

Stamping Training Course

# Advanced Die Engineering – Getting Started

ESI Stamp Team

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## CONTENTS

PAM-STAMP Cold Forming - I .....	2
About the Course.....	2
Examples Used in the Training.....	2
Content .....	5
00-Jump-Start .....	5
01-Getting Started .....	5
02-Graphic User Interface .....	5
03-Tools .....	5
04-Blank .....	6
05-Material and System of Units .....	6
06-Draw Beads.....	6
07-Process Setup .....	6
08-Solution .....	6
09-Gap Controlled Simulation .....	7
10-Setup Step by Step .....	7
11-Main Curvature Analysis.....	7
12-Post-Processing .....	7
13-Iterations .....	7
14-Compensation .....	8
15-Objects and Attributes .....	8
16-Toolkit – Macros.....	8
17-Front Hood Reinforcement – Die Starter .....	8
18-How-To and Checklist .....	8
19-Utilities .....	8
20 Front Hood Reinforcement.....	8

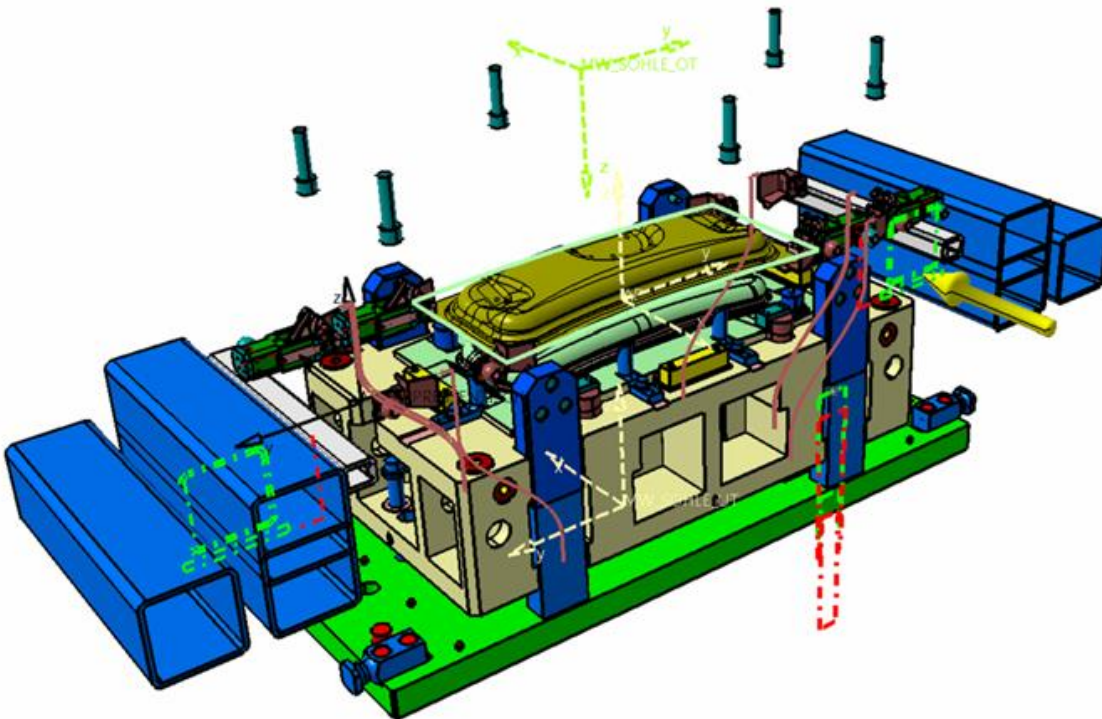
## PAM-STAMP COLD FORMING - I

### ABOUT THE COURSE

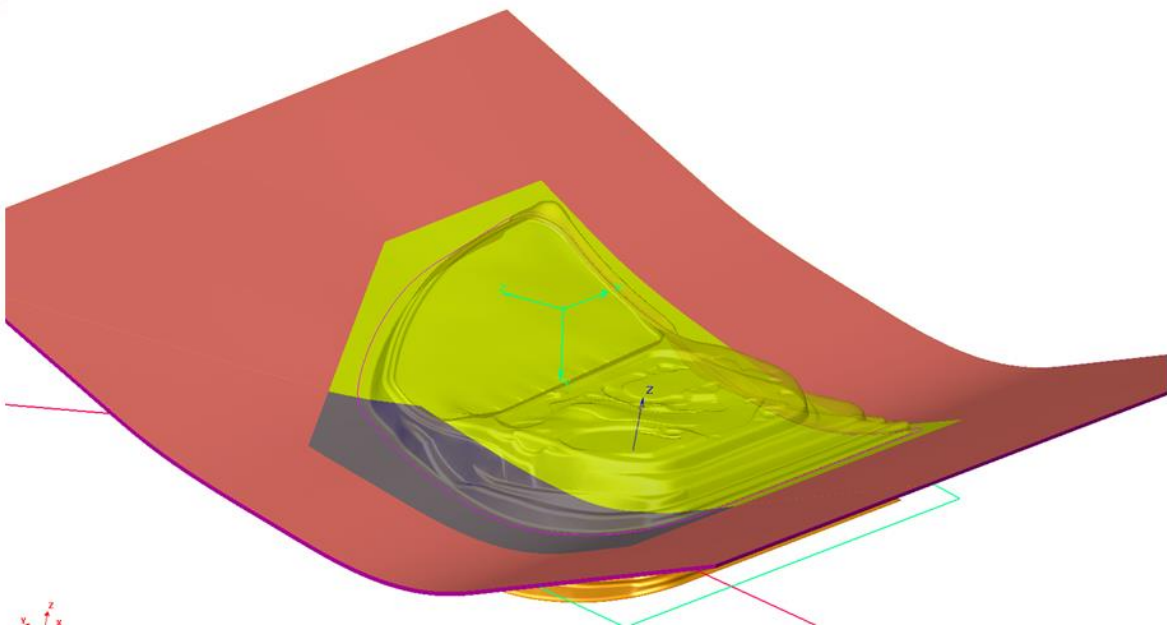
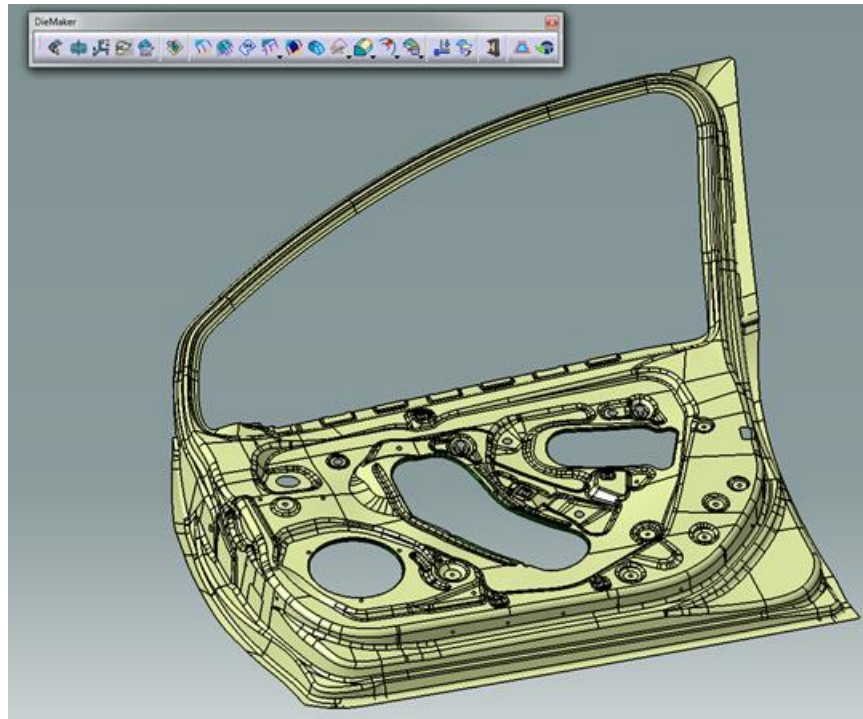
- Students work from the beginning of the course with the software
- The course proceeds in digestible milestones
- Students learn all necessary working techniques – step by step
- Working techniques will be explained by the instructor
- Working techniques are documented with 82 videos (17 die face design)
- Students practice working techniques interactively
- To work interactively, each student does have two screens if number of participants allows
  - One screen to play the videos with start and stop option, following the individual pace, and to see the screen of the instructor via gotoM
  - One screen to exercise the content of the video with the software
  - Videos can be played on any device
- Several examples are treated
- A complete example is exercised, from early feasibility to validation for tryout, springback and compensation, including draw bead and blank shape optimization
- Students take the complete course with all videos home and can repeat any part of the course at any time

