the first successful projects, they decided two years later to enter into a

development partnership. It gave rise to the ims 291, a marker series that was able to be ideally integrated into the Komax Wire product range and that was launched on the market for the first time in 2003. Following constant further development of hardware and software, the successor series ims 295 was introduced in 2010. Today, after nearly 18 years of successful collaboration, the two companies are pleased to have signed yet another long-term supplier and cooperation agreement with each other.

ISO CERTIFICATION FOR KOMAX CHINA

Komax China with headquarters in Shanghai has now been certified to the ISO 9001 standard. The project was launched in 2013 in connection with the setup of a quality management system. To this end, the relevant processes were meticulously documented, checked in internal audits and constantly optimized. In the autumn of 2014, the world's leading certification company Bureau Veritas conducted a final external audit of Komax China. It furnished the Chinese certification office with objective evidence that the company conforms to the standard and recommended that it be given certification. After a thorough government review, the Komax process owners had the privilege of proudly accepting the ISO 9001 certificate in January 2015. The standardized processes will contribute noticeably to the development of Komax China.

KOMAX ACQUIRES A STAKE IN LASELEC SA

As part of a capital increase at the start of 2015, Komax Holding AG acquired a 20 % stake in the French firm Laselec SA. Laselec has about 60 employees. The company is headquartered in Toulouse, France, and operates branch establishments in the United States and Mexico. Laselec develops laser-based solutions for stripping and marking cables as well as smart wire harness layout boards for producing wire harnesses. The products of Laselec are employed mainly in the aerospace industry. Komax and Laselec are already carrying out joint customer projects today. The two companies will deepen their collaboration in the future.

BEST EQUIPMENT SUPPLIER

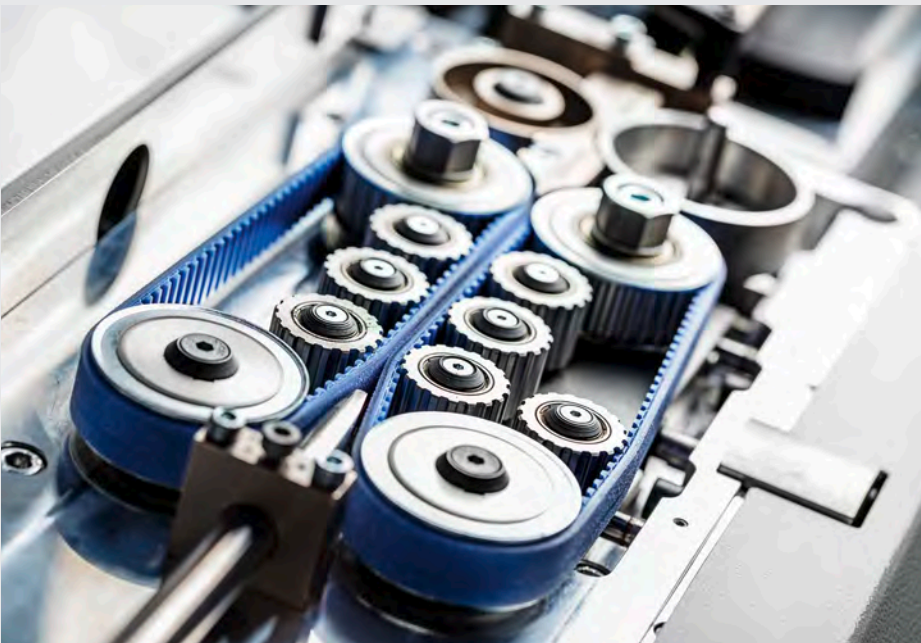
In April 2015, Komax Wire was singled out by Kunshan Huguang for the "Best Equipment Supplier Award". Kunshan Huguang is a Chinese wire processing specialist for the automotive industry. This make-to-order manufacturer was founded in 1988 and today has two harness assembly manufacturing facilities and one wiring cutting manufacturing facility. Kunshan Huguang has more than 1,200 employees, who work in a total factory space of 54,000 square meters. The company is classified at international level as an A supplier for Volkswagen.

It is a special honor for Komax Wire to receive this award in this, the year of its 40th anniversary in business. Kunshan Huguang and Komax Wire have already been business partners for 27 years. We are thankful for this extraordinary long-standing partnership and look forward to a continuation of this fine collaboration.

GLOBAL INNOVATIONS

ALPHA 550 AND ALPHA 530

The revolutionary Alpha 550 and Alpha 530 fully automatic crimping machines set new standards once again with maximum flexibility and extreme robustness, matchless precision and unrivaled productivity. With the new fully automatic crimping machines, Komax Wire presents itself as the leading full-range supplier and service provider with a large spectrum of smart, innovative solutions.



The belt drive reliably draws in the cable at a speed of up to 12 m/s (Alpha 550) or 9 m/s (Alpha 530).

Companies can improve their competitiveness on the market with flexibility, maximum precision and efficient performance. The new Alpha 550 and Alpha 530 meet these criteria with the most modern and forward-looking machine technology around plus ultra-short setup and conversion times and integrated quality monitoring for conductor detection and stripping. Customers benefit from profitable unit costs and unsurpassed quality.

Designed for maximum efficiency

The ergonomic operation by touch screen, keyboard and mouse supports the quick, simple operation of the machine. The easy setup and conversion procedures are designed for speed and enable highly flexible production. The next job can be edited without interrupting operations. Options such as the quick change systems for wires and for contact rolls enable the material and the crimp tool to be prepared while production is going on. Short distances between the stations accelerate the processes. Indicator lamps and LED-illuminated work zones optimize and expand user guidance.



ALPHA 550

Alpha 550 – maximum performance

Consistently high productivity and flexibility with maximum precision are the requirements fully automated wire processing has to meet, both today and in the future. The Alpha 550 – the latest fully automatic crimping machine for two-sided seal loading – meets these requirements across the entire spectrum with revolutionary technology. Equipped with ACD automatic conductor detection as a standard feature, this machine can process top quality wires in cross sections ranging from 0.13mm² to 6mm². The Alpha 550 can yield crucial competitive advantages with its unmatched unit cost performance, flexible production output and superb quality.

