PRODUCT FAMILY ENGINEERING

KEYWORDS

Concept design, structural reinforcement, lightweight design, product-production co-design, topology optimization.

In many companies, new product designs share a lot of commonalities with their previously designed products. To optimally reuse your design assets such as models, codes, simulation results, test results, etc.. it is recommended to adopt a product line engineering approach.

Using this approach, a product family is defined, after which designers can specify variants and product variant codes are generated automatically. This approach improves productivity, quality and time-to-market.

WHAT WE OFFER

- Development of a modular approach to manage the variability within a product family and to automatically configure software for a given chosen variant
- Development of modular tooling to assist trade-off analysis of performance, cost and value over the entire product family using a platform approach.

SOFTWARE

- Tools: Pure::variant, BVR, Simulink, Enterprise Architect, MagicDraw, Papyrus
- Expertise: Feature modeling (central variability modeling), product family modeling within tools like Simulink/UML/SysML/native code, automatic configuration of the selected product software.

CUSTOMER REFERENCES

ATLAS COPCO
BARCO
BORIT
BOSAL
CNH
DANA
GRAMMER
VAN DE WIELE
NOESIS
PICANOL
PUNCH POWERTRAIN
QINETIQ
RECTICEL
REYNAERS ALUMINIUM
SAMSONITE
SIEMENS
TENNECO
THULE
VAN HOOL
VAN HOECKE
AUTOMATION
VOXDALE
and more..

TESTIMONIALS

We generated thousands of layouts automatically for transmissions in Flanders Make's model based synthesis tool and then analyzed them automatically to arrive at an optimal system. This resulted in a total cost of ownership reduction of 5% for forklift trucks and therefor a significant improvement for the end customer.

Thomas Vyncke
Manager Mechatronic System Design
DANA

Originally, we were making a lot of small shapes of the hard-to-be-formed parts of the plate that then got tested one by one on the press. This was a lengthy process. Thanks to Flanders Make we can do a lot of iterations through simulation packages before we effectively order the mold. As a result, we can eliminate all the manual iterations on the press through the simulation platform. This leads to a better and more accurate product.

Leo Oelbrandt
Industrial Project Manager
BORIT

DANA added a component to analyze and optimize different hybrid concepts in a simple way."The result is a 10% reduction of power in the combustion engine. We've also managed to reduce consumption by 10%.

Steven Vanhee
Advanced Engineering Dept
DANA

Whereas we used to be quite experimental, Flanders Make supported us through simulations, a more educated approach. The result was an optimized bike rack that we have effectively been able to bring into production.

Wim Lernout
Product Development Manager
THULE

Scan me Scan me Scan me Scan me Scan me Scan me

FLANDERS MAKE
DRIVING INNOVATION IN MANUFACTURING

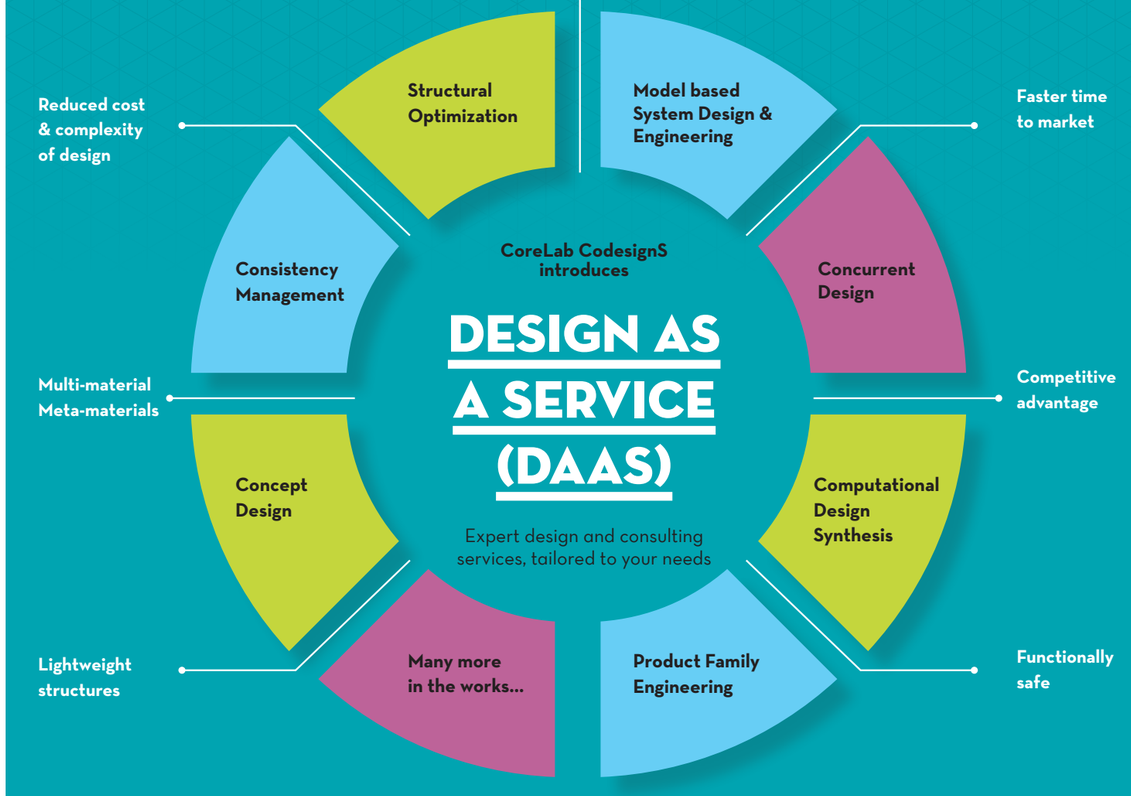
www.flandersmake.be
info.codesigns@flandersmake.be
T +32 11 790 590