### EXAMPLES USED IN THE TRAINING

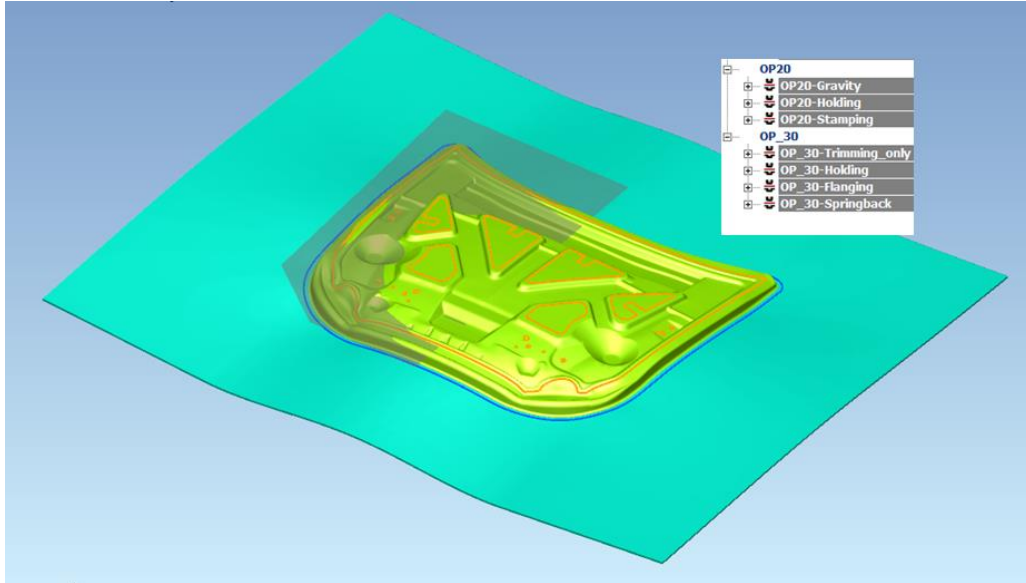
- Front Hood Reinforcement - FHR



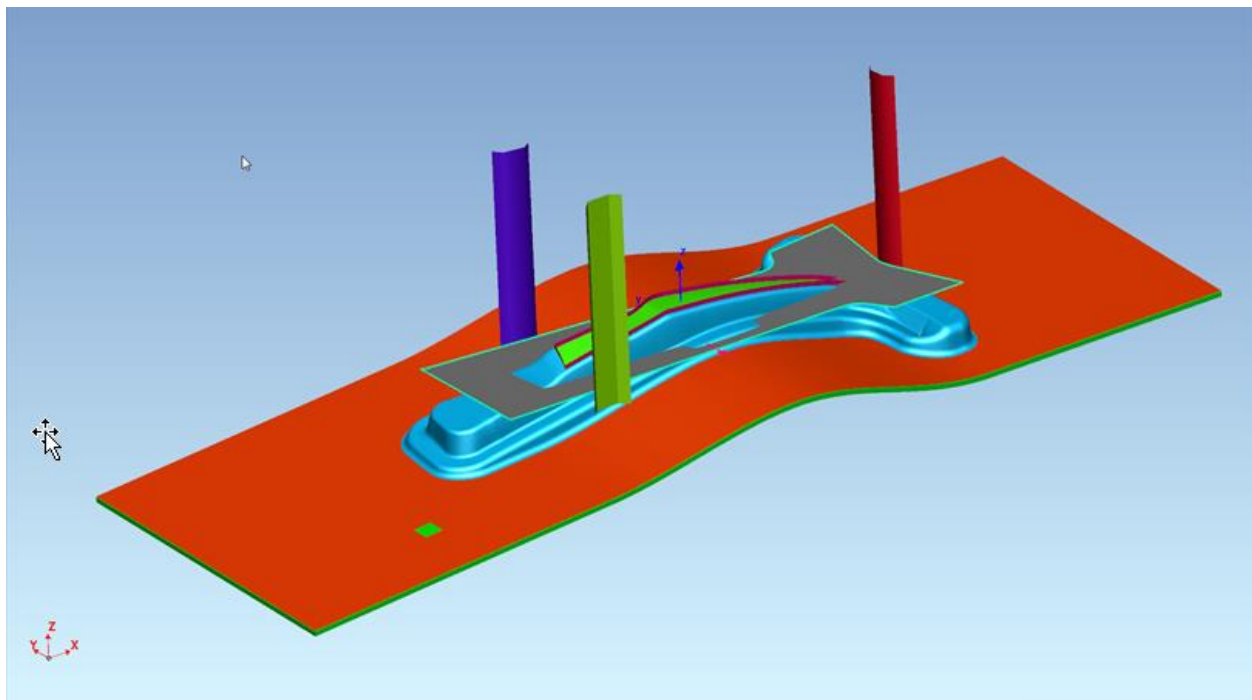
- Door inner with tailored blank



- Hood frame with following operations



- Hot forming sample



## CONTENT

### 00-JUMP-START

- Generate die faces for several parts with the die starter, process a simulation and review results
  - Fender
  - Hood frame
  - Floor panel
  - Front hood reinforcement

### 01-GETTING STARTED

- Graphic user interface
  - Mouse and views
  - Keyboard shortcuts
- Display and select
- Get information
- Change colors of objects
- Check
- Toolbars
- Objects and attributes
- System of units
- Tool mesh check and cleanup
- Measure distance between tools / objects
- Cut model views
- 6 steps to set up a simulation
- Data check, simulation
- How to and checklist

### 02-GRAPHIC USER INTERFACE

- Extension of getting started – GUI – for the interested student

### 03-TOOLS

#### TOOLS

- Building tools based on die face design – automatic
- Building tools with the tools editor – step by step
  - Operation
  - Frame
  - Objects
  - Contents of objects
  - Build tools

- Advanced example with two operations and flanging
- Tailored welded blank with straight weld lines
  - Curved weld lines in the next chapter

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## HOW TO GET THE TOOLS MESH RIGHT

- Background of tools meshing – how to get the best possible results
  - For the interested student to read

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## 04-BLANK

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### BLANK

- Building the blank from an outline
- How to build tailored welded blanks with straight weld lines and tool step lines
- How to build tailored welded blanks with curved weld lines and tool step lines including setting up of the complete project

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## HOW TO GET THE BLANK MESH RIGHT

- Background of blank meshing – how to get the best possible results
  - For the interested student to read

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## 05-MATERIAL AND SYSTEM OF UNITS

- Definition of material and system of units
- Commonly used unit systems
- Material database
- Yield criterion and hardening
- Properties for blank definition

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## 06-DRAW BEADS

- Management of draw beads

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## 07-PROCESS SETUP

- Running macros to set up the process
- Management of the attribute tree

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## 08-SOLUTION

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### SOLUTION – POST-PROCESSING