The advantages

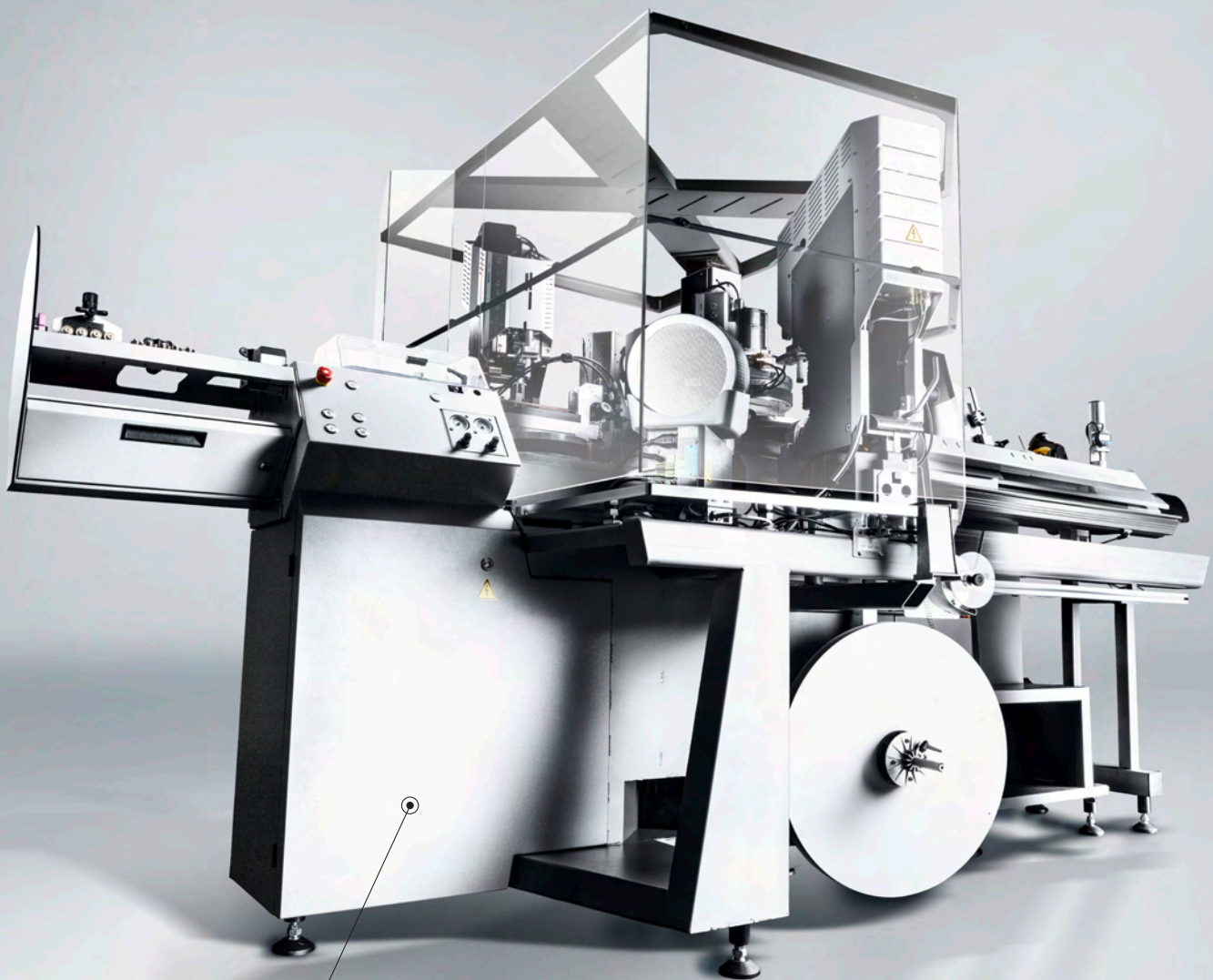
- Best productivity in its class
- High production output due to innovative machine controls optimized for efficiency
- Integrated automatic conductor detection (ACD) for high quality stripping
- Equipped for future requirements (e.g. aluminum wire processing) thanks to quality monitoring and gentle wire processing
- Produces special and complex applications thanks to flexible machine configuration
- Robust and reliable processing of wires ranging in cross section from 0.13 to 6mm²

Alpha 530 – robust all-rounder

Solid, reliable technology coupled with innovative solutions ensures and increases your company's ability to add value. The Alpha 530 – the fully automatic crimping machine for one and two-sided crimping and seal loading – meets this criteria with solid, powerful technology. The fast setup and conversion times of the Alpha 530 contribute to a high level of productivity. Quality options such as ACD and SQC can be retrofitted and satisfy the highest quality requirements.

The advantages

- Unrivalled robustness and durability
- High production output thanks to innovative machine controls optimized for efficiency
- Perfectly synchronized machine processes for excellent CPK results
- Optional automatic conductor detection (ACD) and Q1240 strip quality check (SQC)
- Solid and reliable processing of wires with cross sections ranging from 0.13 to 4mm²



ALPHA 530

Quality as a factor in competition

Perfectly synchronized machine processes and quality verification and monitoring functions ensure top precision and excellent CPK results – the basis for meeting the top quality requirements of the automotive and other industries.

The automatic conductor detector (ACD) assures quality even for the finest wires. The ACD detects the slightest contact between blade and strands while the wire ends are being cut and stripped. This feature allows cut-off or damaged single strands to be detected and prevented early on. Other available options include integrated strip quality monitoring (Q1240) and crimp force analysis (CFA+/CFA) as well as seal position monitoring (SPM).

Robust yet gentle

Powerful servomotors position the swivel arm with unrivaled repeat accuracy. The mechanical and electronic components are well-protected from dirt and ambient influences; they can also withstand environments with high temperatures and moisture. By actively monitoring roller pressure, the straightening units prevent cable damage, for example, during a machine stoppage and ensure optimum cable guidance. The conveyor belt speed is likewise automatically adjusted. This protects the cables and allows them to be gently processed.

