

■ Press Line Simulation (PLS)

Shortest Possible Set-Up Time for Press Lines

If the many independent process steps of a press line are simulated, it is possible to optimize tools, material flows, and press movements on the PC. The result is fast production start-up and high cycle rates.

During press set-up – that is, the preparation, installation, and optimization of the press lines for a workpiece – it is necessary to coordinate and synchronize a large number of technological components, mechanical settings, and automation parameters while adhering to a chronological sequence of work steps. Due to the highly complex nature of this process, it is almost always necessary to carry out several time-consuming correction cycles on tools, transfer devices, and control parameters, and in the past this has made set-up both time-consuming and expensive.

Using simulation to save time

Mapping the press line set-up in a simulation environment such as Press Line Simulation (PLS) remedies this problem. Based on a technically precise and

modularly designed model of the press line, PLS allows both the basic manufacturing process and all the process-relevant details to be defined on the PC, adapted to each other, optimized, and checked. It is also possible to compare and contrast alternative process strategies or motion sequences quickly and with very little effort, as well as to verify tools and fixtures based on check calculations. As a result, a great deal of time is saved by simulation during press set-up. When using the conventional procedure, checking cannot begin until the relevant design phases are complete or the tools and fixtures have already been constructed.

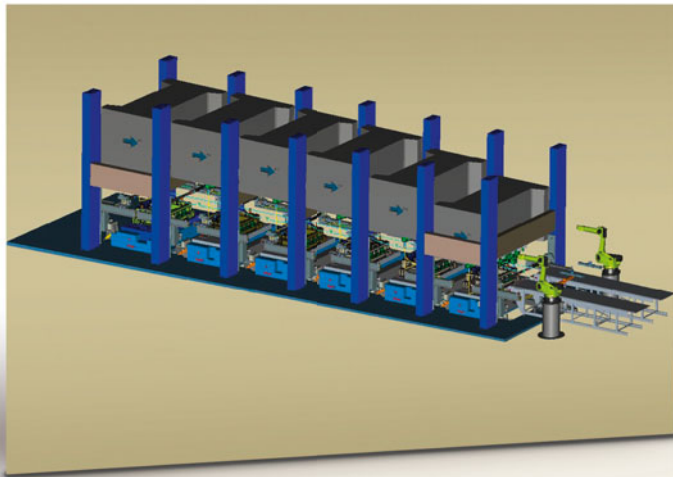
Accurate mapping of the press line

The Press Line Simulation software from Siemens comprises a standard basic software program with the simulation algorithm and user interface as well as libraries containing basic models adapted to the specific line of all the simulation components required (press stations, drawing cushions, blank and orientation stations, material supply and storage, tooling components, and control and drive system). This means that set-up using PLS is suitable for very different press designs but provides the maximum benefit in servo-presses and press lines with electronic transfer.

To use PLS in a real press line, the existing model components are adapted so that they match the conditions of the real press line as accurately as possible – particularly with regard to collision-relevant geometries and important programming parameters. The PLS software structure enables separate processing of each functional area of a press line, with the result that every PLS installation is equipped with the press-specific functions required in that

PLS at a glance

- ▶ Method planning and material flow: Checking whether the sheet metal parts can pass through the press in the way planned
- ▶ Determination of the stroke rate: Calculation of the maximum stroke rate for various scenarios of sheet metal part transport
- ▶ Tool verification: Simulation of driver and slide combinations, testing of tools for internal collisions
- ▶ Final inspection and documentation: Checking for external collisions, issuing of certificates, communication with others involved in the process



PLS offers many advantages such as the calculation of the dynamic deformation of sheet metal at high stroke rates, for example

Reduce set-up time

Increase stroke rate

Improve fixture construction

Install error-free tools

Siemens AG

particular case. Workpiece and tool data are imported from the CAD/CAM system in order to set up the line for a specific tool set. Then the production process is planned, verified, and optimized down to the last detail on the PC. The collision testing includes the installation space of the tool and possible collisions during sheet transport. In addition, a simplified finite element method (FEM) process in the PLS calculates the dynamic deformation of the sheet metal according to the stroke rate. It is thus possible to achieve reliable, collision-free transport and precise positioning of the metal sheets even at very high stroke rates.

Optimum combination of controller and PLS

It is particularly easy to reliably link the simulation with the real press lines if the press simulation includes not only the actual software used on the press's hardware controllers but also enables direct data exchange with the press controller. This is the case with PLS for Simotion, the motion control system used in many press lines. Thus, it is possible to query the current motion curves of the plunger, transfer them from the Simotion controllers, and visualize them in the simulation. Electronic cams optimized and verified in the simulation can be

loaded directly into the controller for the individual drives of the press and the transfer, which not only saves time but also considerably reduces the probability of transmission errors.

Saving time, reducing costs, and improving productivity

With PLS, press set-up becomes easier, faster, and safer, which speeds production start-up and reduces unproductive time. It is also possible to increase the productivity of the press line or at least utilize it better. What's more, with PLS it becomes much easier to control additional manufacturing processes, such as the use of multicavity molds. Overall, the use of PLS leads to a significant increase in production capacity and provides the flexibility to respond to requests at short notice. For this reason, press line simulation is becoming increasingly essential in competitive markets such as contract manufacturing and component supply industries. ■

info
contact

www.siemens.com/plm
ulrich.lorenz@siemens.com