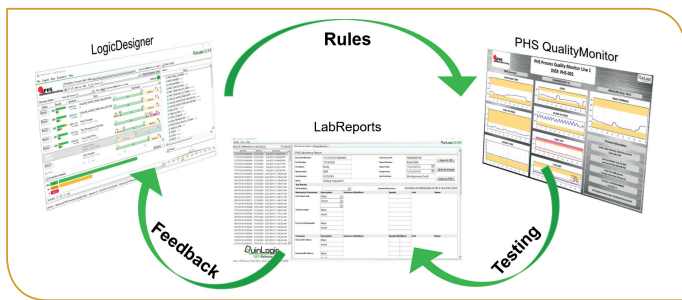


Integrated manufacturing quality control for the hot metal forming industry

Applying QuinLogic's rule-based Quality Execution System in the manufacturing of press hardening steel, brings huge benefits through optimisation of the production process



In the automotive industry hot sheet metal forming has become the state-of-the-art technology in manufacturing components with challenging properties. Providing parts with high geometrical complexity and ultra-high strength requires profound know-how in order to comply with ever increasing customer requirements regarding safety and weight. Changing material properties and applying heat in contrast to cold metal forming, means there is a responsibility shift from supplier to manufacturer that makes quality assurance an important success factor.

QuinLogic offers a fully integrated Quality Execution System (QES) which is well established in the steel industry, especially within mills that focus on the automotive sector. QuinLogic has entered the manufacturing industry by releasing a PHS edition of its QES. This production quality management software package allows 24/7 monitoring of the hot stamping process and product quality data. As a ready-to-use software product with quick installation time and low maintenance effort, the benefits are realised soon after start up.

Three benefits at a glance

- Gaining customer trust with an established quality system
- Increasing production efficiency, lower cycle times
- Avoiding repeating issues with root-cause analysis

Rule-based quality assurance

One of the main features of the QES is assuring that product and process quality meets its specification. The system is implemented as a set of data integrating and rule-based software modules, which focus on user-friendliness while still implementing advanced features. Quick adaption is said to be one of the key successes of the QES.

Having all relevant quality data on one screen, directly at the production line, gives quality managers and operators instant feedback

The system allows a multitude of quality criteria to be specified, managed and changed immediately. Having all relevant quality data on one screen, directly at the production line, gives quality managers and operators instant feedback on up-coming issues and allows quick reaction times to correct any unexpected problems.

Quality Execution System – PHS edition

The PHS edition is a software package tailored for the hot metal forming industry. All quality relevant process and product data

collected from gauges, presses, thermal cameras and business systems is connected, structured and prepared with the Data Integration Studio, making data handling within the QES quick and easy.

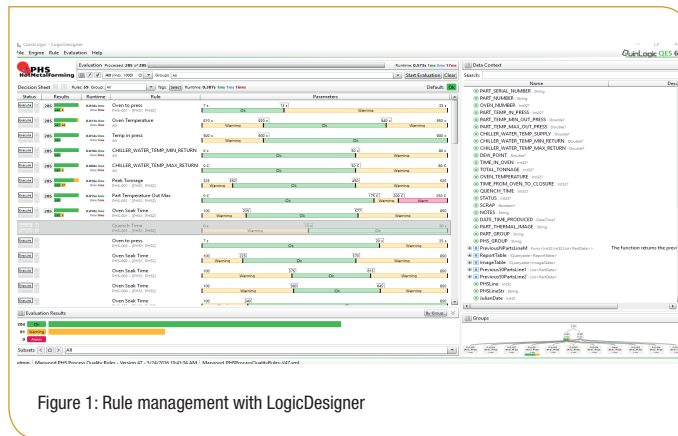


Figure 1: Rule management with LogicDesigner

The LogicDesigner (see Figure 1 above) is the core part of the QES. It is an easy-to-use rule management tool, which allows the creation, modification and management of basic, as well as advanced, rule sets. By applying simple drag-and-drop, engineers and operators without programming skills can edit rules in everyday use without involvement of the IT department.

Since all data is connected to the system, production data is put into context (customer specifications, material grade). Through simulation of rule sets on archived data, their performance can be evaluated before they are activated. For advanced programmers, scripting is supported, so that highly sophisticated rules with any level of complexity can be implemented.

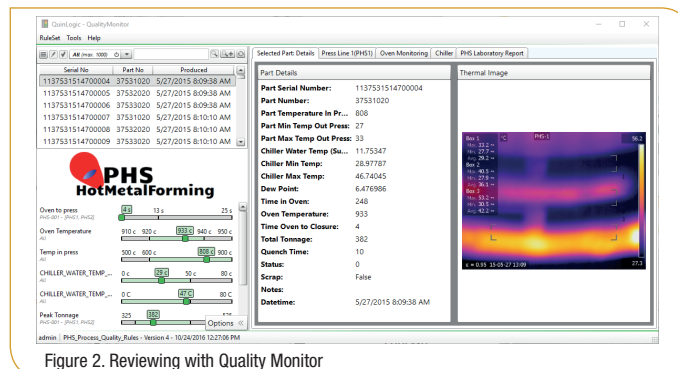


Figure 2: Reviewing with Quality Monitor

Background services employ these rule sets to constantly check production data against specifications. Long-term analysis and the individual review of critical products is carried out using the QualityMonitor (see Figure 2 above) which is a highly customisable visualisation and decision supporting program.