Reliably and profitably into the future

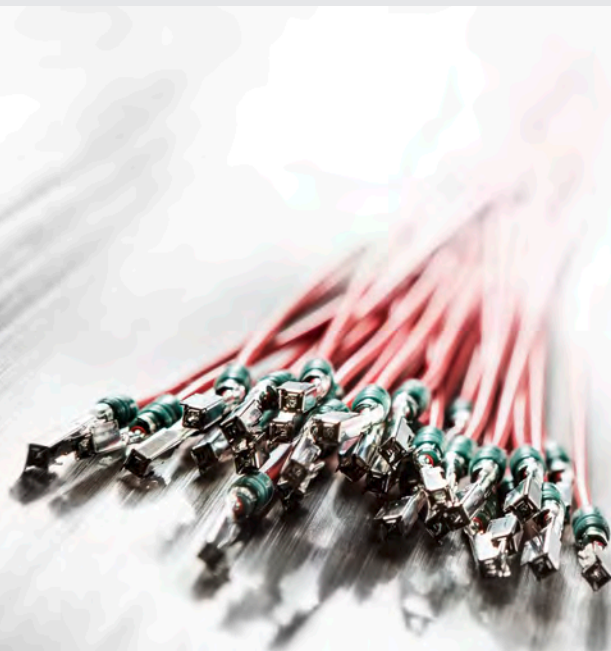
The new solutions are also compelling for the new and unique approach they take to wear parts. Maintenance costs for the new solutions are substantially reduced as a result. Whether one opts for the robust all-rounder or the strongest in its class, these current global innovations are suitable also for aluminum processing and for the production of special and complex applications. The new fully automatic crimping machines are built for a long life cycle with minimum maintenance cost and effort.



Uniform guide tubes support optimized cable handling for the thinnest cables.



The tools are within reach at any time in the practical, lockable drawer situated directly under wire draw-in.





With its ultra-short setup and conversion times, the C1370 crimping module ensures maximum productivity on the latest fully automatic crimping machines from Komax. It can do so because of operator guidance with LED lighting and cable positioning directly on the module. Reliable CFA+ crimp force analysis also assures top quality and minimal rejects. In combination with the time savings, productivity can therefore be boosted considerably.

C1370 CRIMPING MODULE – FOR MAXIMUM PRODUCTIVITY



Innovative operation on crimping module during the setup process.

The C1370 crimping module processes cables ranging in cross section from 0.125mm² to 6mm² (AWG 26 – AWG 10) applying a maximum crimp force of 22kN. With this performance, it has sufficient power reserves in each processing range. And thanks to the optimized cycle time of about 220ms (depending on the setting), the module is very fast and delivers the highest level of productivity in combination with short conversion times.

Uniquely effective operator guidance

Cables are positioned directly on the module – this is done very quickly and with unrivaled positioning accuracy. LED illumination guides the crimping module operators step by step through the various work zones and points out focal points and hazards to them. This feature and the central operator control unit on the crimping module additionally reduce changeover and setup time. Operators can conveniently enter all settings from the TopWin user interface.

Precise, fast crimping in top quality

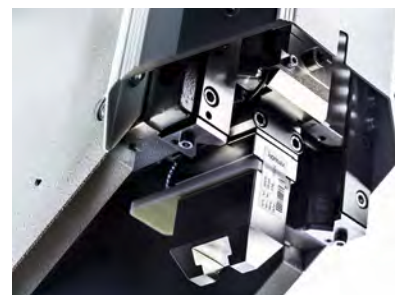
The new crimping module delivers maximum productivity and quality with the lowest possible level of rejects by intelligently combining efficiency, precision and CFA+ crimp force analysis. With the optional CFA-lab software, the data generated with CFA+ crimp force analysis can be read out from the crimping module and analyzed and optimized. Production continues operating without interruption.

Crimping is just this flexible and reliable today

Most commercially available terminals can be crimped quickly and precisely thanks to the high crimp force, the continuously adjustable speed and the double stroke function. The programmable crimp height and effective operator guidance shorten the conversion times and enable the crimping module to be used flexibly. Moreover, the robust crimping module design delivers extraordinary repeat accuracy for consistently high quality.

The advantages

- Extremely short setup and conversion times
- CFA+ crimp force analysis for maximum quality and minimal rejects
- Uniquely effective operator guidance with LED illumination
- Increased crimp force of 22 kN



Top tool fixture with integrated CFA sensor.



S1440 SEAL MODULE – EASY, FLEXIBLE, RELIABLE

The S1440 seal module reliably processes the widest range of cables with the maximum diversity of seal varieties. Precision mechanics combined with seal position monitoring (SPM) ensure a high degree of process reliability. The module can be converted quickly from one variety of seal to another. The seal position is set up automatically. These innovations make it the ideal module for the latest generation of Komax fully automatic crimping machines.

Interactive process lighting and reliable error detection assist you during manufacturing.

Production is quick and easy thanks to superb accessibility, operator guidance with LED-lighting and the automatic setup of the seal position. Precision mechanics combined with the optional seal position monitoring (SPM) ensure a high degree of process reliability. About 350 seal applications for various seal types, including mini-seals, are available for the S1440 seal module, so this model leaves nothing to be desired.

Ergonomics for high efficiency

The module is integrated deeply into the latest machine control system so module setup and operation are both intuitive. The interactive process lighting with LEDs supports the operator in all manufacturing steps and greatly simplifies machine operation. The monitoring of the processes assures process reliability as well as dependable error detection. The module can be converted in a very easy procedure from one variety of seal to another quickly and without complication. The compact design and superb accessibility make its use highly flexible. The

most important functions are controlled from one of the keyboards installed on both sides.

SPM reduces reject rate

A high-precision laser sensor measures the position of the seal on the cable in seal position monitoring (SPM). The seal position is set up automatically. During each loading operation, SPM monitors the seal position and stripping quality as well as detecting pierced and turned seals on the wire. SPM subsequently adjusts positioning automatically to compensate for process fluctuations. Production statistics displays the last 100 SPM images, allowing the operator to evaluate the complete production output in a dialogue with the TopWin software. This controlled process reduces rejects and increases productivity.

Use of existing applications

The modular seal applications in this latest generation are compatible with the seal applications of the seal modules mci 761, mci 762, mci 765, mci 765C and the manual workstation bt 752.

The advantages

- High level of process reliability
- Seal applications for more than 350 different varieties of seals
- Guided convenient operation
- Automatic setup of the seal position
- Use of existing applications possible

KOMAX MICROGRAPH LABORATORIES WITH NEW SOFTWARE

Seamless quality control is becoming an ever more important factor in competition. Micrographs are indispensable in the release of crimp terminals and tools for these systems. Komax Wire offers three ultra-precise micrograph labs for the analysis and evaluation of crimp connections: the mobile MicroLab 30, the automatic MicroLab 35 and the modular MicroLab 55. The SmartVision software that goes with them measures and evaluates the micrographs.

