Productivity Gain in Crashworthiness Simulation EASi-CRASH for Complete Safety and Crash Modeling for LS-DYNA

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The pre and post-processing for crashworthiness and safety simulation in automotive development projects is constantly changing. New functionality of the solver requires evolutionary updates, while the paradox of combining reduced lead times with an ever increasing range of regulatory tests calls for more dramatic improvements and innovative approaches.

Hence the changes, the underlying need is constant – to increase productivity in model build-up, analysis and results evaluation for crashworthiness and safety simulation. This paper will present what is essential for productivity gains in crash modelling and results evaluation for simulation with LS-DYNA - exemplified with use cases from OEMs and major safety suppliers.

INTRODUCTION

In a majority of European automotive and safety system development organisations the pre and post-processing for crash and safety are still disintegrated processes with a low level of automation. To stay competitive European automotive development organisations have to perform an increasing number of analyses in less time. Therefore, the productivity of CAE comes into focus. The need for increasing productivity in CAE for crash and safety analysis has never been greater and it will continue to grow.

The increasing demand for simulation is driven by the general acceptance of frontloading strategies for automotive R&D. This demand is emphasised by:

- an increasing complexity of designs
- the increasing number of product variants
- the increasing number and complexity of legal requirements
- the increasing importance of crash and safety performance for the success of the car development projects

Additionally there are developments in the automotive business setting affecting how CAE is applied:

- an increasing application of simultaneous engineering
- an increasing product – process integration
- integration of structural crash and safety
- integration of active and passive safety
- transfer of innovation value added between OEM and supplier
- increasing resource mobility in global organisations
- recent down-sizing of development organisations

In order to manage and benefit from these developments there are a number of measures which can be applied in pre and post processing for LS-DYNA, for example:

- introduce concept simulation earlier
- introduce faster hardware and solvers
- structure and manage simulation data
- automate assembly build-up and welding
- automate meshing
- automate load case build-up and best practices
- automate post-processing and report generation
- automate processes for regulatory test simulation
- introduce screening and optimisation techniques

Before going into depth on the measures to increase productivity we will discuss and exemplify the potential of productivity gains in the environment supporting CAE in general.

The Potential Productivity Increase in Safety and Crash Simulation

A prerequisite for any solution addressing productivity improvement for LS-DYNA is that the right application and functionality is covered. In this case it is pre and post-processing for crash and safety simulation. Since this is supported in EASi-CRASH DYNA, delivering productivity is primarily a question of automation, integration and customization.

A larger European OEM recently presented the following summary on the **potential** productivity improvement in CAE:

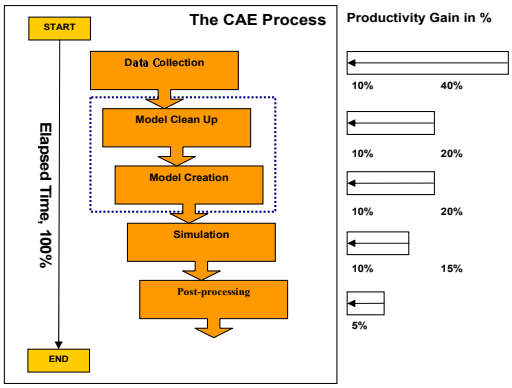

Figure 1. The potential productivity improvement in the CAE process

Conclusions from this organisation are:

- Hence the assumed maturity of pre and post-processing solutions there is a significant potential to reduce elapsed time (by 50%)
- The conventional pre-processing tasks can be improved further
- The majority of potential is in improved data collection

Even though the potential of data collection cannot be ignored, especially not for larger organisations, what matters for increasing productivity differs substantially between organisations/ applications. An idealised CAE process for crash typically covers the following chain of tasks:

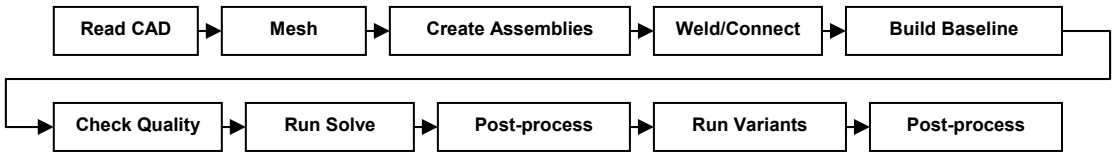

Figure 2. Productivity improvements can be integration of these tasks

When we implement productivity gains we automate the parts of this process or the complete process chain, or we introduce integration where applicable. This requires that the underlying technical platform is complete and process-driven. What this means is described in the next section.