

Manufacturing, reinvented

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(PhysOrg.com) -- European researchers have created the architecture, hardware and software that will enable super-agile distributed corporations capable of reconfiguring themselves on the fly. It promises to make 'made-to-order' a reality for consumers.

European researchers have created hardware and software that will enable companies to fundamentally revolutionise the way they manage and run their organisation, moving manufacturing from hierarchical divisions to an increasingly distributed collection of resources and production units.

It will ultimately mean that customers, whether other businesses or consumers, can choose the exact product they want, tailored to their precise requirements. It will mean that orders can be changed up to the moment before they are manufactured and it will mean production lines can adapt to changes in fashion or design, almost instantly.

More than made to order, this is bespoke or custom manufacturing for mass markets, a seeming paradox that is resolved by the agility and adaptability of a new business architecture designed by the European project, Pabadis Promise.

It is no longer about what is obvious, but what is possible, and the concept goes way beyond specifying five types of upholstery, one for each seat in you car, for instance.

It could even completely reinvent product engineering. Currently,

designers choose the type of product they want, design it, and then adapt the production line to the product.

But in a Pabadis Promise-enabled enterprise, engineers could reverse that concept by looking at the resources and production facilities they have and figuring out what different types of product those machines can make.

No pasta from a steel mill

When a company is so flexible that it can reconfigure its production on the fly, what does it matter what it makes, as long as it is profitable.

“Obviously, there are limits,” explains Arndt Lüder. “You are not going to get pasta out of a steel mill.”

And thanks to a combination of simulation software and hardware that the company will be able to develop, production line engineers can test new production configurations to discover which are the most effective, confident that the results are a reliable reflection of the real world.

The EU-funded Pabadis Promise is a follow-up project to Pabadis, which conceived the fundamental concept of a very highly agile management and production structure. The current project sought to realise the promise of Pabadis, which stands for Product Oriented Manufacturing Systems and Reconfigurable Enterprises.

Big-name backing

The system has the backing of some of the biggest names in business management and production engineering, world leading companies like SAP, which produce enterprise resource planning (ERP) software, and

Siemens.

It boils down to a combination of software and hardware, to create ‘P2’ systems, where P2 is shorthand for the name of the project.

Hardware consists primarily of a smart RFID tag, dubbed RFIT, or radio frequency information technology. A tiny computer, the RFIT is programmable and it can execute routines locally.

The RFIT can adapt to changing circumstances via interaction with agents - autonomous software routines that can carry out specific functions. Most tasks require several cooperating agents, and it is this capacity to cooperate that makes the system so flexible.

These agents interact with an advanced ERP system, which requires detailed process and product description languages, using semantic technologies based on business and manufacturing ontologies. In a semantic system, ontologies are dictionaries of terms that machines can ‘understand’, offering the context and how it relates to other elements in the overall system.

The RFIT uses machine-interpretable descriptions of data, services, and processes enabling it to interact autonomously and perform critical functions.

Allied to this, the team developed a special simulation that combines real machines with a digital simulation of a given production line. “This has proven to be a very reliable way of testing how a [production line](#) will perform in the real world,” explains Lüder. “It is a useful result in its own right.”

The team has shown that the technology works, and performs as intended. Though it will be five years before a full-blown system makes

its appearance.

In the meantime, companies and academic peers are very interested in the project's work and results, and already a limited version of the technology is working in the Fiat Mirafiori plant at Turin, Italy.

Defi systems, the partner responsible for the RFIT unit, is already commercialising the technology, and is currently working on its third version, which will be the size of USB memory stick. And SAP is currently introducing part of the project's results into the next version of its world-class ERP system.

More information: [Pabadis Promise project](#)

Provided by [ICT Results](#)

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