# PROCESS DATA VIEWER FOR VISUALIZATION OF COMPLEX DATA

THE TASK

The Data Management Excellence Center is collaborating at the IWS with the TU Dresden and the University Hospital Dresden in the development of interactive visualization systems and methods to process huge data volumes. Research is focused on sensor data, digital image data, process parameters and patient data. Research and development issues include sensors, statistics, automated pattern recognition, image acquisition via image processing, modeling and visualization, design of user interfaces and application.

Data management and confidential data handling are also important for laser processes. The management of the process data, such as process parameters, takes final users up to one quarter of their time. The system sensors generate data of various types, of which it can be difficult to keep track. The digital revolution has also found its way into production equipment. Processes, products, resources and production facilities, and employees are linked by cyber systems and communicate via Internet. The term "big data" describes the handling of data structures whose volume, diversity and complexity demands for new data processing and analysis methods to extract hidden significance. This experience, in turn, is introduced into processes enabling "machine learning". Such big data solutions are being tested in laboratory operations at the Fraunhofer IWS Dresden.

OUR SOLUTION

The power and pressure values, position data, images, video data and bus signals that are collected in laser processes, need to be analyzed. Reasonable compression of process data and representation simplifies interpretation and decision-making. Automated analysis of process data is possible by means of interactive visualization. Correlations and patterns can be found rapidly and easily; process failures and exceeded limits are identified. Visualization techniques can be used for interactive data exploration. They provide a general overview of the collected data, the definition of limits and the detection of deviations from specifications even under real time conditions (Fig. 1).

1 Process data viewer function for laser processes at the IWS
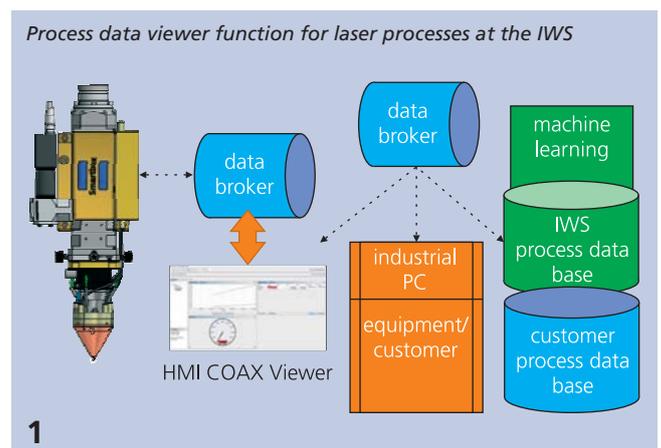
RESULTS

The process data viewer can identify useful correlations among the recorded data records of a finished process to analyze and control it. All parameters can be captured during manufacturing and used for tracking & tracing seamlessly. For laser welding, deposition or cutting, the essential parameters are melt pool and component temperature, laser power, process gas pressures, the distance from component to the optical processing unit, and the image of the processing zone.

Data workflow and data processing phases in the laser process. The process can be controlled and adjusted as a function of the state by means of process data monitoring.
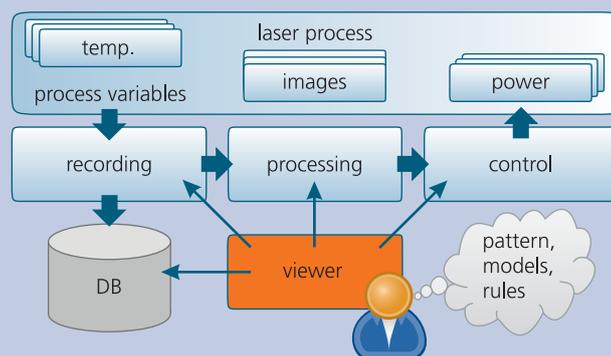
2

The user can view the process (Fig. 2) and is given the curves for pool temperature, laser power, and the process image as a function of time.

The Fraunhofer IWS Image Processing and Data Management group has the following competences:
- exploring Industry 4.0 technologies for process data
- data management and data analysis
- development of image databases and technologies
- image processing and interactive visualization of process data
- software engineering for data analysis and data modeling

The additional competence profiles of the collaboration partners include:
- professional software engineering and consulting:
  • object-oriented programming languages: J2EE, .NET, Python
  • professional project management: scrum agile model
  • IT & software architecture modeling
- data management and analysis:
  • development of technology and data standards to manage digital images and meta data
  • automated real-time data processing and management,
  • multi-parameter and statistical data analysis, visualization, management
  • visual analytics

CONTACT

Prof. Dr. Karol Kozak
☎ *+49 351 83391-3717*
✉ *karol.kozak@iws.fraunhofer.de*