The recent quality trend and production performance is displayed on the Live Process Quality Monitor (see Figure 3, next page), ideally running on large screens directly at the press line. It displays all process and product relevant quality data (e.g. oven temperature, time-from-oven-to-press, total tonnage) of the recently produced parts and their type specific, and customer specific limits.

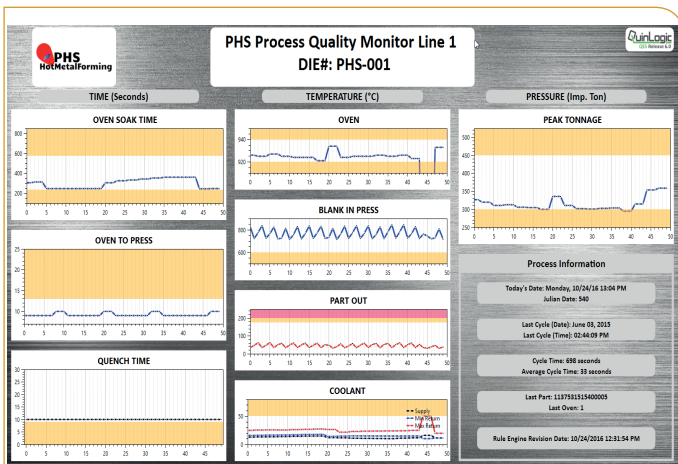


Figure 3. Live process quality monitoring

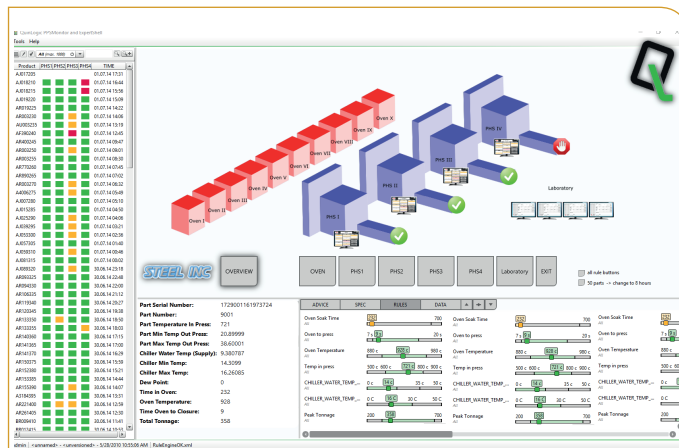


Figure 5. Expert system integrated into the Process Monitoring

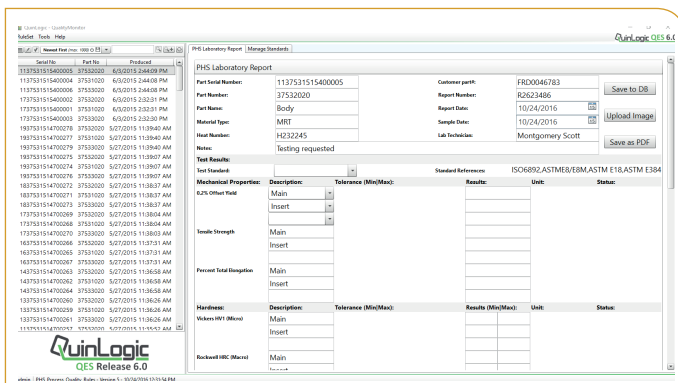


Figure 4. Managing laboratory test data

Having all quality data on one screen means there is no need for engineers to crawl through databases to find the information they are looking for. Easy access to all process and product quality data allows significantly faster product development, as well as reduction of cycle time leading to more efficient production.

Outlook

ProactiveProcessSupervision and ExpertShell are visualisation tools that are taking the process monitoring and know-how management of hot metal forming to the next level. They can visualise the production process as a fully-featured 3D model, flagging production inconsistencies as they occur. The system is tied in with a knowledge conserving and improvement mechanism (advice-feedback-cycle), giving expert advice at the line where and when it is needed.

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Live production results can also be displayed in the quality laboratory where lab testing is performed, so that samples from specific dies can be requested. Test data from the laboratory is stored within the system's database through the intuitive LabReports tool (see Figure 4 above). Later it can be used for statistical analysis using the LogicDesigner rule management tool, allowing a steep learning curve on the hot metal forming process.

Additionally, Web Reporting & Analysis, a web-based tool to access shift, day, month and year reports as well as long-term quality analysis on any device that features a web browser (including tablets, phones, notebooks and desktop computers) is included in the package.

Features and benefits

The QES is a ready-to-use customisable software product. No project specific development is necessary, guaranteeing short installation times and a quick return-on-investment. Automatically generated quality reports, product certificates and shift reports give manufacturers a solid discussion basis for negotiations as well as faster product development and certification. Using a proven quality assurance solution helps gain customer trust, a key factor in long term business relationships.

Using a proven quality assurance solution helps gain customer trust, a key factor in long term business relationships

Laboratory testing data is fully integrated into the workflow. A better understanding of quality data and their correlation improve the process know-how and assure consistent and reproducible product quality. This is particularly challenging, as steel is transformed from simple geometries like strip or bars into complex components as a result of the hot press forming.

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Tel: 020 8441 2024 Fax: 020 8449 0810 E-mail: info@mbh.co.uk

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