Ansys

STRUCTURES

LS-DYNA in Stamping Applications

For more than three decades, Ansys LS-DYNA® usage in the simulation of sheet metal stamping has been steadily increasing due to its reputation for prediction accuracy. During this period, state-of-the art constitutive models were added for simulating high strength steel and aluminum alloys now commonly used in the automotive industry. In addition, the improved robustness, speed and accuracy of the implicit solver has made gravity loading, binder wrap and springback calculations routine. Die face compensation calculations in LS-DYNA save money and time by eliminating the trial and error in die manufacturing. Many original, unique ideas are implemented to ensure reliable stamping simulations, which makes LS-DYNA® an excellent choice for this manufacturing process.

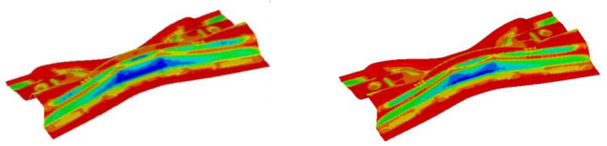
Typical Applications

- Sheet metal gravity loading, binder closing, deep-drawing (shells/solids)
- Springback prediction and springback compensation (shells/solids)
- Trimming and lancing (shell/solids)
- Flanging and hemming
- Hydro-forming
- Magnetic forming and thermal forming
- Superplastic forming
- Denting
- Scrap trim and fall simulation
- Panel transfer in stamping press
- One-step simulation for woven carbon fiber composite
- Roll forming

Features

- Mesh adaptivity
- Advanced material models for aluminum alloy and high strength steels
- Smooth contact to minimize contact noise
- One-step fast forming method
- Un-flanging method in trimming curve development
- Parametric input
- Solid element results mapping
- Formability index: more reliable forming limit prediction for non-linear strain path
- Carbon fiber: predict fiber orientations in the final part and initial blank size corresponding to certain fiber orientation

One step result vs. incremental result

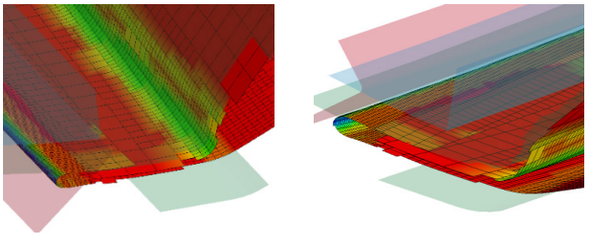


(a) Incremental solution (b) One-step result

Accurate un-flanging simulation for trimming curve development

(a) Before un-flanging (b) After un-flanging

Press hemming simulation



Roll forming simulation