



Your partner on the way for miniaturization

Long a trend toward standard technology in other sectors, miniaturization is now establishing itself in the automotive industry. Increasing use is made today of tiny terminals, conductors with small cross sections and mini-seals. They are found in particular in entertainment and information systems, in sensors and in safety and security systems. Komax is the right partner for this demanding type of processing.

Miniaturization at Komax

Fifteen years ago, conductor cross sections of 0.35 mm² and smaller accounted for only a fraction of total output. Today they are among the leading applications in quantitative terms. The next big step is the utilization of 0.13 mm² conductors, for which gentle processing is the major challenge faced. Komax can draw on its years of experience in the processing of small-sized conductors outside the car industry and make an important contribution to find the beste solution for the customer.

Ever smaller conductors in ever tighter spaces

The challenges in vehicle construction are to reduce weight, cut costs, increase efficiency and achieve ever greater functionality while maintaining an increasingly high level of quality. What these challenges mean for wire harnesses in vehicles is that an increasing number of conductors must be accommodated in an extremely tight space.

Handling of conductors

Processing is largely influenced by the copper alloys used in the stranded wire, the insulation material and the structure of the conductor. The conductor is gently drawn in from different types of containers and guided to the cutting and stripping blades, fed by belt- or rollerdrive. Pre-stations for ensuring gentle feed are recommended for achieving a high production output for long conductors (Figure 1).

A precise cutting unit ensures that the ultra-fine stranded wires are correctly cut and that the insulation is properly stripped off. The ends of the conductors must be moved with precision to the processing stations and neatly placed in the deposit tray. Conventional conductors are processed with programmable motor drive using standard parameters. Komax offers product-specific solutions for the processing of small cross sections (Figure 2).