Highly flexible modular micrograph laboratories are central components of modern quality management. The traceability of production lots and their quality is vital to complying with the high industrial standards. The micrograph laboratories from Komax Wire cover the needs of modern wire processing, both as flexible and mobile on-site stations and as modular, central quality control units. Samples are prepared in wet or dry processes that are quick and reproducible. The analysis and documentation of the samples with the SmartVision software is intuitive and readily understandable.

Smart and user-friendly software

SmartVision is a special software for measuring and assessing micrographs. The software analyzes the micrographs of the widest variety of crimp connections established on the market. SmartVision can photograph, analyze and document the entire terminal, but also transverse and longitudinal sections. The analyses are simplified and accelerated by the deposited industry standards (USCAR 21, TYCO 114-18022-10, PSA 9634115099, Renault 36-05-019, VW Norm 60330). The most important measured variables can be measured automatically and

manually. "Guided measuring" is a function available for each measurement. It greatly simplifies the measuring procedure for users. They are guided reliably and efficiently through the measuring procedure using an overview.

SmartVision is easy to integrate in the production system of companies and is available new or as an upgrade of SL Vision III.

01





02



03

MicroLab 30 – Intuitive control and minimal maintenance

The mobile MicroLab 30 can produce a micrograph in less than thirty seconds thanks to the intuitive control system and the optimized arrangement of the cutting and polishing module. An integrated line laser simplifies the determination of the micrograph position. The autonomous preparation, evaluation and documentation modules that are part of the lab operate independently of each other and enable a complete on-site analysis. A standardized holder positions the sample; the need for re-clamping is eliminated. The concentric arrangement of the saw blade and polishing wheel enables an optimum process sequence and two step motors ensure reproducible micrograph preparation.

MicroLab 35 – Quick and with laser support

MicroLab 35 was developed for the automatic and quick creation of micrographs of terminals up to a diameter of 3mm. The processing time is short thanks to the fully automatic transport system and the reliable technology. It allows one micrograph per minute to be produced on a continuous basis. The sample is clamped in place quickly with laser support, so the inspection position is determined precisely. MicroLab 35 cuts and polishes the samples automatically without re-clamping them. As soon as the samples arrive at the evaluation unit, they undergo electrolytic cleaning – the micrograph is taken and evaluated.

MicroLab 55 – Versatile for every application

MicroLab 55 is designed for the most versatile application ranges and is therefore modular. It produces micrographs for all types of crimps available on the market – both transverse section and longitudinal section (e.g. aluminum). This applies also to products such as PCBs or housings from outside the automotive sector. Processing times are ultra-short because of the optimum arrangement of the individual modules. Reproducible sample preparation is sure to be perfect because the sample does not have to be re-clamped between the individual processing steps.

The advantages

- Analyzes B crimp, IDC, longitudinal cuts
- Deposited industry standards
- All-purpose sample holder for all diameters
- Ultra-easy to handle
- Reproducible sample preparation
- Readily understandable evaluation software

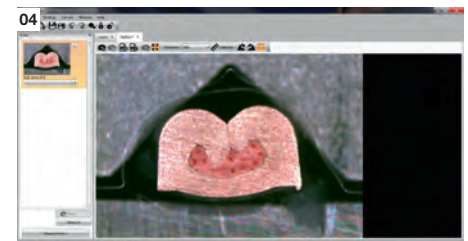
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MicroLab 35

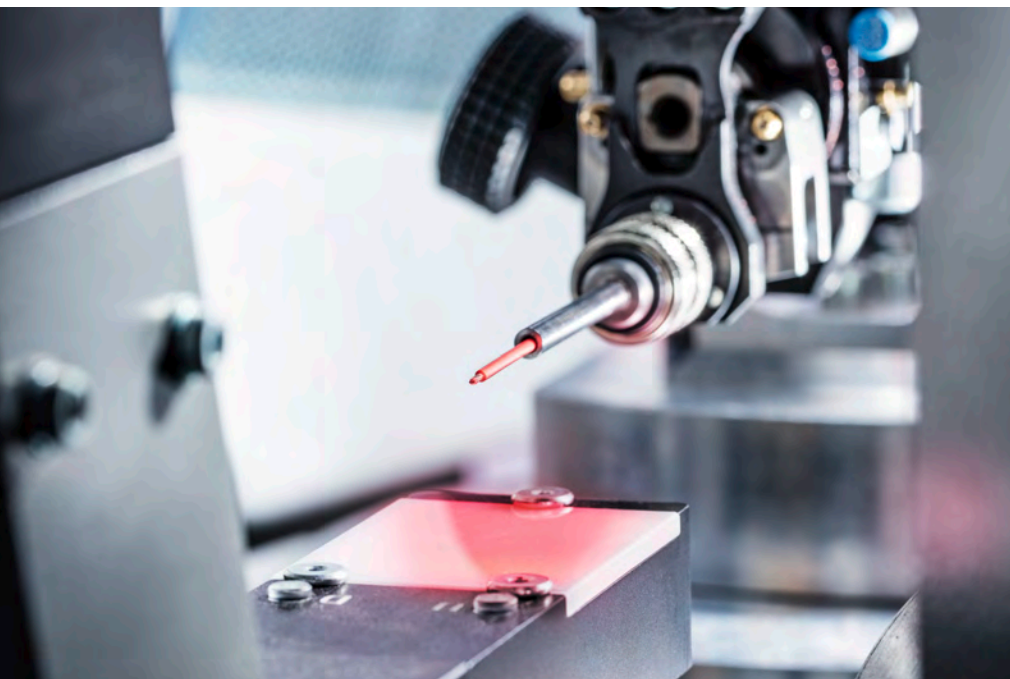
02
MicroLab 55

03
MicroLab 30

04
SmartVision in recording mode

05
Standardized holder





Q1240 – STRIP QUALITY CHECK FOR THE ALPHA 530/550

The Q1240 strip quality check (SQC) runs an optical check on stripping quality and automatically removes rejects.

The optical check integrated in the process increases productivity and ensures traceable quality. The Q1240 quality tool runs an optical check on strip quality during the swivel movement and detects stripping problems early on. It checks the wire with respect to stripping length and the presence of pulled or splayed strands and automatically separates out defective products. Processing errors relevant to seal loading or crimping are prevented early on, which increases productivity and quality.

