

Project from the program OP Research and development for innovations

New technologies and special components of machines
CZ.1.05/3.1.00/13.0291

Presentation of the partial project IA5

Intelligent control system tool for sheet drawing

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Sheet drawing technology

Advantages

- Production of parts having plane and spatial shapes of different magnitudes.
- Achieving the quality surface with high accuracy of the prescribed dimensions.
- High stiffness at minimal product weight.

Disadvantages

- As a limiting factor of the drawing technology there is a maximal achievable deformation of the formed material under given technological conditions.
- Problematical boundary technological conditions setting – try and error method.

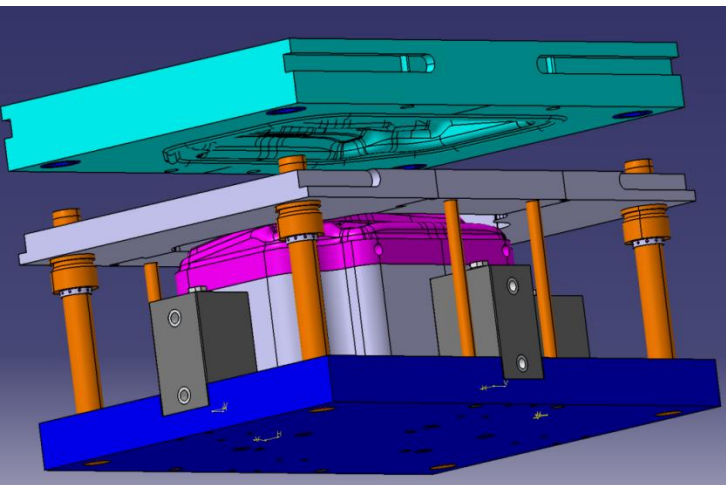
Crucial influence on the stamping quality has magnitude and course of the blank-holding pressure !!!

- At setting of the small blank-holding pressure there is undesirable wrinkling on the stamping – as a defect resulting from the insufficient drawing clearance.
- At setting the high blank-holding pressure there is undesirable deformation distribution on the stamping which results in the crack creation – depletion of the formed material plastic abilities.

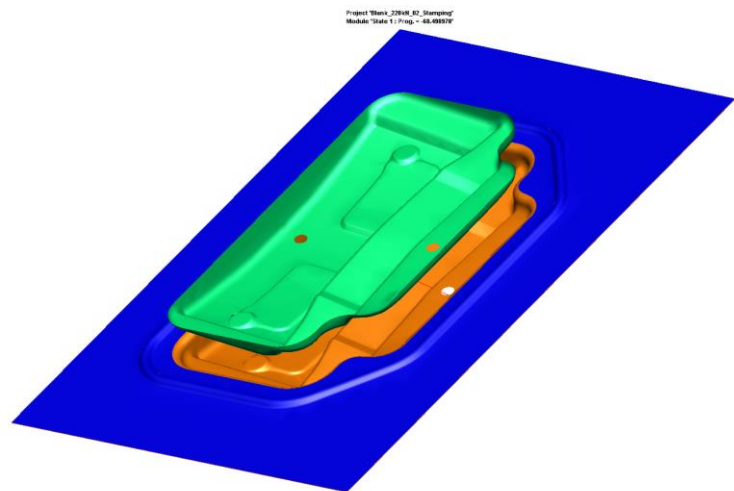
Solving „Tool with the intelligence control system“

- Possibility to change the blank-holding pressure distribution and magnitude in dependence on the drawing depth and thus to achieve maximal utilization of the formed material plastic properties.
- Lowering of the drawing operations number for complicated stampings and achieving g optimal strain on the stamping surface for the simple stamping types

Optimization of the drawing process by the technological process virtual modelling