Figure 1: k106 pre-processing station for gentle wire feed

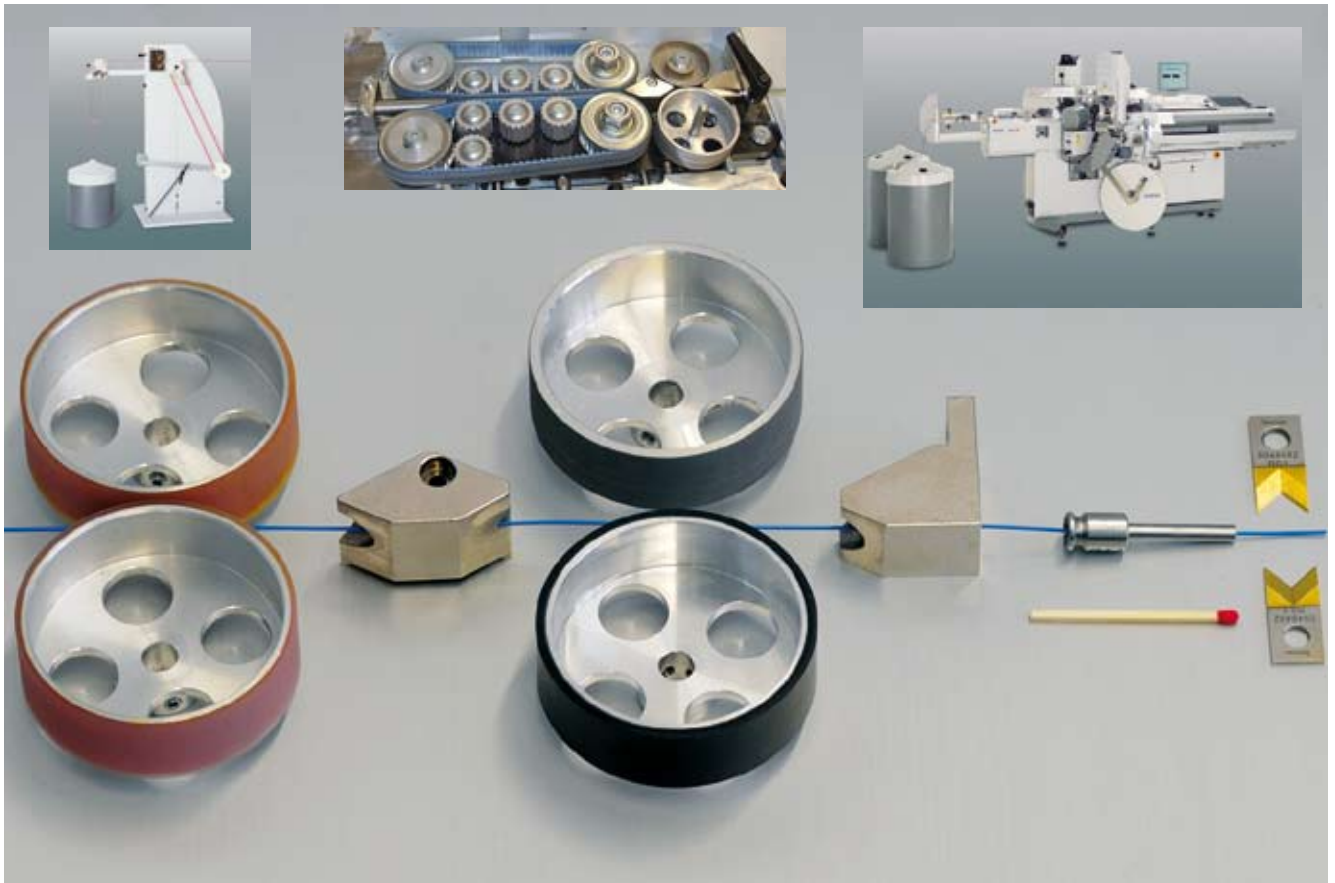


Figure 2: Set of guide parts for conductors with small cross sections on Alpha 355 fully automatic crimping machine

Small-pitch crimp terminals

Terminals are being made of increasingly thin-walled material and the pitches for the connectors are minimized to save as much space as possible. The conductors consequently have a reduced cross section and thinner insulation.

Faster and cheaper methods for manufacturing small components have caused quality and compliance with specifications to decline, which can lead to undesired fluctuations in production (Figure 5). Deviations in the thickness of materials or irregular spacing of transport holes are two possible causes of this.



Figure 3: Miniaturization of terminals



Figure 4: Connectors

However, it is crucial that production safety and reliability not be affected in the least throughout the whole process. Process monitoring must be guaranteed even as dimensions become increasingly smaller and characteristic responses ever more sensitive. Komax's crimp force analyzers cover a wide range. By using the appropriate set of parameters, proper monitoring in this area can be ensured (Figure 6).

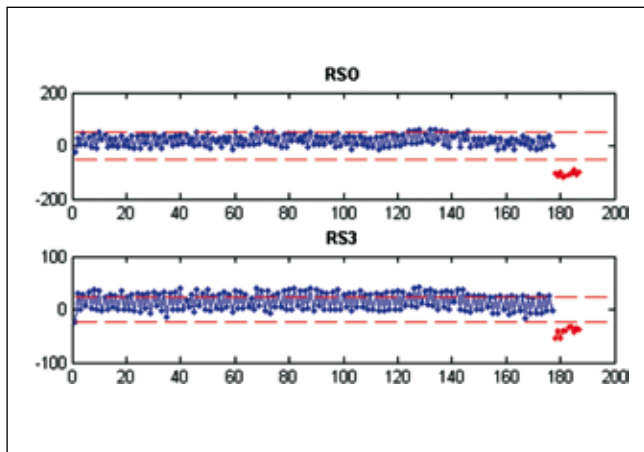


Figure 5: CFA values due to fluctuations in the material

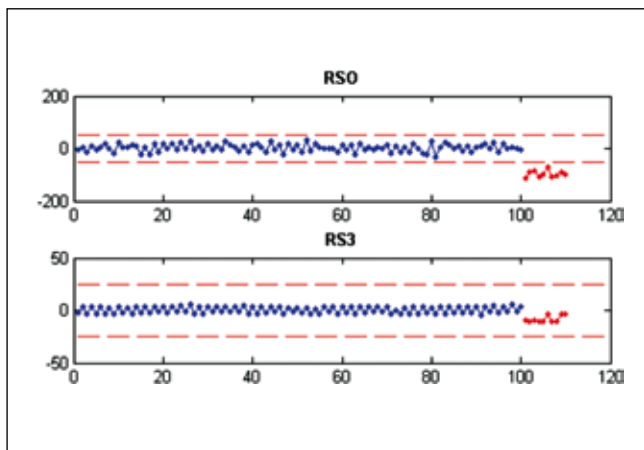


Figure 6: CFA values following adjustments (0.13 mm²)