Documented quality is the future

Integrated directly in the machine software, Q1240 allows a comparison to be made between desired and actual performance without additional teaching procedures for article parts and is therefore suitable also for the production of sequences. The stored values and images can be read out via the WPCS interface and ensure quality traceability. The use of the Q1240 instead of the CPS option ("cut pulled strand") can boost the output by

up to 10 percent depending on the conductor length and the quality of the conductor material.

The advantages

- Early detection of possible stripping problems
- Increased production capacity
- Traceability thanks to statistics, image saving and WPCS
- Easily integrated in the production process without the need for teaching
- Reduces operator influence

TOPTOUCH VERSION 15.11

TopTouch user interface for crimpers now even more user-friendly

Version 15.11 of TopTouch for crimpers has a completely new user interface. The focus is on user convenience, efficiency and saving time.

These objectives are met by providing direct access to a wizard for recording articles and a display of entries that are missing or incorrect, both accessible directly from the main menu.

With MIKO (Manufacturing Interface Komax) as a data interface, TopTouch 15.11 can connect multiple bench-top crimpers for the first time. A manufacturing execution system (MES) provides the crimpers with job data containing information about the wire, terminal and seal. Quality is further increased in combination with QCenter, a central measuring station. QCenter requests measurements of crimp height and of pull-out force and sends the measured values back to the crimpers.

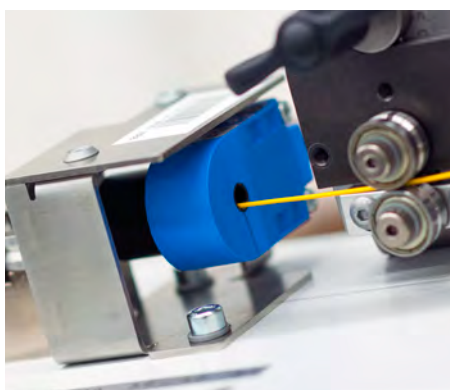
MATERIAL CHANGE DETECTION

Ring sensor for cable change detection

Material change detection notices every change of tools or materials. Before production can resume after a change of this kind, the user software demands a corresponding verification. This feature prevents mix-ups in connection with tools and material replenishment.

Change detection works especially well in combination with a bar code scanner, which then conveniently records the required information.

Komax Wire now uses a ring sensor to ensure the reliable detection of a wire change across a large range of cross sections. It is inexpensive and easy to mount on all machines. Straightening stations or manual wire changers do not restrict the use of this device.



Ring sensor

SHORT OPEN ENDS ON TWISTED WIRES

Alpha 488 S fully automatic twister now with the option "short open ends"

The Alpha 488 S fully automatic crimper incorporates Komax Wire's many years of twisting expertise. Already today, the machine processes unshielded twisted pair (UTP) cables reliably and up to standards. With the "short open ends" option, Komax Wire goes one step further. To meet the required specifications of Ethernet data cables and optimize the data link, Komax Wire reduces the length of the open ends to a minimum of 15mm.

The option is installed in fewer than three hours because it contains a customized handover module that simply replaces the standard module.



Option «short open ends»

WIRE HANDLING

F1150 feeder – Quick-to-setup feeding system that is gentle on wires

The F1150 automatic wire feeding system greatly boosts the production output of a wire processing line. Regardless of whether thin, flexible strands are involved or thick, sensitive coaxial cables; the new feeder transports each cable type gently with minimal tensile strain in a reliable process. To carry out the task, the F1150 is fitted with a powerful and robustly designed drive and handles wire reels weighing up to 300kg.

The F1150 offers maximum compatibility. Thanks to a compatible control system, it can be integrated seamlessly into any wire processing line and supports high production output.

The setup time is minimal because of the axes motorized in all directions and the straightforward manual remote control.

The F1150 wire feeding system is available in two versions to accommodate wires with two different outside diameters: 18mm and 35mm.



Feeder F1150

WIRE HARNESSES – NERVOUS SYSTEMS OF MODERN VEHICLES

Wire harnesses serve as the nervous systems of automobiles and must function with absolute reliability. The increased complexity of wire harnesses poses challenges both in terms of production and in terms of quality control. TSK test systems assure top quality in each step of the production process.



TS 1700 test bench for reliable testing of cable harness in harness testing.

Mobility is a basic human need. We therefore place ever bigger demands on the reliability of technology needed for achieving mobility. Durable and reliable functions for new features can only be assured if the wire harness satisfies the highest requirements, beginning with production and ending with it undergoing final quality control prior to being installed in vehicles.

The on-board power system

The wire harness serves as a nervous system for the vehicle. It comprises all electrical connections and hardware components required for control signals and power distribution in a passenger vehicle. The wire harness can be divided into subsystems, e.g. for the audio system, the engine interior, power supply (high voltage), bumpers or for safety systems.



Manufacturing / production

Due to their high complexity, only very few wire harnesses are manufactured in an automated process. More than 90 % of production is done on what are called form boards or design boards. There are basically two types of on-board power systems:

1. Modular wire harnesses

Modular wire harnesses are assembled and pre-produced in accordance with fixed equipment packages. Many varieties with differing levels of complexity are available to cover the entire spectrum of equipment, from minimum to maximum, with which a vehicle is fitted. During assembly, the modular wire harness that best corresponds to the equipment in the vehicle is the one that is installed. Unlike complete wire harnesses, this version saves on materials and costs. If this approach is taken to its logical conclusion, the result is a customer-specific wire harness.

2. Customer-specific wire harness (KSK)

A customer-specific wire harness contains solely the components actually needed in the given vehicle. In other words, only cables necessary for the desired vehicle configuration are installed. So, for example, several million different configurations might be conceivable in a mid-range vehicle. The customer-specific wire harness requires extensive logistical efforts and expense in manufacturing and quality control. A big plus of this version is that the cost of the individual wire harnesses is reduced and so is their weight.

