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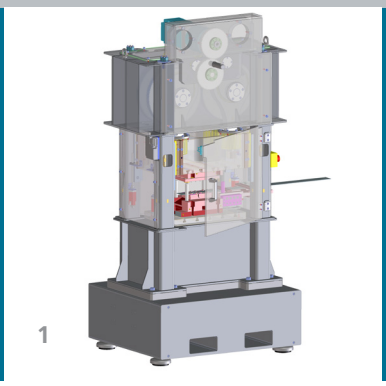

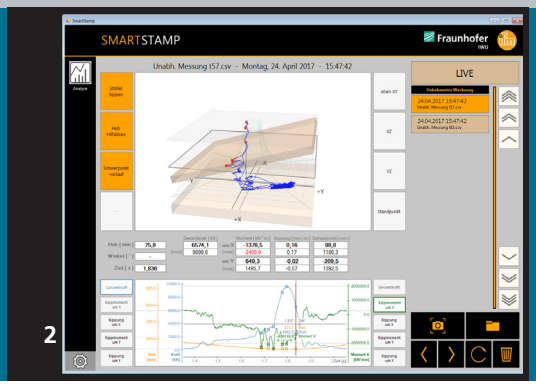

1 *Eccentric press with sensors for condition monitoring*
2 *Smart Stamp user interface*

SMART STAMP – CONDITION MONITORING FOR PRESSES

Goals

Condition-based maintenance aims to carry out maintenance and repair work only when required. Unexpected production losses can be avoided and the necessary spare parts can be procured in time and purposefully. This ultimately leads to cost savings.

The Fraunhofer IWU offers condition monitoring (CM) from the creation of measurement and evaluation concepts, to the implementation and commissioning at the customer up to the support of the system and the training of the operator.

Smart Stamp

If damage occurs in press lines in critical components such as the main drive, the hydraulics of the die cushion or the press transfer, the press comes to a standstill, which causes high cost due to repairs and loss of production. In order to avoid unscheduled standstills, systems of condition monitoring are increasingly applied. Using signals coming from sensors or measurements from the control unit and drives, they create damage predictions.

Smart Stamp is one part of such a condition monitoring system for presses and performs monitoring of the main press drive in order to verify whether permissible values are being adhered to regarding press force, overturning moment and tilting of the ram.

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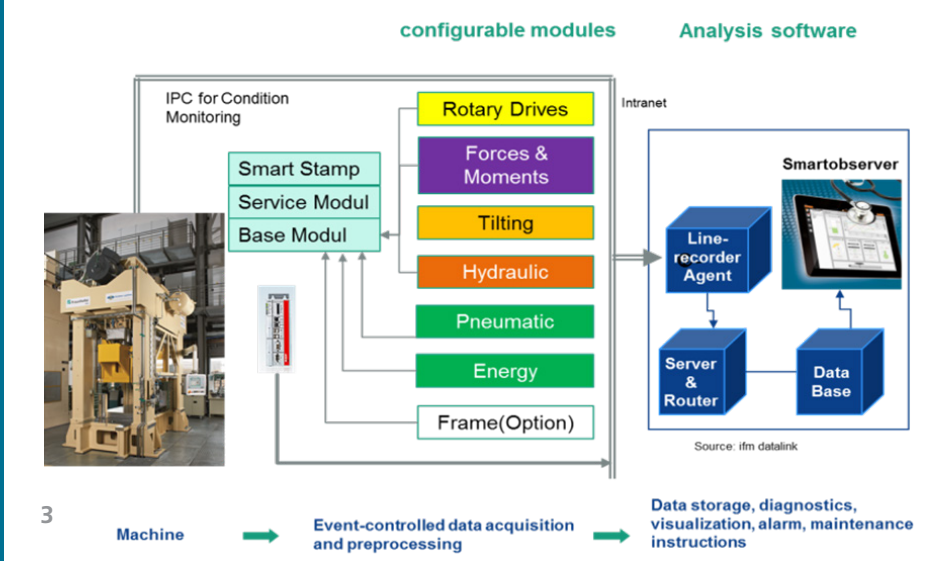

Technical implementation

Today, modern press drives are mainly based on servo-electric drives. Several torque motors with eccentric crank gears generate the movement of the ram along the guides. The force transmission to the ram takes place via several pressure points of the drive. The eccentrically distribution of the process forces in the forming tool depends on the stroke, leads to overturning moment in the ram and causes the ram to tilt. Smart Stamp detects and visualizes these physical variables. Thus overload of the press can be avoided. It is possible to identify forming tools that load the press improperly, which causes increased wear. At the same time, Smart Stamp is a "fingerprint" of the forming process for the specific forming tool on this defined press. Changes in the press setup or wear in the forming tool can be detected as a tendency.

Requirements on CM systems

Condition monitoring requires data from the numeric control, machine drives as well as data from additional sensors and condition signals typical for the process in order to derive a diagnostic result. This data may comprise measured continuous data, which vary slowly (e.g. temperature), or these signals may consists of rapidly changing triggered values (e.g. vibrations, forces) which only occur at certain points of time. Furthermore, machine interfaces are required.

The CM system must be able to capture these different data sources in a consistent unified format. To limit the volume of data, preprocessing should already be done during data acquisition, so that only necessary parameters for machine diagnosis are stored in the database.

A specific software for evaluation and visualization is utilized for clearly illustrating the characteristic values, determining the alarm threshold and for informing the maintenance staff, and even for placing the maintenance order.

System advantages

The CM system of Fraunhofer IWU can meet all these demands. The following advantages are obtained:

– The CM system is modular in design. Only components required for the specific application must be installed. An expansion at a later time is possible without difficulty.
– The CM system does not interfere with the actual machine. In case of failure of the CM system, the machine can continue the production without any restrictions.
– The use in different machine types and retrofitting to existing machines is easy to implement. Only the interfaces for machine control may need to be adjusted.
– The evaluation software accesses a database and is therefore only required once. Depending on the size of database, almost any number of machines can be connected to the database.

3 *Modular condition monitoring system*