

GLOBAL MEGATRENDS

The coronavirus pandemic has changed nothing here: environmental awareness, safety, and connected and affordable vehicles are global megatrends, and will act as key drivers of the steady rise in demand for automation solutions. Each of these trends is resulting in more and new types of wire being installed in vehicles, and automated processing is increasingly required for reasons of quality, efficiency, complexity, cost, miniaturization, and traceability.

Global megatrends will support Komax's business in the long term. These include growing environmental awareness on the part of consumers and the associated goal of emission-free vehicles. A key role will be played in this respect by e-mobility (see page 11). Another megatrend is increasing interconnectivity. Infotainment systems in vehicles are becoming increasingly comprehensive and complex, while integrated information systems are laying the basis for the future: autonomous driving. The need for greater road traffic safety represents a further megatrend. Here the emphasis is now no longer just on protection in the event of an accident, but above all on avoiding accidents. As a consequence, the number of sensors in vehicles will continue to rise. Finally, a global megatrend towards affordable vehicles is emerging. This requires greater cost efficiency in manufacturing, which in turn is increasing the pressure to automate wire processing further.

More wires per vehicle

These megatrends are leading to an increase in the number of electronic functions in vehicles. Accordingly, the number of wires that need to be assembled per vehicle is on the rise. The electrical systems in today's compact passenger cars comprise as many as 1 300 wires, 2 300 crimp contacts, and 300 plug housings. Full-size vehicles require as many as 1 900 wires, 3 400 crimp contacts, and 500 plug housings. Innovations in vehicle construction, new functionalities, and an ever-rising fit-out level in all vehicle classes are leading to a further increase in demand for wires and crimp contacts. This trend, which has been perceptible for a number of years now, will strengthen further in the future.

Low degree of automation

A large part of the wire harness manufacturing process is still done by hand, but rising wage costs and an increasing lack of personnel are driving the trend towards automation solutions. As systems become increasingly complex, the potential sources of error in manual wire processing and assembly become more numerous. Manual processes are becoming less capable of meeting these demands. Furthermore, the end-to-end traceability of the individual process steps cannot be ensured with the same degree of reliability that comes with automation solutions. For example, in the absence of automation, the retrospective search for a source of error is more complicated. Intelligent automation solutions, quality assurance tools, and systems for testing harnesses before they are installed in vehicles help to guarantee and increase the efficiency and reliability of the production process. This has been recognized by automotive manufacturers, who are therefore increasingly calling on their suppliers to further automate their production processes.

Simplifying wire harnesses and miniaturization

The individual subsystems and assemblies in vehicles – and wire harnesses in particular – are becoming increasingly complex, which presents challenges for automatic production. To counter this, various automotive manufacturers are seeking to radically simplify the wire harness (see page 17). The aim is a zonal electrical system with several smaller wire harnesses rather than one big, complex one. This reduces wire length, but not necessarily the number of wires used, and this is the key element for Komax. Simpler wire harnesses with shorter wires will help significantly increase the degree of automation in processing.

Another factor driving automation is the ongoing miniaturization of wires, a development that has been around for some years now. Wire cross-sections are becoming ever smaller, which makes manual processing difficult or even impossible.

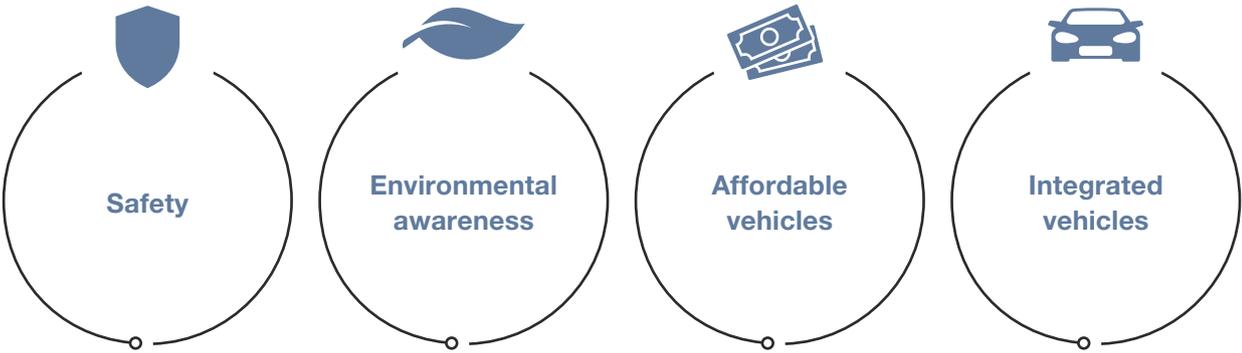
Global megatrends unchanged by coronavirus pandemic

The coronavirus pandemic weighed heavily on the automotive industry, with the result that production figures for 2020 and 2021 were significantly down on previous years (see page 10). As a result, Komax customers had sufficient or even excess capacity for a prolonged period of time, and only resumed investment in capacity expansion as 2021 progressed. The aforementioned factors that are driving a higher degree of automation in wire processing – such as rising wage costs, a lack of personnel, the ongoing process of miniaturization, seamless traceability, and higher quality and efficiency demands on the part of automotive manufacturers – nevertheless had an impact. Discussions between Komax and its customers on increasing the degree of automation in a sustainable way have therefore continued uninterrupted over the last few challenging years.

