Niederlenz Feb. 2016

Coperion K-Tron is a global leader in providing process automation, equipment, systems and solutions for bulk material handling. The company has expertise on feeders, conveying components and material handling systems, used in the plastics, chemical, food and pharmaceutical industries.
Coperion K-Tron's R&D team started to work with Code_Aster in early 2015. The decision to work with Code-Aster was based on the desire to have as less limitations as possible. Two major projects investigated with Code_Aster are shown below to give an idea about our emphases:

Contact & Plasticity Simulations

A key component of our company is our weighing technology. To produce critical parts, operations like deep drawing are performed. To get a deeper understanding of this process and the resulting properties concerning weighing performance, simulations were executed. These simulations included material plasticity, large deformation, contact, and friction. It was possible to get a better understanding of critical parameters and weighing performance effects like hysteresis.

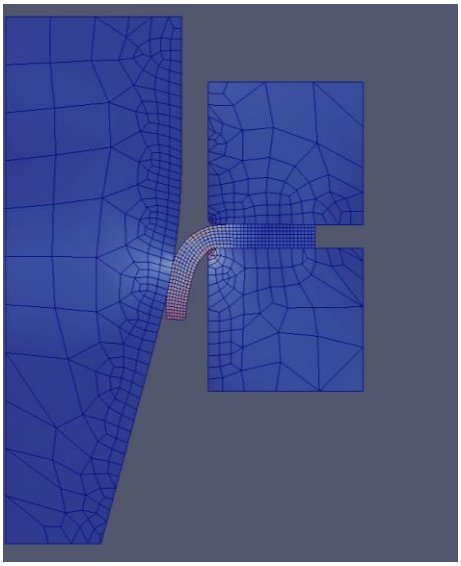

Figure 1: Axial symmetric simulation of the deep draw process

Dynamic Simulations

Dynamic simulations showed the improvement potential for several of our components. A complex model combination of structural and harmonic analysis was no barrier to Code_Aster. The possibility to control the calculation by python made the possibilities almost limitless. An overall python script is used to investigate different geometrical and parametric variations and calculation steps. Code_Aster solves the pre-stressing of the model in a first place and processes the results in a harmonic analysis.

A whole set of load cases are calculated for each individual geometrical modification by a parametric study. Various Data are extracted and post processed at specific points (cf. Figure 2). Python offers a brought variety of possibilities.

The examples return realistic values, matching to the actual product's behaviour. The results help enhancing further improvements on our products as well as gathering new ideas for future developments.

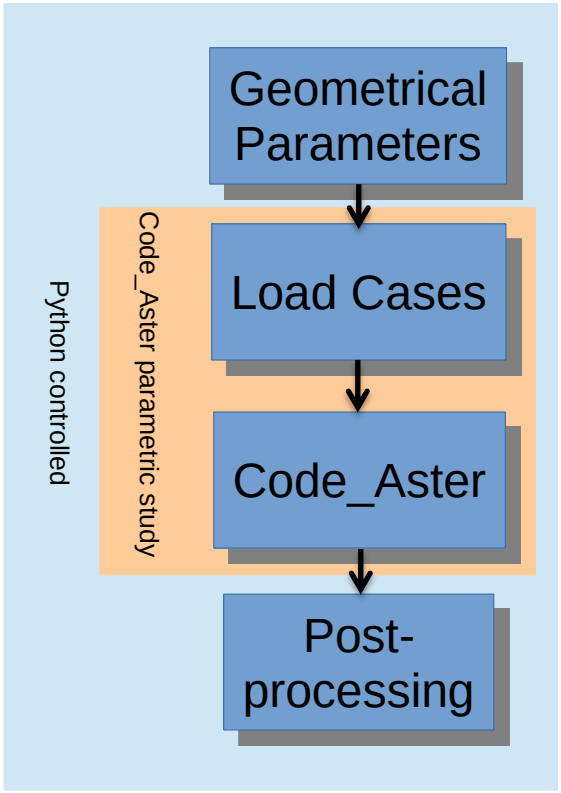

Figure 2: Structure of the simulation process

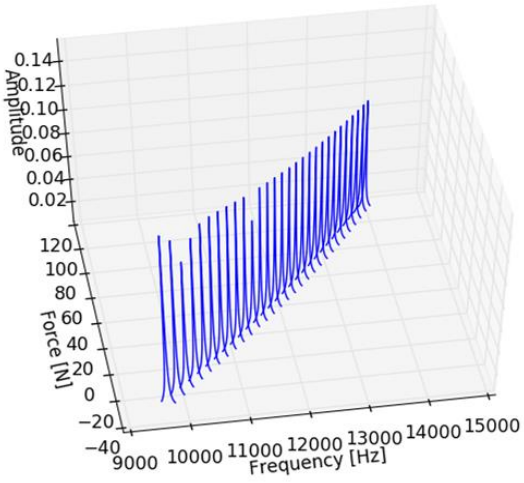

Figure 3: Harmonic response of different load cases

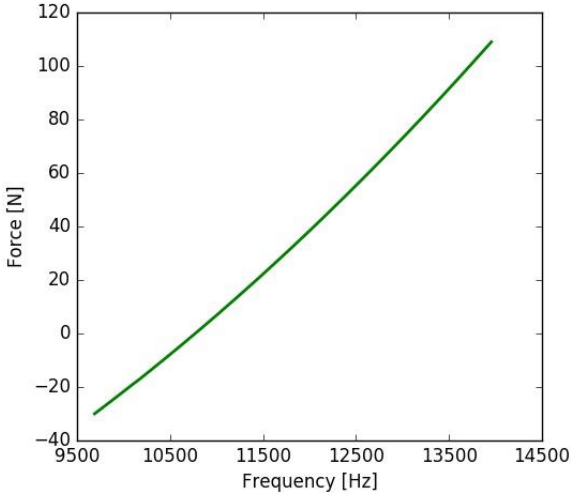

Figure 4: Simulated dependency of force and resonance frequency

Urs Helfenstein
R&D Engineer

Men Bernegger
R&D Engineer