Press, crimp force analyzers, crimping tools

With their great stability and high degree of crimpheight accuracy, the mci presses from Komax provide a solid basis for the processing of small terminals. Small crimp forces at the lowest end of the work range for the press have to be controlled accurately and reliably. At Komax, special algorithms are used in the machine software to solidify and evaluate the data for even the tiniest crimp forces in an optimum manner.

Great attention has to be paid in the processing of small components to the parameters set in the CFA (crimp force analyzer) and to the use of precise and stable crimping tools.

Extensive headroom (Figures 7/10), determined by the combination of conductor and terminal, is prerequisite for monitoring the processes. Headroom describes the peak force difference between a crimp with a conductor and a crimp without a conductor.

The smaller the conductor cross section and the terminal, the more important the correct setting of the CFA parameters. Optimum CFA settings can be determined easily in order to achieve reliable error detection in production while minimizing unnecessary volumes of rejected material. Once values are calculated, they can be transferred to the other machines in the production operations via the networking interface WPCS (Wire Processing Communication Standard). In all its processes, Komax strives to make the application as easy as possible for the customer to use.

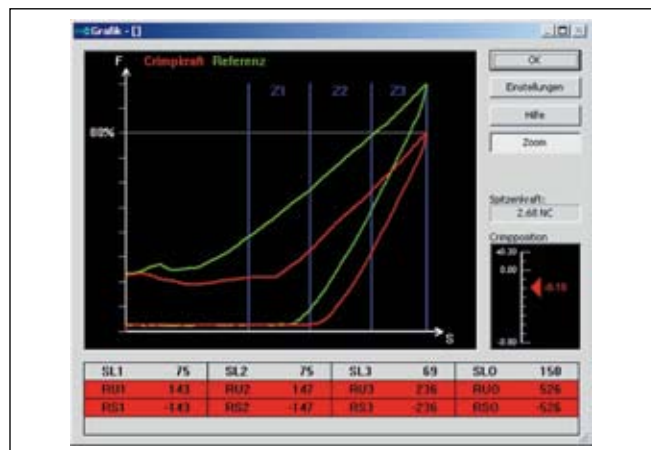


Figure 7: Headroom



Figure 8: mci 722

The crimping tool (applicator) itself is often underestimated as a factor influencing the process. In small terminals, mechanical factors can cause irregularities and irritating malfunctions. Three ways to help minimize these disruptive factors is to ensure that preliminary settings are precise, wearing parts are in proper condition and maintenance is carried out on a regular basis. For instance, the terminal feed must push the terminal into the crimping position with absolute precision. A poorly placed terminal is pressed asymmetrically, which directly detracts from crimp quality as well as the roll-up behavior and the crimp force curve (Figures 9/10).

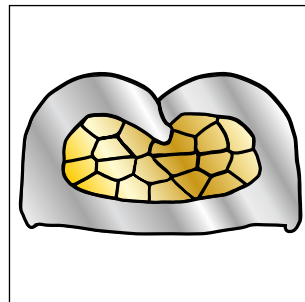


Figure 9: Terminal with poor roll-up behavior

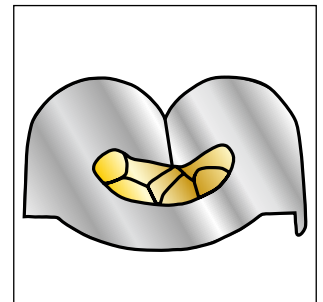


Figure 10: Terminal with small headroom, poorly placed in the applicator

Processing mini-seals

Ever thinner seal walls and increasingly extreme ratios between seal diameter and seal length pose major challenges for production operations. Many of these mini-seals have hardly any holding or orientation points, which makes processing more difficult. Moreover, these tiny, delicate seals have to be loaded on a conductor without being over-stretched or damaged.