FLANDERS MAKE

DRIVING INNOVATION IN MANUFACTURING

In an endless effort to improve competitiveness of the manufacturing industry and thanks to a long and successful record in research and development, Flanders Make introduces a suite of differentiating Design Tools and Services.

Unravel, reduce and contain the complexities of today's design challenges for the realization of differentiating cost-effective mechatronic components or systems, vehicles and flexible production cells. The methods and tools have been developed using standard software packages in order to allow for seamless adaptation by our clients.



DESIGN CHALLENGES THAT WE ADDRESS

- Complexity of products and production systems grows continuously
- Ever increasing number of available design tools and hardware technologies to realize a product
- Trend towards interconnected, intelligent, autonomous systems
- Mechatronics industry expects faster time-to-market, with decreasing designs costs
- Higher design constraints and requirements towards manufacturability, serviceability and safety

STRUCTURAL DESIGN AND OPTIMIZATION

KEYWORDS

Concept design, structural reinforcement, lightweight design, product-production co-design, topology optimization.

Structural optimization is a method to optimally design load-carrying mechanical structures. The objective of the optimization can be to minimize the stresses weight or compliance for a given amount of material and boundary conditions. It can be utilized to design engineering structures from scratch but also to tailor microstructures. Structural Optimization has over the past decades qualified as an important tool in the design process. The method can be grouped into topology, size and shape optimization.

WHAT WE OFFER

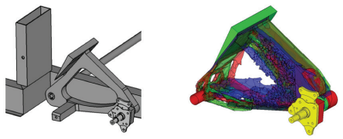
- Optimal mechanical structure design (topology, structure, sizing) for improved functionality, product Quality, robustness, NVH, weight and cost of your mechanical structures
- Assistance to implement Structural Optimization methodologies into your design process
- Design-for-testing services (multiple testing platforms available in-house)
- All these services can use standard (off-the-shelf) or in-house developed design tools

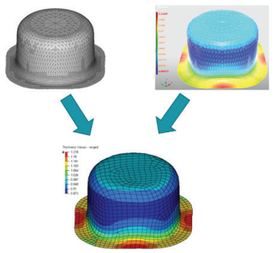
STRUCTURAL OPTIMIZATION TO THE NEXT LEVEL BY

- including the effects of the production process and optimizing the parameters of your production processes
- applying structural optimization for multi-material structures

SOFTWARE:

- Expertise: ALTAIR HYPERWORKS (modules Optistruct & Inspire), MATLAB, FreeCaD
- Tools: Concept filtering and ranking tool, tool for structural design reinforcements, scripts to connect product and process simulations





SUPPORT TOOL FOR MULTI-DISCIPLINARY CONCURRENT DESIGN

KEYWORDS

Inconsistency management, traceability, collaborative design, concurrent engineering

The design of mechatronic products and their production systems is a complex process requiring knowledge and expertise from multiple engineering domains and a strong collaboration between several domain experts. The work of one designer is rarely independent the design activities performed by another one.