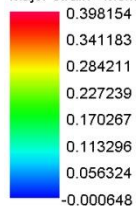


Virtual tool



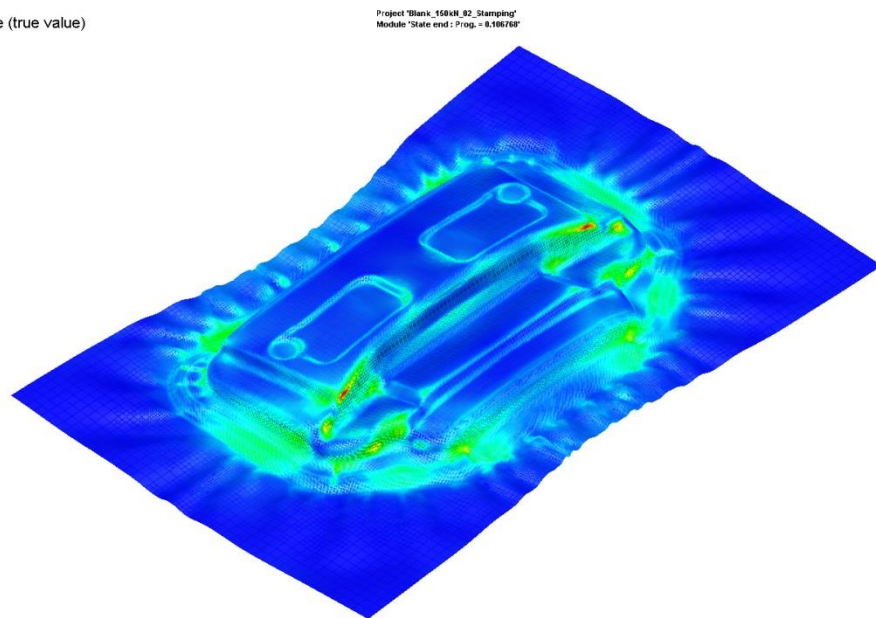
Drawing of stamping by means of the
PAM-STAMP 2G

Major strain - Membrane (true value)