Quality control for customer-specific wire harnesses (KSK)

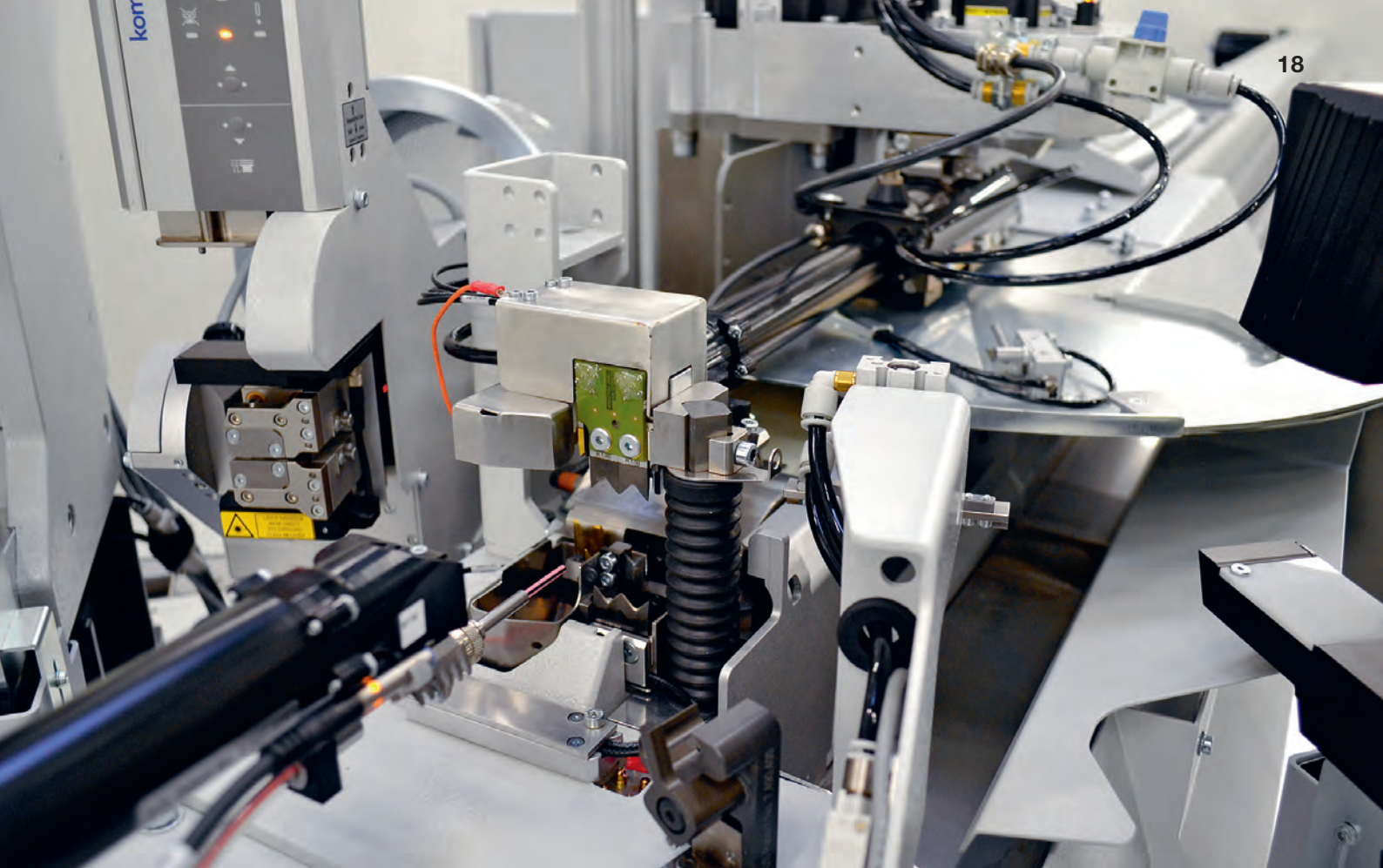
Quality testing for customer-specific wire harnesses poses several challenges. A KSK is virtually unique. In other words the lot size is extremely small. For this reason, the process requires flexible test systems that can create an individualized test program for the electrical test on each KSK. The test systems from TSK with the test software CS WIN nx and the optional JIT Professional (Just in Time) are capable of doing just that. They can accommodate the enormous diversity of individual vehicle configurations. They thereby ensure that the suitable test program or test project for testing the given customer-specific wire harness is always available at the right time and in the right place – and that this happens not just for final testing and inspection but already after each step in the production process, at all facilities.

Along with the test software CS WIN nx featuring the option JIT Professional, TSK is a complete test equipment supplier. Its range extends from adaptations for connectors and clips to wire harness test systems and HV test systems and beyond to the module tests on individual components.

The more comprehensive the electrical equipment in the vehicle, the more extensive and the heavier the wire harness. The individual cables in an on-board power system in a modern mid-range car can be up to 3,000 m long and weigh far more than 50 kg. As such, the wire harness is one of the largest, heaviest and most complex electrical and electronic components in a passenger vehicle.

Modultesting: Test system for bumpers





The Komax fully automatic crimping machine is equipped with ACD and SQC options and all set for aluminum processing

ALUMINUM – MATERIAL WITH A BRIGHT FUTURE

Aluminum is considered a material with potential in the wire processing industry. Along with its many advantages, however, this material also poses major processing challenges. Today, Komax machines already guarantee optimum processing of aluminum conductors.

Mounting demands from consumers combined with massive increases in vehicle functionality have left their mark on the electrical systems in automobiles. In recent years, these systems have become ever more complex and that trend continues. This is clear from the following analysis:

	Mercedes 220 E	BMW 3er	VW Tuareg
Year built	1963	1998	2012
Weight of electrical system	3–5 kg	30 kg	45 kg
Conductor length	150 m	1,800 m	4,000 m
Number of conductors	110	900	1,600
Number of connectors	30	300	450
Number of terminal parts	200	1,700	3,000

Source: Delphi, 2014

With the huge expansion of functions in vehicles, wire harnesses are increasingly extensive, complex and heavy. At the same time, car makers are obligated to reduce CO₂ emissions. Great efforts are being made to try to reduce the weight of harnesses without having to limit functionality.

The conductors make up the largest share of the total weight by far. The activities right now are therefore focused on this area.

Read the table as follows: The values for copper reflect the situation today and the values for aluminum and for 0.13 mm² conductors show the potential for weight reduction.

