

## Metrology: future trends

▶▶ *Trends in the field of metrology aimed at delivering new solutions to the industry*

---

There is nowadays a marked tendency towards linking “*offline at lab*” measurement means and procedures to “*near process, in process*” manufacturing for in-situ monitoring and control of processes and their outcomes to obtain further knowledge on process variables, their status and evolution over time.

By gathering this information, real-time decisions can be taken whenever these critical parameters are modified and thus influence the end result of a process. Solutions of this kind require flexible measurement systems allowing for automation and programming in order to address and integrate all the control methods applied until now to controlled production environments. The aim is to allow machine operators to make better use of measurement results by simplifying decision making during manufacturing cycles.

It is also necessary to develop systems to collect and process data and eventually provide assistance in terms of decision making by monitoring the most relevant features of a process. Therefore, control means that one must integrate/draw closer to the process a similar or even superior degree of accuracy and speed relative to the external verification and calibration methods used to date.

With a growing demand in terms of higher value added manufacturing, work is already in progress with this manufacturing-measuring binomial and in connection with several goals to discover how a process can be upgraded, how faulty parts can be prevented and how predictive maintenance can be carried out in relation to the means used, control process biases and any corrections to be made, if necessary.

Special emphasis must be made with regard to the necessity of adapting measuring procedures and means to different kinds of manufacturing environments. One of the biggest challenges posed by research into the fields of current dimensional metrology is linked to transferring measurement traceability from the laboratory to the production environment, as many of the factors controlled in a laboratory (environmental conditions, machine geometry,

sensor calibration, etc.), are not monitored in the production environment or are even unknown because it has been unnecessary to characterise them in this space until now.

### Challenges and trends

- More flexible measuring software (communication with multiple systems) that can be programmed with a user-friendly interface
- Measuring systems that are able to acquire and process massive data packages
- High accuracy contactless measuring systems
- Smart programmable sensors
- Metrology systems that can be integrated into multidisciplinary communication networks
- Decision making and data evaluation systems
- Real-time measuring systems for various gdl (100% production control)
- New measuring techniques and technologies
- Process simulation (measurement, assembly, production) using predictive models
- Machine uncertainty allocation
- New communication languages and interfaces
- On-site self-calibration

IK4-TEKNIKER is developing capabilities in line with metrology trends to deliver new solutions to the industry.

*Gorka Kortaberria, responsible for inspection and measurement at IK4-TEKNIKER*