

# GLOBAL MEGATRENDS

Environmental awareness, safety, as well as networked and affordable vehicles are global megatrends, and will act as key drivers of the steady rise in demand for automation solutions in the medium and long term. 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 16). 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 250 plug housings. Full-size vehicles require as many as 1 800 wires, 3 200 crimp contacts, and 350 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 throws up challenges for automatic production. To counter this, various automotive manufacturers are seeking to radically simplify the wire harness. 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.

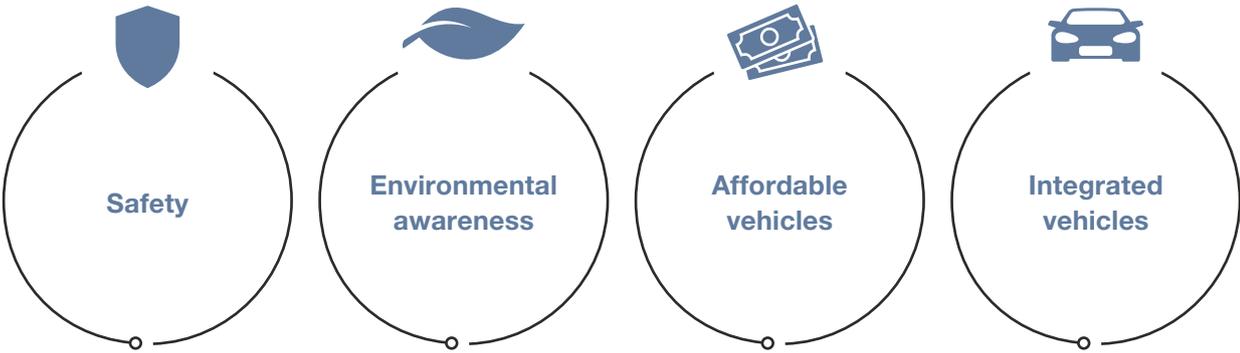
**Growth opportunities for Komax**

The automotive industry suffered in all geographical regions in the year under review, and this is reflected in lower production figures (see page 9). Consequently, Komax customers did not invest in capacity expansion. 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. Customers are aware that there is no way of avoiding the trend towards automation. They therefore invested in automation solutions in 2019, too, albeit to a lesser extent, with lower investment volumes, given the economic backdrop. This momentary snapshot does not change the fact that global megatrends will lead to a step-by-step increase in the degree of automation in wire processing over the next few years. 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 the kind of test systems produced by TSK, for example. Test systems of this kind guarantee the 100% functionality of wire harnesses and electronic assemblies installed in vehicles.

Komax possesses a broad spectrum of solutions that provides its customers with convincing answers to the current global megatrends. Komax is also seeing a number of trends from the automotive industry gain momentum in other market segments in which it is active. Thanks to its expertise and the market proximity of its product range, Komax is in a very good position to generate growth outside the automotive industry, too.

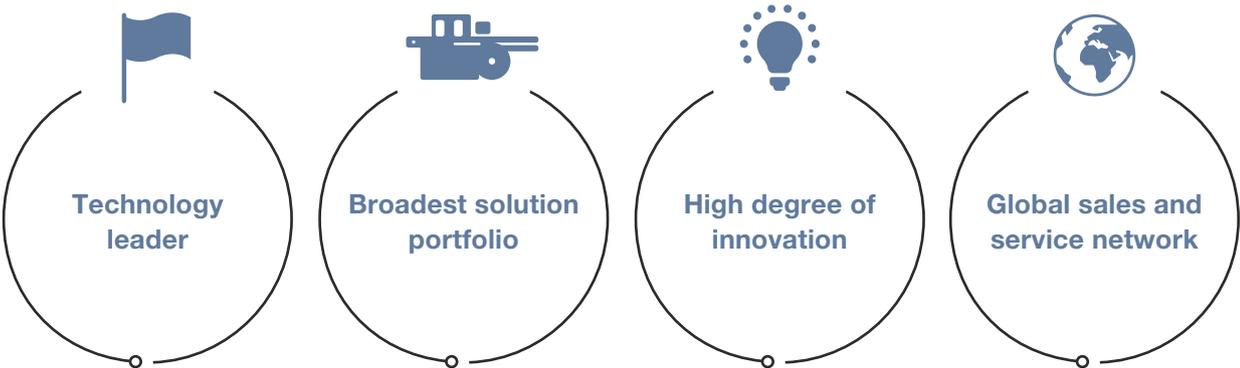
## GLOBAL MEGATRENDS



## GROWTH DRIVERS

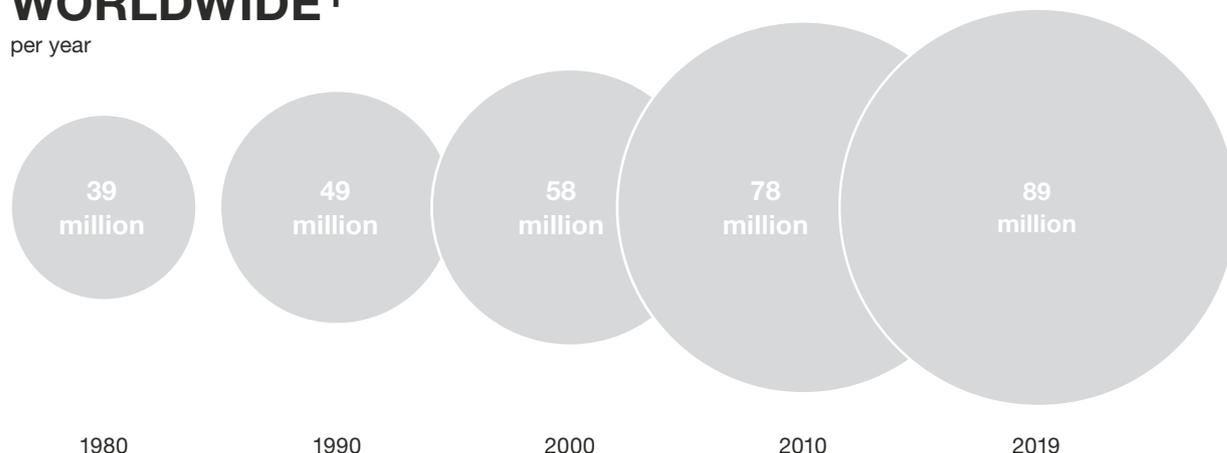


## ADVANTAGES OF KOMAX



## NUMBER OF VEHICLES PRODUCED WORLDWIDE<sup>1</sup>

per year



<sup>1</sup> Passenger cars and light commercial vehicles (source: IHS Markit).

## INCREASE IN ELECTRICAL FUNCTIONS