The wire processing industry draws the following conclusion from the analysis: Copper conductors should be reduced in size from their current cross section of 0.35 mm² to a cross section of 0.13 mm². Copper conductors with cross sections from 2.5 mm² to 80 mm² will now be replaced by aluminum conductors. These steps can improve the efficiency of the vehicle while lowering the cost of the electrical system, because aluminum is currently substantially cheaper than copper.

What do these trends mean for Komax Wire?

The challenge for Komax Wire is to handle and process miniaturized components and to process aluminum conductors. The miniaturization of terminal parts, housings and conductors, in turn, increases the demands on harness production and on Komax machines.

Komax Wire introduced the Zeta 633/656 quite some time ago to deal with these tough requirements. This model is just the solution for the fully automatic manufacturing of harnesses with miniaturized components and conductors with a cross section of 0.13mm^2 . With the ultra-precise spindle drives on all insertion axes, housings with a pitch of 1.5mm can be loaded reliably in a controlled process. Incorrect insertions are practically unavoidable and this degree of precision cannot be achieved with manual harness production.

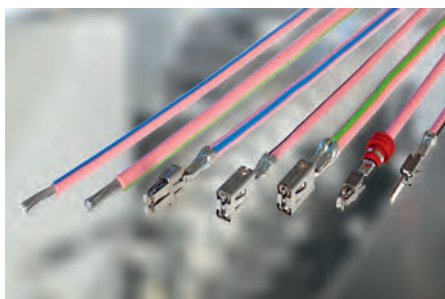
The precise force sensor monitors the entire insertion process, continually comparing the measured forces with the specified values. This approach ensures a high degree of process reliability and seamless monitoring of the loading process.

Processing aluminum conductors

Besides the above advantages of aluminum as a conductor, this material also poses challenges in processing:

- Less strong than copper
- Susceptible to creep – a gradual deformation under mechanical stress – and at much lower temperatures than copper
- Susceptible to electrochemical corrosion

Ultimately, the advantages predominate, making aluminum a material for wiring harnesses in the future.



Contacting system from TE Connectivity

Fully automatic processing on Komax machines

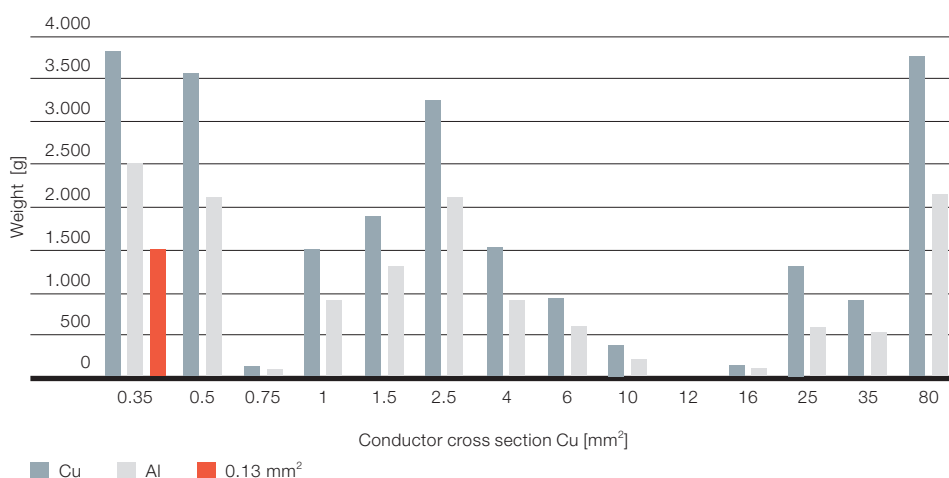
Komax machines are ideal for the following challenges and give the customers the support they need:

- Conductor feeding that is gentle on cables
- Straightening of aluminum strands
- Cutting and stripping with special blades
- Cut monitoring with automatic conductor detector (ACD)
- Stripping monitoring with strip quality check (SQC)
- Conductor positioning in the crimp tool with maximum repeat accuracy and position monitoring
- Crimp force monitoring system featuring CFA

To meet these requirements in full, the individual processes must be optimally coordinated with each other. Komax standard machines can be configured and equipped for specific applications based on the contacting system used.

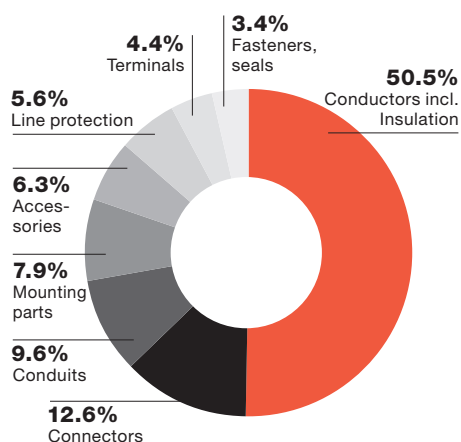
The above processes were successfully used and optimized for a contacting system from TE Connectivity. Komax Wire is thus the only machine maker to offer equipment for this contacting system.

Cross section range



The diagram above shows the potential for weight reduction by type of material and cable cross section. Source: Audi AG, 2012

Weight distribution



After a look at the weight distribution in a harness, it is clear where the greatest potential weight reductions could be made. Source: Audi AG, 2012

CUSTOMER-SPECIFIC SOLUTIONS FROM KOMAX WIRE

With its years of experience in process automation, the “Value Added Engineering” unit at Komax Wire offers customers tailor-made solutions for the full range of wire processing, from cable handling and classic processes to complex specialized applications.

The broad selection of processing modules is a decisive factor in giving customers an optimum solution to match the production volume and the complexity of the application. The demands within the industry can vary greatly. The need for individual applications can be triggered, for example, by a special conductor material and the associated processes and insertion operations. Komax processing modules consist of bench-top units such as cut and strip machines (Kappa), semi-automatic systems such as compact cells and fully automatic crimp machines (Gamma, Alpha, Zeta) as well as systems (Lambda).

