



1 *The picture shows the nesting of blanks at a coil. The result is a periodic pattern.*

CoilNest – MINIMIZES WASTE IN PRESSING OF CAR BODY PARTS

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Software

Within the CoilNest project, the Fraunhofer Institute SCAI has developed a software for cost and waste minimization in the pressing of car body parts.

In advance of the deep drawing process for car body production, between 50 and 100 blanks are pressed out of various coils. Optimized nesting of the blanks and pressing of the nested patterns allow considerable material savings compared to the conventional pressing of rectangular or parallelogram-shaped blanks. The software solves the resulting optimization problem to decide which blanks are pressed out of the same coil and how they are nested.

Optimized Decisions

Due to limitations of the presses only few blanks may be nested together on one coil. Since the blanks are pressed out by a tool moving up and down while the coil is transported below it, the blanks that are placed on a coil must form a periodically repeating pattern. The optimization algorithm chooses not only the feed of the coil but also its width, in consideration of optimizing the costs. Even width-dependent material prices can be taken into account.



2 Source: Stahl-Zentrum / ThyssenKrupp Steel

Several constraints are supported by the nesting, e.g.:

- Is placement upside down allowed or prohibited?
- May the blanks be rotated freely or are there constraints on the angle relative to the direction of rolling?

Prior to the nesting of the blanks the software also computes which blanks are the best to be nested on the same coil. This is required since the blanks for the production of one car body must be assigned to several coils due to the small number of possible blanks per coil. For the decision which blanks should be put on the same coil, restrictions and degrees of freedom are to be considered: A list of possible materials is given for each blank, and costs as well as available widths can be given for each material. The software computes cost optimized and highly efficient nestings of the blanks and chooses the best material and width for each of these nestings in consideration of the costs.

2 Coils ready to dispatch.

3 The software has assigned the blanks to different coils and nested them optimally.

Benefit

Thanks to the software, optimal nestings can be computed automatically without time consuming tries. The runtimes range from seconds or a few minutes (nesting for one coil) to some hours (optimization of a complete set of parts including assignment to different coils) – depending on the amount of the calculation.

By means of the optimized nesting and material selection, savings of ten percent in material costs are possible. Reduced costs for transport and logistics are additional benefits.