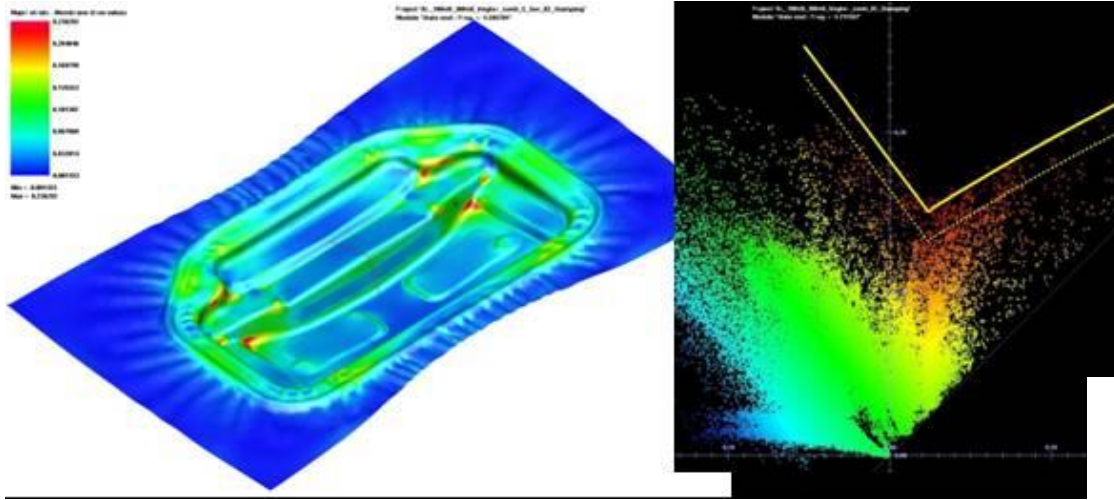


Min = -0.000648
Max = 0.398154

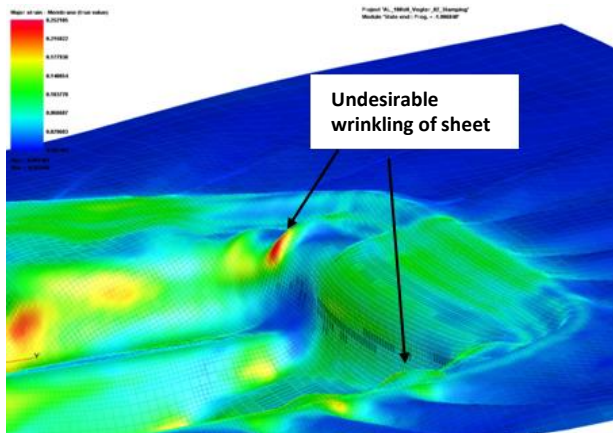
Deformation distribution on the
stamping at drawing



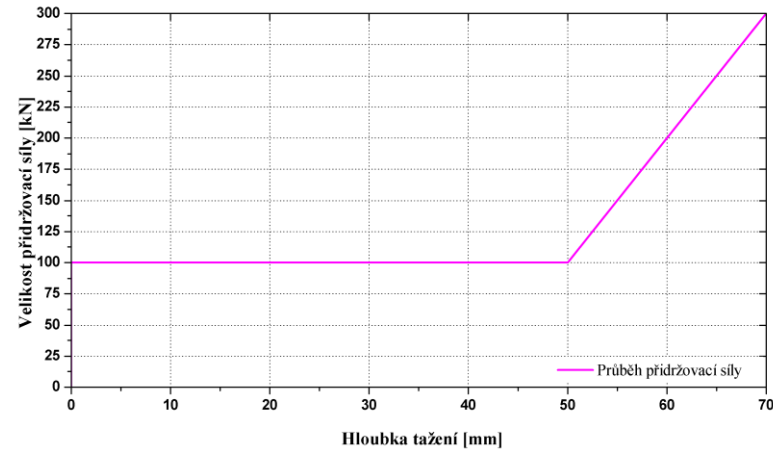
Optimization of the drawing process by the technological process virtual modelling



Deformation analysis – determination of the stamping critical zones



Deformation analysis – determination of the wrinkling zones



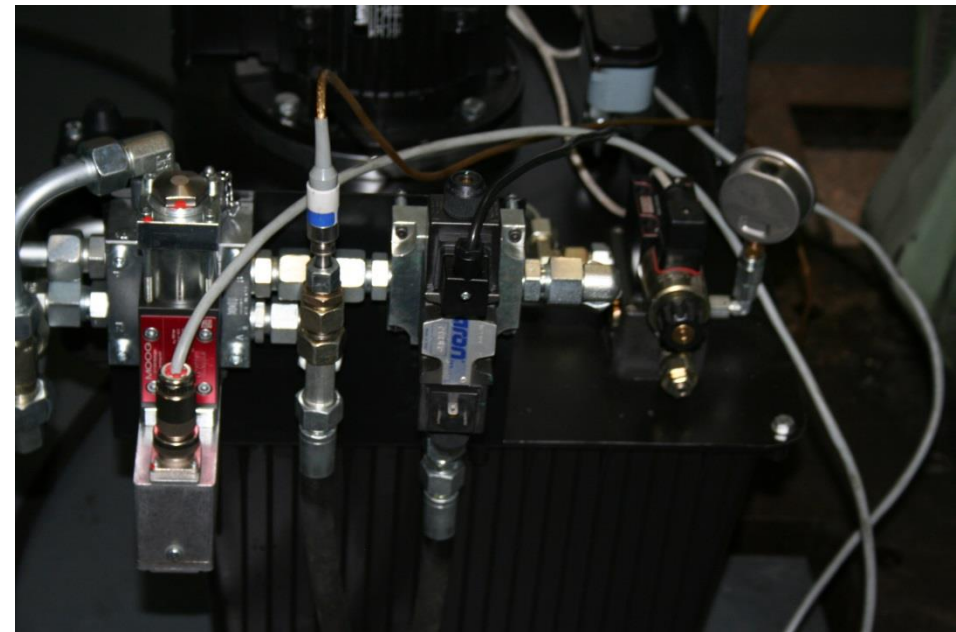
Blank-holding pressure course and magnitude optimization for the given stamping