For instance, if the autonomy of an electrically driven AGV needs to increase, an electrical engineer might select a bigger battery, which might in turn require a new CAD design, different motor selection etc.

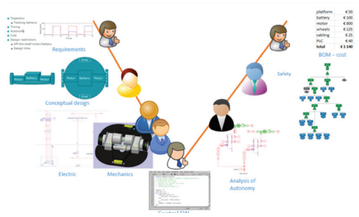
If one of the domain experts forgets to inform another expert affected by these changes, this typically leads to errors which are only detected at integration time, and hence costly iterations and rework. While domain experts are well equipped with analysis tools tailored specifically towards their domain, there is a lack of tools supporting the collaboration between the experts of different domains.

WHAT WE OFFER

- Assessment of your multi-disciplinary design processes leading to suggestions for reducing the number of inconsistencies
- Customized cross-disciplinary information management tool for your specific mechatronic system design process and integrated with your design tools

SOFTWARE:

- Expertise: Eclipse, Papyrus, Sirius, EMF, OCL
- Tools: Excel/E-plan/SysML consistency management tool, SysML templates for mechatronic system dependency descriptions



COMPUTER-SUPPORTED DESIGN OF ASSEMBLY CELLS

KEYWORDS

Engineering Design Automation, Design Space Exploration, Knowledge-Based Engineering.

The complexity of assembly cell design is ever growing. New technologies such as collaborative robots, VR and AR technology result in ever more design candidates to evaluate.
On the other hand, the time to market should always be further shortened and design costs further reduced. Fortunately, the availability of computing power has changed the nature and practice of engineering design and can be used to support designers during the conceptual design of robotic assembly cells.

WHAT WE OFFER

- Support for your designers during the conceptual design of your assembly cell through modeling, simulation, and optimization
- Build customized tools that:
  - exploit computing power to exhaustively generate and evaluate assembly cell design candidates, resulting in optimal designs in shorter design times
  - allow you to formally capture and reuse your assembly cell design knowledge across various design projects

SOFTWARE:

- Expertise: KUKA Sim, ABB Robot Studio, MATLAB, Minizinc, 3D Unity
- Tools: optimal robot selection tool, (human-)robot assembly scheduling tool, workcell geometry and ergonomy optimization tool, (human-)robot assembly scheduling tool, workcell geometry and ergonomy optimization tool

FUNCTIONAL SAFETY

KEYWORDS

Design for Reliability, Physics of Failure

Standards implemented in the Flanders Make Functional Safety Portal (FLAME): ISO 15998, ISO 25119, ISO 26262, IEC 61508, ISO 62061, ISO 13849

As mechatronic systems are becoming more complex and with an increasing number of electric, electronic or programmable electronic systems (E/E systems), companies are confronted with functional safety standards.

These standards are often seen as a burden. It can be challenging how the standard can be implemented into the design process of the company. Next to this for different application domains, different standards are valid. Finally implementing a functional safety standards is time and thus cost consuming. Flanders Make has developed methods and processes to help companies to apply the functional safety standards.

WHAT WE OFFER:

- Generic process generation based on the different standards according to the domain of interest
- Functional safety standard compliance assessment and implementation of your designs (HARA)
- Definition of Safety Integrity Level (SIL, ASIL)
- Use of model-based design tools for applying the different steps in the process
- Functional safety training (on-site, off-site); functional safety academy will launch in 2019

COMPUTER-SUPPORTED DESIGN OF MECHATRONIC SYSTEMS

KEYWORDS

Conceptual design, electro/mechanical/thermal/hydraulic simulation, optimization, design synthesis

The complexity of mechatronic systems is increasing due to increase of components, functions, technologies and demanding requirements. This leads to fast growth of the design space in which the optimal concept needs to be selected. Without supporting tools, designing and analyzing the concepts becomes difficult and time consuming for the designer. This can be solved by computer aided tools to model the different aspects of the system, generated possible concepts and optimize the design to reach the requirements.

WHAT WE OFFER:

- Modeling, simulation, and optimization of your mechatronic components and systems
- Support in the conceptual design phase by generation and evaluation of the possible design candidates

SOFTWARE:

- Expertise: SimCenter-Amesim, MATLAB-SimScape, CASADI, YALMIP
- Tools: drivetrain concept generation tool, optimal physical and control co-design tool