The following requirements must be met to optimize the processing of mini-seals on fully automatic machines:

- > High quality seals
 - Properly molded so the seal is free of brows and excessive projecting material
 - Compliance with dimensional tolerances
- > The seals should be as free of silicone oil as possible
- > Prominent features such as ribs or grooves to simplify feed and positioning

Drawing on their years of experience in automatic seal loading, Komax is able to respond quickly to new customer needs and adapt the processing modules accordingly. The application parts for seal modules provide the necessary flexibility to carry out these adaptations with great speed. The applications are mutually compatible so they can be used on all current Komax seal modules.

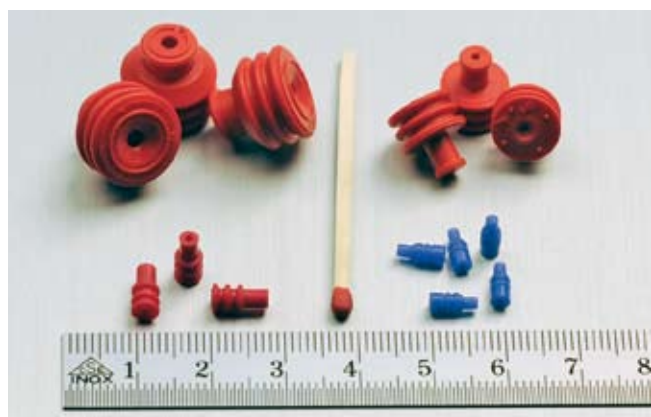


Figure 11: Seal dimensions



Figure 12: mci 765

The new mci 765 seals module has a feature that allows the seal position to be measured and subsequent automatic adjustments to be carried out.

Readiness for processing small components

The processing of small terminals and seals is a complex task influenced by a number of different factors. It is therefore crucial that a holistic approach be taken to achieving successful, reliable production of miniaturized components on fully automatic crimping machines. Komax provides a full range of solutions from a single company: from feeding, cutting and stripping to crimping and block loading. Contact us about your challenges. We are happy to advise you.

What you gain from having Komax as your partner for miniaturization:

- › Broad selection of machine types
- › Pre-station for gentle pre-coiling and for increasing the machine output (k106)
- › Precise blade unit for proper processing of conductors with fine stranded wire
- › Special blades as required
- › Reliable crimp force analysis (CFA) with parameters that are easy to set
- › Specially integrated amplification of the force signal for small crimp forces
- › Highly stable crimp presses
- › Specially designed seal applications for processing mini-seals
- › Seal position monitoring with the mci 765 seals module
- › Networking of machines using Wire Processing Communication Standard (WPCS)
- › Years of experience with tiny conductor cross sections and terminals
- › Complete solutions from a single company

◀ exhibitions 2008 ▶

Date	KW	Name of Exhibition	Representative	Place / Country
27. – 30.05.08	22	BIAS	Cofilimacchine	Milano / IT
27. – 30.05.08	22	INDUSTRIA	Thonauer Ungarn	Budapest / HU
10. – 13.06.08	24	Automatica	Komax Systems / Komax DE	München / DE
19. – 21.06.08	26	2008 International Electronic Exhibition	komax China	Shenzhen /CN
02. – 05.09.08	36	Electronic India	Bergen Indien	Bangalore / IN
15. – 19.09.08	38	MSV 2008	Komax DE	Brno / CZ
16. – 18.09.08	38	ENERGOTAB	JP International Poland	Bielsko Biala / PL
22. – 25.09.08	39	Motek	Komax Systems	Stuttgart / DE
07. – 10.10.08	41	VIENNA-TEC	Thonauer Österreich	Wien / A
07. – 11.10.08	41	TIB	Thonauer Rumänien	Bukarest / RO
14. – 17.10.08	42	ELOSYS	Thonauer Slovakia	Trencin / SK
16. – 19.10.08	47	Energy Expo.	JML Pro	Minsk / BY
28.10. – 01.11.08	44	Matelec fair Madrid	Estanflux ES	Madrid / ES
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