Customers are aware that there is no way of avoiding the trend towards automation. The coronavirus pandemic has underscored this realization, as – for example – being dependent on the availability of personnel can become a problem. Reducing this dependency therefore becomes a goal to aim for. In the coming years, too, global megatrends will contribute to the step-by-step increase in the automation of wire processing. The current projects of various automotive manufacturers and suppliers that aim to simplify wire harness topology are also designed to increase the degree of automation significantly. Komax is involved in some of these projects, and is demonstrating what changes are needed to wire harnesses in order to facilitate a greater degree of automation in the production process. Modern wiring concepts (e.g., for infotainment systems or electric vehicles) also present opportunities for Komax to establish further unique selling propositions and thereby create additional sales potential.

The rapid proliferation of the zero-error tolerance principle means there is an increasing need for test systems to guarantee the 100% functionality of wire harnesses and electronic assemblies installed in vehicles. This is understandable, as defective wire harnesses require considerable time and expense – at the cost of productivity and profitability – to repair or replace once they have been fitted in a vehicle. Moreover, functional defects in the electronic systems of delivered vehicles can result in serious reputational damage.

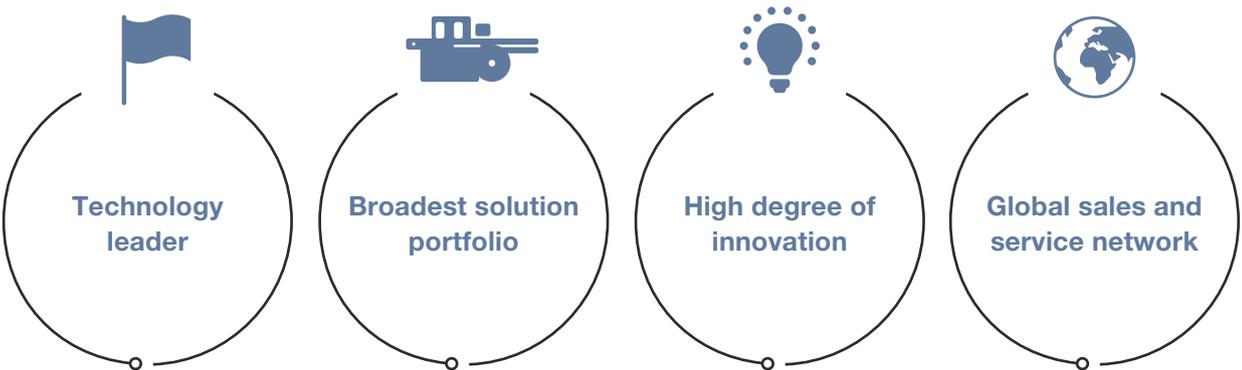
GLOBAL MEGATRENDS



GROWTH DRIVERS

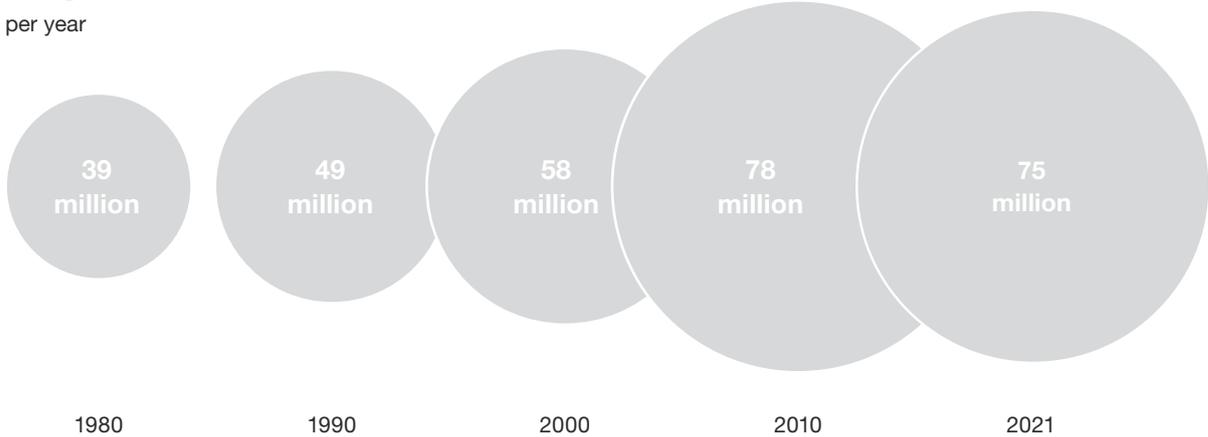


ADVANTAGES OF KOMAX



NUMBER OF VEHICLES PRODUCED WORLDWIDE¹

per year



¹ Passenger cars and light commercial vehicles (source: IHS Markit).

INCREASE IN ELECTRICAL FUNCTIONS

