PRODUCT ENGINEERING AND SIMULATION: A BREAKTROUGH FOR AGILE COLLABORATION

TEACHINGS FROM A COVID YEAR

As we look forward to a Happy New Year 2021, good health wishes take on a renewed meaning after the damages of Covid-19. Taking a step back, the human toll due to the pandemic can render insignificant the analysis and lessons of the economic impact. If we wish to play a constructive role, we can strive to work more efficiently, be more resilient, and implement a product development «resilient to changes », and make 2021 a rebound year.

Looking at the development of industrial products, the major lessons for 2020 include the widespread practice of home working, the need for resilience, the ability to allocate engineering work – design and simulation activities – within product development processes ("design chain") that are potentially fragmented geographically, spread outside industrial sites, shaken by the ups and downs of a tormented supply chain that are reflected by the telluric shocks of the world economy.

The concepts of resilience, digital continuity, remote working and agility, as old as they are, found and will find this year a new meaning.

THE CHALLENGES OF A RESILIENT, CROSS-LINKED, AGILE DESIGN CHAIN

As a result of this context, in most companies the design chain – which relies on increasingly advanced simulation functions –is facing fragmentation of applications, digital disruptions, and the cumbersome coordination of disciplines (especially at a distance) and finally the sometimes 'unavoidable' use of physical testing resources or high-power computing resources not available at home "right from your sofa".

To operate remotely, to avoid the compartmentalization of the disciplines and to take the hit, it is necessary to investigate the digital ruptures of the design processes first. In today's meaning of this concept, which began thirty years ago, several aspects may be considered.

DENIS DEBAECKER, PARTNER, MEWS PARTNERS

1. Install or consolidate the information systems that constitute the backbone of the product design. This is of course the PLM: have a solid PLM repository, for the appropriate need for functional coverage.
2. Connect this repository to the vital components of the information system: it is a field for gradual and vast improvement: interface with the ERP/MES, but also with project management, and via the RPA (Robotic Process Automation) of a multitude of business applications.
3. Consider the flexibility of the cloud.
4. Take advantage of new technologies – and the disruptions they bring – to meet the challenge of multi-disciplinary collaboration, and address the issue of the silos of design-simulation.

THE MULTI-DISCIPLINARY SILOS

The specialization of engineering disciplines is increasing and making it more difficult to work together. Quality, costing, performance, etc. do not speak the same language. Today you can find oil spray specialists for the gearbox! Forty years ago, a mechanic could do everything, today a vehicle has electronics, software, artificial intelligence, carbon free electric motors, hydrogen tomorrow, 5G, connected services, etc.

And, of course, each domain owns specific equipment, CAD software for example, different from its partners'. How to untangle this complex web in these conditions? Especially since we have to decide quickly!

The question has traditionally been addressed in two ways. The big software companies work to provide and impose a single model. But alternatives are emerging: they involve not sharing the infinite representations of the product (CAD, drawing, CAE, tests data, etc.) file-based data, but only the fundamental and key information they contain parameters and decision rules.

The idea is to build a core model containing only the parameters useful for the decisions to be made. For example, for a CAD model with hundreds of parameters, the architect of the subset will select the five or six parameters that are most useful to him, which are impacting the objectives and performance of the product and track them in his dashboard. These parameters may vary during the project. This monitoring can be supplemented with steering tools to compare options and perform design alternative studies ("what if").

The Karren software, developed by Digital Product Simulation, a simulation specialist, does this and illustrates the capability of modelling and linking the key data of a design – simulation chain, while leaving them in their original applications, and offers a lightweight, cloud-ready control of the concurrent parameters of a product under development.

THE SUPPORT OF METHODOLOGICAL & ORGANISATIONAL COMPONENTS

In addition to the aforementioned applications, their connection and light control models such as Karren, methodological bricks come to the rescue of project managers and R&D:
- To identify key interface data;
- To promote agility and decoupling of engineering deliverables;
- To support change.

Identifying which key data to convey requires method and rigour and while respecting the customer's voice, and enables the detection of key product parameters as well as scheduling of design decisions.
On this basis, and to cushion the vagaries of customer demands, delays or problems of some suppliers or businesses, biomimicry suggests, as for the Internet, that we should be inspired by the robustness of spider webs: Decouple tasks and deliverables to be able to make progress on elementary work as independently as possible, until critical meeting points.
Finally, any disruption in the ways of working requires an adequate management of change to facilitate the appropriation of these new, lighter, resilient and agile methods and tools. Denis DEBAEKER

www.cad-magazine.com