

Distributed Diagnostic Systems

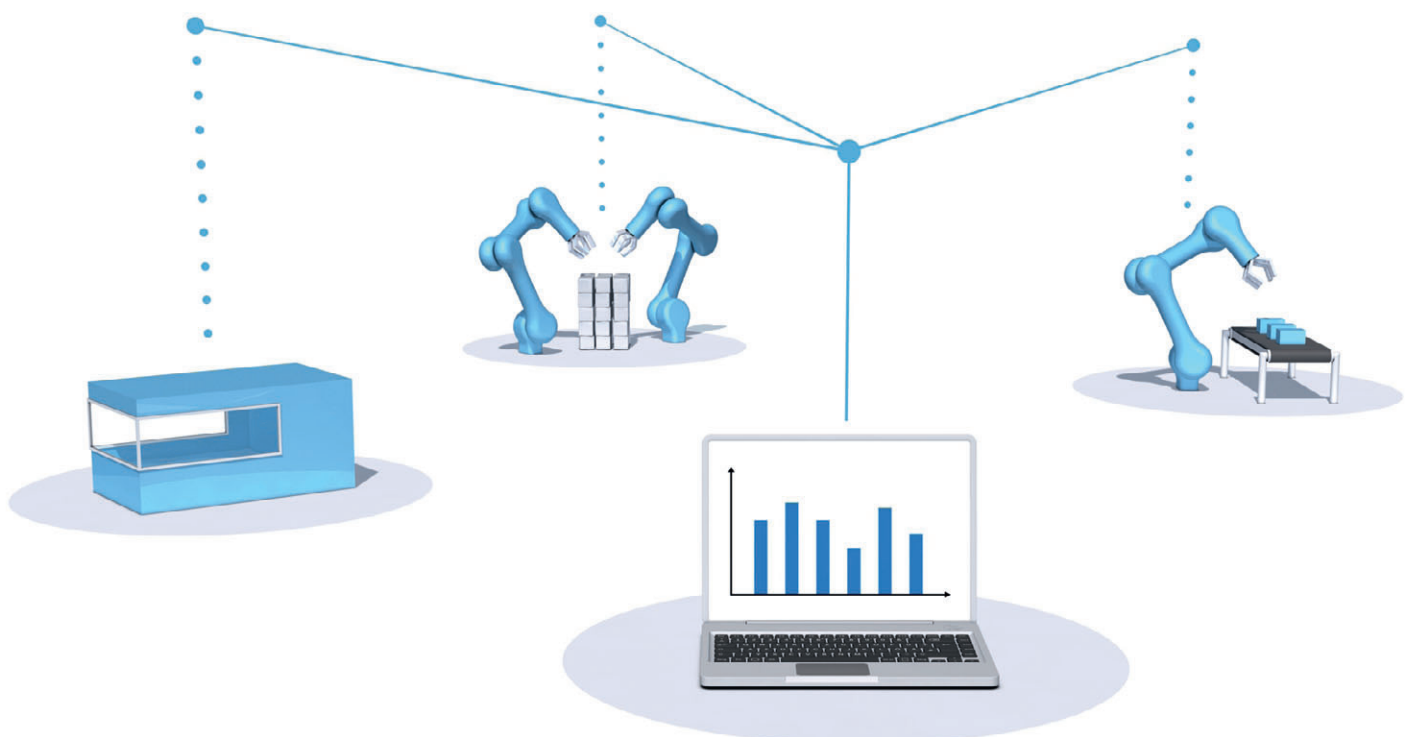
Tried and proven diagnostic concepts for high production line availability

As in the vehicle, the systems in industry are growing in complexity too. Particularly the trend towards Industry 4.0 will see the use of sensors on a far broader scale. Alongside this, the demands on the diagnostic systems are increasing as well: These must permanently check whether all system components are still working reliably and respond to any problems. In addition, operators want to keep a system available even if a failure has occurred in one part of it. For instance, a faulty temperature sensor can be substituted – at least temporarily – by computing the temperature with a model generated from the values measured by other sensors.

In the automotive sector, IAV can draw on decades of experience in developing solutions for on-board diagnostics (OBD). Recent years have witnessed the growing use of distributed diagnostic systems which are integrated on a decentralized basis in various control units, spreading the computing load over several microcontrollers. It is also important to avoid follow-on faults: As soon as a problem is identified, related diagnoses are disabled to prevent further entries from being made in the fault memory. In doing so, we take account of the relationships at system level.

We now want to use this successful approach for industrial plants in order to continue operating production lines in a sub-system after production line failure and minimize the costs of faults. For this reason, we develop distributed diagnostic concepts for our customers that are perfectly tailored to the requirements of safety-critical and high-availability systems.

In over 35 years of automotive engineering, IAV has gathered experience in complex systems, using this to enhance numerous digital tools and methods. We are now making this expertise available to customers from industry, e.g. for the Internet of Things (IoT). Among other aspects, our mathematicians, data scientists, IT specialists and control engineers are working on solutions that meet our customers' needs in an ideal manner. Whenever necessary, we cooperate with leading solution providers in customer projects.



The Quicker Way to Eliminating Production Problems



Distributed diagnostic systems permit a faster response, ...



... help to cope with complex systems ...



... and simplify troubleshooting.

The increasing use of integrated production lines is resulting in complex systems. Production runs through a closed loop of machines and lines. There are hardly any buffer memories. If problems occur, production must, in most cases, be completely interrupted, resulting in high financial losses.

Connectivity provides an overall, central picture

One of the reasons for this is lacking interconnection: machines and lines do not communicate with each other, which means there is no central overall picture and no substitute responses are possible at system level. If, on the other hand, the technology were to be interconnected, problems could be gathered at a central level, displayed on operating terminals and a string of follow-on faults avoided. Personnel could respond more quickly and try to maintain production, at least in part – e.g. by reducing the speed of production.

Distributed diagnostic systems: tried and proven in the automotive industry
Extremely complex systems are also at play in vehicles, for example the exhaust gas aftertreatment system. If a technical problem occurs here, distributed diagnostics identify the cause and report it to the superordinate control system. This can then initiate a substitute response, making it possible to continue the journey, at least for a while. We are now applying this tried and proven principle to the beverage industry.

Complete service for fewer production downtimes

Our experts develop architectures for interpreting faults and implement them in existing or new production lines in the beverage industry. For this purpose, we provide software modules that are compatible with the control systems of well-known manufacturers, such as Siemens, Phoenix and Beckhoff, and can be integrated in modular form. Our customers benefit from simplified troubleshooting and detailed logging of the operating parameters at the time of a malfunction – an important key to providing remedial action. Predictive diagnostics are also possible which, proceeding from patterns or trends in the operating data, point to imminent problems and permit predictive maintenance.