Tool for sheet drawing with installed control system and blank-holding pressure control



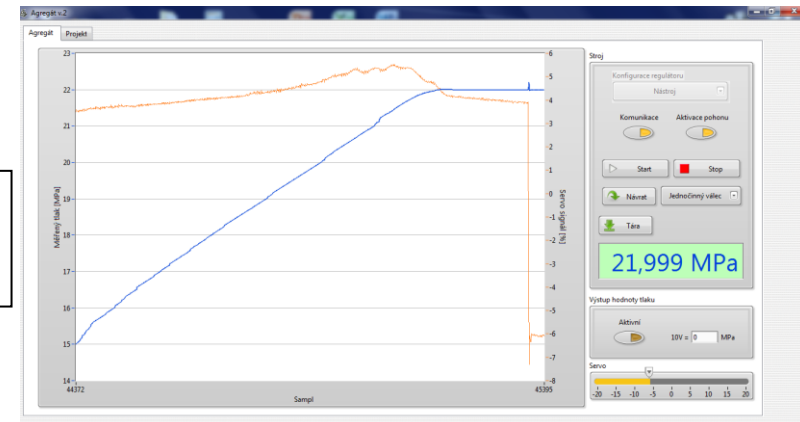
Tool for drawing with the blank-holder hydraulic control

Hydraulic aggregate with PID regulation of the blank-holder pressure required magnitude and course

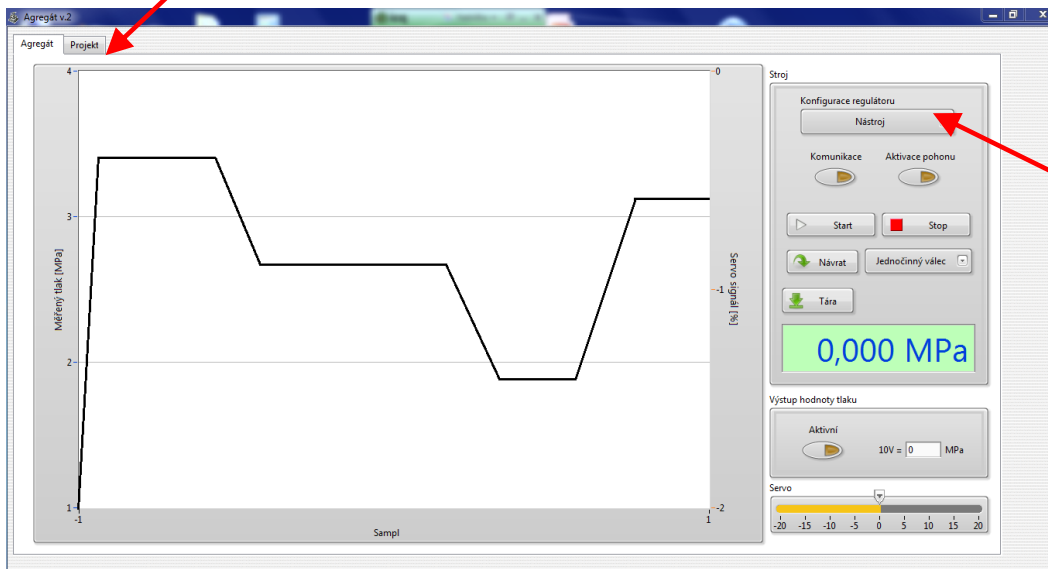


Tool for sheet drawing with installed control system and blank-holding pressure control

Option of the blank-holding pressure course
 Possibility to save different courses



Option of tool type
 Possibility to save tool type



Software for controlling blank-holder hydraulic system

Example of the intelligent tool control system application for drawing sheets stampings



Common stamping



Stamping at using TUL control system

Thank you for your attention

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