Close and responsive to the customer

The customer-specific solutions from Komax Wire generate added value for the customer across the entire process and optimize efficiency. With its takeover of SLE Quality Engineering GmbH in Grafenau, Germany, Komax Wire has further expanded its performance capabilities in this line of business. SLE is a leader in quality control systems for the production of plug-in contacts and wire harnesses and is an expert in building special machines for infotainment and high-voltage applications in the automotive sector. As a result, the customers from Komax Wire receive even more comprehensive solutions from a single source. The value added hubs in Buffalo Grove, Illinois (USA), in Nuremberg,

Germany, and in Shanghai, China, provide the customers with local and regional support. They implement applications for automatic loaders and adjust standard machines to meet the needs of specific customers. In addition, they develop new processing modules, also with partner companies. The thorough advice customers receive in connection with sales and service for the building of special machinery and systems is especially important in this context. Komax Wire also makes available sales and service support in more than 60 countries through subsidiaries and independent representative offices. Collaboration with the value added hubs allows the company to act quickly in the respective time zones.



» INTERVIEW WITH GÜNTHER SILBERBAUER

Managing director of Value Added Engineering, CEO of SLE Quality Engineering and member of the business unit management for Komax Wire.

Automotive business accounts for an extremely large portion of total business at Komax Wire. In what areas do customer-specific solutions play a big part?

We offer solutions for the automation of processes for data lines in infotainment or for sensors of the kind used in axle cabling or for engine sensors. Also of major significance are systems for demanding cabling for safety equipment such as airbags. A further line of business pertains to solutions for the processing of autonomous wire harnesses, for example, ones that automate the entire harness for vehicle doors. In value added business we take care of high voltage technology and also manufacture systems for electric and hybrid vehicles.

And what platforms do you use in these applications?

Largely semi- and fully automatic processing cells, standard machines (crimp to crimp) and benchtop machines (e.g. sliding carriage presses).

What clear advantages do Komax Wire customers derive from the Value Added Engineering unit?

Thanks to the many specialists at Value Added Engineering, the customers obtain the appropriate automation approach to fit any task no matter how challenging. Moreover, Komax CAO can be used for networking standard machines with system installations. In these cases, customer project management configures the CAO and advises the customer on how to introduce Komax solutions into production operations.

How many employees work at Value Added Engineering?

At the moment, this unit has more than 150 employees in order to cover the growing demand from customers in an optimum manner.

In what direction will this business unit develop in the near future?

At the Grafenau site, the building is currently being enlarged to quadruple the floor space for manufacturing and administration. Komax Wire is taking this step to meet the growing demand for special solutions. The facility in Rotkreuz, Switzerland, is expanding its production operations and creating additional structures to accommodate growth in engineering and sales.



Günther Silberbauer

LASER TECHNOLOGY IN WIRE PROCESSING



The requirements placed on wire processing in the aerospace industry are extremely high. Laser technology simplifies the processing and marking of the complex cables that are used. Reliable laser technology will establish itself in the future in wire processing for the automotive industry as well. Thanks to the collaboration between Komax Wire and Laselec SA, customers profit from highly innovative wire processing solutions incorporating laser technology.

The aerospace industry utilizes a myriad of cable types that have to meet the highest requirements. The insulation materials on cables must withstand influences such as chemicals, moisture, extreme temperatures and mechanical loads. Strand designs range from copper through annealed copper to high-strength copper alloys containing nickel, tin or silver coatings. Another focal issue is weight reduction. There is demand for lightweight insulation materials and the thicknesses of insulation material are reduced to a minimum. Special insulation materials are used for this reason. Typical examples are polytetrafluoroethylene (PTFE/Teflon), ethylene

tetrafluoroethylene (ETFE/Tefzel) and/or polyimide (PI/Kapton). These special materials have different degrees of hardness and require extremely exact processing. Along with a large number of insulation materials, the widest range of geometrical wire forms are also used, e.g. single- and multi-core cables, shielded and unshielded cables, circular and non-circular cables and twisted pairs.

Wire stripping – a challenge

All these characteristics and requirements make it difficult to process these cables with conventional stripping machines.

For certain kind of cables, excellent and cost-effective results can be achieved with special form blades or rotary stripping methods. But as soon as asymmetric multicore cables or cables with ultra-thin shields/insulation are processed, these types of mechanical processes reach their physical limits. In some cases, it is not possible to cut into the insulation with the precision required for trouble-free stripping. Consequently, insulation becomes frayed or strand is incised, scratched or even cut off. This is no alternative given the stringent standards and guidelines in the aerospace industry and the high quality requirements that go with them. This is precisely where laser technology comes in. Instead of a mechanical stripping process of the kind performed by conventional stripping machines, a laser stripper vaporizes the insulation in the cutting area. The strands in the cables reflect the laser beam and are not damaged.

Laser marking

Cable marking is a further application in which laser technology is used. Unlike permanent marking processes such as hot-stamp marking, laser marking has the major advantage that small cables and cables with thin insulation can be marked unharmed. UV laser marking can be easily read without magnification and is not causing damage or reducing the insulation thicknesses. Compared to inkjet marking, laser marking is slower but inkjet marking is not permanent or not resistant to chemicals. The marking quality of laser marking is also superior to other marking processes, especially on thin wires.

Laser technology and the automotive industry

Laser technology is employed only rarely in wire processing for the automotive industry. The requirements placed on insulation materials and marking quality are currently still lower than in the aerospace sector. This situation could change in the future. After all, the automotive industry is also focusing sharply on optimizing the weight of the on-board power system. It is only a question of time before aluminum cables and customer-specific wire harnesses will be used, along with thinner insulation materials. The trend to ever smaller wire cross sections also requires new solutions for the optimum marking of wires. Cable designs are becoming ever more complex owing to higher signal transmission rates; this is, in turn, is leading to exacting types of processing. Because of these trends, laser technology will be used more broadly in the future in wire processing for the automotive industry, as well.

Partnership between Komax Wire and Laselec

Laselec has an outstanding position in the aerospace market thanks to its laser-supported marking and stripping solutions for cables in this industry. With its expertise in laser technology, Laselec is the ideal partner for Komax Wire. Thanks to this collaboration, customers in the automotive and aerospace industries benefit from solutions optimally geared to their needs, regardless of whether those needs relate to conventional wire processing, laser technology or a combination of both. The success of this partnership is obvious from the solutions that have been achieved for crimping machines and also Zeta-based component insertion machines. For you, Komax Wire and Laselec are therefore names that are synonymous with highly innovative solutions for wire processing.

Extremely precise laser marking with the MRO 200 from Laselec.



UV-Laser marking with best legibility.





Komax AG
Industriestrasse 6
6036 Dierikon
Switzerland
+41 41 455 04 55

komax WIRE
komaxwire.com