

USING MECHATRONICS TO EXPLOIT POTENTIAL WORTH MILLIONS

By Professor Werner Bick, Chief Executive Officer of ROI Management Consulting AG

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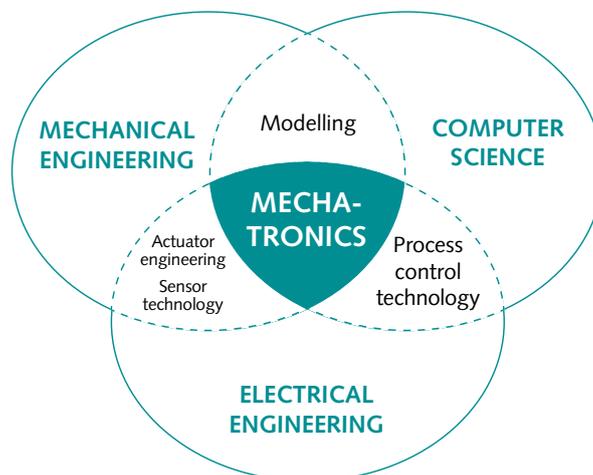
Programming our home cinema via smartphone, crafting models on a 3D printer or receiving Twitter posts from our own car. These are no longer visions of the future but everyday occurrences that are achievable thanks to ever new combinations of micro-electronic systems with information and communications technologies. In terms of 'intelligent production' this also means a profound change for production processes. Development is clearly moving in the direction of flexible and intelligent automation that makes optimal use of technical innovations. Here it is not just a question of networking machines, workpieces, means of transport and humans in an intelligent manner with the aid of IT and sensors and actuators. What is also important is the early integration of electrical engineering and information technology particularly in research and development (R&D). Our industry analyses demonstrate that integrated mechatronic product concepts at machinery and plant construction companies could generate a significant boost in efficiency. And yet many

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businesses in the industry continue to rely on traditional processes within R&D and thereby neglect cost saving potential running into millions.

Overcoming inflexible departmental thinking

Mechatronic concepts systematically combine process steps from mechanical engineering, electrical engineering and IT across development, production and process design. This is made possible, first, by the fall in the costs of high-performance processors and complex sensor technology that are available as components for serial production. Second, a look at the production cycles in other industries illustrates just what a huge influence the dynamic speed of hardware and software development is now having there. For example, medium-sized and even compact cars now have driver assistance systems that only a few model generations ago were reserved for owners of luxury-segment vehicles. This is mainly due to efficient and integrated product development processes in the automotive industry.





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On average 30 per cent of the costs of a car nowadays are due to electronics. This means that car designers and construction engineers are having to work together with electronics engineers and IT specialists from a very early stage of product development since changes become more expensive the closer a vehicle approaches the start of production.

However, the machinery and plant construction sector is still very far from such a simultaneous, mechatronic approach. This can become a serious problem even for many established businesses in the next 5-10 years since technology push is already putting the market under a great deal of pressure. Even so, most machinery and plant construction companies are already familiar with the approach – the difficulties lie in its implementation. The main cause for this is the sequential nature of traditional processes. Engineers develop a machine or a component and only then pass their ideas on to electronics and software engineers in a second step. But by sticking to the conventional process model these companies are wasting considerable value creation potential. Mechanical engineering companies with a mechatronic approach are at least 20 per cent faster in devel-

oping an idea from the initial sketches to the product ready to go into production than competitors without such an approach.

Improvements can also be achieved in quality planning. Early interdisciplinary collaboration identifies and solves problems early on. This method reduces the error rate and the number of product tests, which can generate a further 10 per cent potential saving in product costs. Potential savings running into millions can be realized in this way even with small order volumes.

Using mechatronic approaches successfully

Best practice projects managed by ROI in the machinery and plant construction field show that the following key factors are decisive for the success of projects:

- **Early integration of mechanical engineering questions with hardware and software aspects**
The central factor for success is to think and act in terms of mechatronic systems from the very beginning of development. As a first step in product development, the overall architecture of a product should be drafted and a decision reached on how the required functions are to be realized. This ensures that companies find the overall best solution – whether mechanical or software-dependent – for the function concerned, which shortens delivery times and reduces production costs.
- **Analysis of value chain structures from different perspectives**
All functions involved in development and production must analyze the value chain structure and develop proposals for improvement at an early stage. This applies particularly to widely differentiated product portfolios with high costs attributable to complexity. This allows a precise analysis of which 'variant drivers' cause internal/technical complexity. These can then be divided up into components with strong and weak sales, thus quickly revealing potential.
- **Activation of partners along the supply chain**
Interdisciplinary collaboration need not be restricted to one's own company. Those responsible for production in partner companies and suppliers are good sources of ideas for R&D, particularly in companies operating internationally, since they are for example more familiar with preferences and changes in regional markets.

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