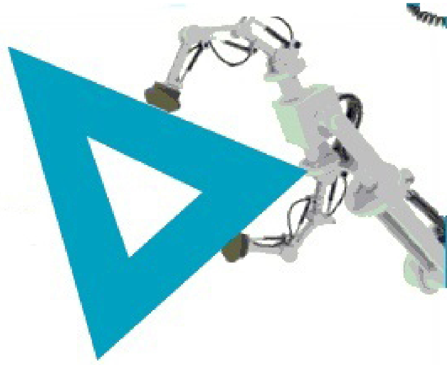
FLANDERS MAKE
MANUFACTURING INNOVATION NETWORK

The Strategic Research Centre for the Manufacturing Industry



PROGRAMME

Utilising the full lightweight potential of sheet material products

Lessons learned in the Flanders Make project "Virtual Design Platform for Sheet Material Products"

Thursday, 28 September 2017

15h00 ***Welcome***

15h30 **Introduction**
Suzanne Van Poppel, Project Leader, Flanders Make

In the design of products in formed sheet material, the lightweight potential is not being fully used as the uncertainty and variability of the production process and their effect on the thickness distribution are not integrated. In the Flanders Make research project 'ViDeSPro', Flanders Make and its project partners developed a methodology taking this into account. This presentation introduces the project and highlights the different parts of the methodology.

15h40 **Linking process and product simulations**
Jan Stroobants, Research Engineer, Flanders Make

In a first step of the ViDeSPro methodology, the simulation of a metal sheet deep drawing process is linked to the stiffness simulation of the final product.
This presentation shows how the thickness distribution of a deep drawn sheet metal part is used in product simulations instead of using the nominal sheet thickness. The improved results have been validated by comparing simulations and tests.

16h00 **Industrial Case – Bosal**
Eric Hansenne, CAE Manager, Bosal Emission Control Systems

The exhaust systems industry makes massively use of sheet metal forming processes. New exhaust generations are becoming lighter and more complex in shape, which makes their performances in terms of durability, NVH, etc. highly sensitive to manufacturing processes. This presentation gives an overview of process simulations and shows how these processes might affect product performances.

16h20 **Optimisation of process parameters by taking product attributes as target function**
Bart Van Doninck, Research Engineer, Flanders Make

When process and product simulations are linked, an overall optimisation loop can be defined so as to optimise the initial sheet properties and production parameters and achieve certain final product attributes. This overall optimisation process can be improved by making use of the sensitivity information of process parameters, process results and *product attributes. In this presentation, methods to perform sensitivity studies and achieve overall optimisation are explained.*

16h40 **Integration and propagation of process model variability**
David Moens, Professor, Flanders Make/KU Leuven-PMA

The Reliable and Robust Mechanical Design research group at KU Leuven studies and develops CAE-based design quality assessment techniques focussing specifically on the effects of parametric uncertainty and variability present in the design under study. Typically, these aspects are translated into non-deterministic quantities in the corresponding model properties and further propagated to the critical design study results. This presentation will focus on the specific challenges arising when manufacturing variability is taken into account in this context. More specifically, the techniques for incorporating the local and therefore often strongly heterogeneous variability throughout the model topology will be discussed and illustrated based on the ViDeSPro case study.

17u00 **Industrial Case – Borit / Noesis**
Leo Oelbrandt, Industrial Project Manager, Borit
Roberto d'Ippolito, Research and Innovation Manager, Noesis

Borit produces bipolar plates for fuel cells based on forming, cutting and welding thin metal sheets. The required complexity of the plate structures requires a very accurate forming process. Simulations of the forming process take a long time and many iterations are required to achieve results that match the production results. Noesis' Optimus software offers the unique capability to automate the engineering and simulation process. A first series of tests showed that a 1-step process was not sufficient to achieve the required channel depth accuracy in the formed plates. A 2-step forming process was investigated and the simulation data were compared to measurements performed on samples formed with this 2-step forming process. The experimental-numerical calibration of the product model with the data-driven process model will improve the simulation accuracy and optimise the manufacturing process capabilities without having to resort to trial-and-error approaches.

17u20 **Q&A**

17h30 ***Networking drink***