- Run a simulation
- Configuration of solver host files
- Solve
- Solver messages
- How to check results during solution
- What to check during simulation
- Trouble-shooting

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## DEFINITION OF SOLVER HOSTS

- Details on solver hosts

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## 09-GAP CONTROLLED SIMULATION

- An example is set up gap controlled
- The advantage of doing things gap controlled is explained
- Specific on gap controlled analysis (no blankholder force, defined gap between die and blankholder, coupled kinematic)
- The press force is determined

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## 10-SETUP STEP BY STEP

- The setup of a simulation from scratch, step by step, without the help of any wizards to create faster tools, is explained
- This to understand in depth what is going on and how the system works
- This part is optional

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## 11-MAIN CURVATURE ANALYSIS

- How to find problems in a die design faster, without simulating all the blank
- Part compensation based on validated tools

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## 12-POST-PROCESSING

- Details and capabilities

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## 13-ITERATIONS

How to get a green part

- Blank shape
- Draw beads
- Switch to validation including trimming and springback



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## 14-COMPENSATION

- Spring back and compensation

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## 15-OBJECTS AND ATTRIBUTES

More on objects and attributes – for the interested student

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## 16-TOOLKIT – MACROS

How to program your own automated process setup

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## 17-FRONT HOOD REINFORCEMENT – DIE STARTER

- How to design tools using the die starter
- How to use many draw bead sections

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## 18-HOW-TO AND CHECKLIST

All the questions that come with getting started – and answers – in a document

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## 19-UTILITIES

- Delete all files that are not needed, in the working directory and hierarchical

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## 20 FRONT HOOD REINFORCEMENT

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### CAD CLEAN

- Topology check and cleanup

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### DIE FACE DESIGN

- Step by step from part to export for simulation
- On demand course

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### SETUP AND RUN BASED ON DIE FACE DESIGN

Automatic set up