



Towards a cellular future

Optimised single-cell manufacturing units will play a major role in the tire industry of the future, writes Harm Voortman

The tire industry needs to think and act differently and become more agile than it is today. For many companies, that will not be easy.

Even before Covid-19, many factors were driving change in the tire industry: growing environmental concerns, a rapid shift to electric vehicles, potential new entrants into the market, intense cost concerns leading to greater automation, the rise of data analytics as a key factor in rethinking production processes.

These pressures have not gone away, and the Covid crisis has just accelerated change, weakened the status quo and made the search for efficiency more intense.

Optimised production

Most tire manufacturers today are optimised for mass production: they work best when they can make long runs of the same tire design. The trouble is that production runs are becoming shorter, the number of designs is increasing and the need for agile production can only grow. The techniques that have served this industry well for decades will become progressively less appropriate.

The future will probably belong to single-cell production methods, which are inherently more flexible. It's easier to make rapid changes to meet market demand when you only need to manage a single, integrated system, rather than trying to coordinate many different machines.

The concept of single-cell manufacture is not new. Most of the majors have built their own systems at one time or other, but they have proved very expensive to operate. So, they have generally been used only for the most specialised products, with high enough sale prices to justify the move away from traditional mass production techniques.

In future, we think that on-demand production will become completely normal, but the market will not accept higher prices for what customers will see as just "the new normal", a natural evolutionary upgrade.

If single-cell manufacture, optimised for on-demand working, is the likely shape of the future, how do we make this technology work reliably? And how do we get the economics right?

Innovative new solutions must not only lead to higher production efficiency and better product quality: they must also reduce costs. Moving

from today's mass production reality to a future of multiple variants and shorter runs cannot be achieved by using technology that requires customers to pay more, because they simply won't.

Future vision

Our vision is a future in which tire companies build precisely what the market requires, when needed, at a price the market will afford. This goal can only be reached when tire companies can raise their levels of flexibility while reducing their own costs.

This kind of strategic change will not happen overnight, so we need a roadmap to the future that controls risks and delivers benefits as soon as possible.

We also need to understand the key enabling technologies needed to drive the right outcomes for tire companies of every kind, at any stage in their development. We don't claim to have all the answers, but we do have a good idea of how to turn vision into practical solutions that deliver for customers. So what do we envisage?

A few important concepts will drive change over the next few years: data analytics (evolving into

Artificial Intelligence), factory-wide management systems, and controlled use of greater automation. Let's explore these.

First, agile production is all about data, both in managing production and in meeting increasingly tough quality and regulatory standards.

Data analytics will be used to:

- Manage production systems, diagnosing issues, spotting trends that require intervention, while enabling proactive maintenance. Data-enabled systems should help eliminate unplanned downtime and deliver major efficiency gains.

- Monitor and manage output, producing detailed audit data to prove the quality and performance levels of every product. Each tire will have its own pedigree, meeting market needs precisely and ensuring compliance with environmental regulations.

We are close to delivering this kind of capability using current systems, and the degree of control provided by AI will make it possible to reduce wastage, costs, time lost in changeovers and transform environmental performance.

Second, current state-of-the-art, factory-wide management systems provide advanced control for tire building machines, but the very latest systems can offer even better functionality for entire groups of machines, not just in one factory, but also multi-site.

Centralised control, eventually enabled by AI, will transform management of end-to-end production through greater visibility of what is happening; enhanced flexibility (rapid changes of everything from materials to recipes to remedial intervention); and factory-wide coordination (all systems working in harmony). When this vision becomes reality, manufacturers will find it easier to work flexibly, while reducing costs.

Third, we need to control risks by automating in a step-by-step manner. "Big Bang" launches of new technologies are appropriate for new (greenfield) factories, but probably not for existing plants. In the future it is possible – likely, even – that companies will build tire-building plants to an entirely new design.



Production runs are becoming shorter, increasing the need for agile production

Smaller, closer to end-user markets, designed to provide what these specific markets want, when they want them and at the right price. We may be seeing a trend that ends with the disappearance of today's huge, centralised production facilities, and single-cell production will be the key enabler for this.

That change is for the future. Right now, tire companies cannot and will not write-down their investments in current facilities, yet they can and must start to profit from the efficiency gains offered by new technologies. They can do this by combining process stages that remain separate today, requiring different machines and involving plenty of manpower, storage, energy use and wastage.

The single-cell strategy is the natural next step for tire manufacturing, but a low-risk approach may involve trying out options through such concepts as machines that combine extrusion and cutting in a single operation. Systems of this kind are now available that demonstrate how integrating previously separate stages in a single-cell approach really does work. This could be an important step towards more efficient, agile tire manufacture.



HARM VOORTMAN is a member of the executive board of TKH, parent company of VMI of which he has been president & CEO since 2010. This year, VMI which employs 1,600 people at production facilities and offices in nine countries over four continents, celebrates its 75th year anniversary – its heritage dating back to 1945, when Jan de Lange founded the Veluwe Machine Industrie. Noting the significant anniversary, Voortman said: "We know that no business has a right to a successful future because it has a great past. Our history gives us confidence in the need to think strategically, be stubborn about long-term investment, and realistic about what works in economic, business and quality terms."