



Precision in paper production

Finland is a major exporter of paper, with pulp and paper contributing two billion euro to their economy. Paper manufacturers are continually striving to increase quality, and production efficiency, whilst reducing manufacturing costs. Ensuring paper quality meets production tolerances is key to maintaining competitiveness. Finnish paper producers require improved measurement reliability to maintain this important national industry.

Europe's National Measurement Institutes working together

The European Metrology Research Programme (EMRP) brings together National Measurement Institutes in 23 countries to address key measurement challenges at a European level. It supports collaborative research to ensure that measurement science meets the future needs of industry and wider society.

Challenge

Paper manufacturers must produce paper to consistent standards to stay competitive, since uniform paper thickness reduces ink use, saving their customers money. To produce paper, large round rollers turn pulp into sheets of defined thickness. These rollers develop scratches and dents over time, so are periodically reground to give them a good surface finish. Very smooth rollers are required since small variations in roller profile affects paper quality.

Ensuring the regrinding process produces a perfect surface is important, and in-process measurement probes are used to confirm the quality of a roller's surface as it is repaired. These probes must be periodically sent to calibration labs to ensure they measure correctly, but this risks damage during transit and has the potential to introduce errors after reinstallation on the roller's spindle.

Reference artefacts that can be installed on the grinding machine would allow the performance of measurement probes to be verified on the machine itself, giving paper manufacturer's greater confidence that once returned to the production process rollers will produce paper of the required quality.

Solution

The EMRP Project, *Traceable in-process dimensional measurement* developed a number of well characterised artefacts, with complex shapes and geometries, for use as industrial reference standards. One of these is a reference disc suitable for confirming the measurement accuracy of probes used to assess re-ground paper roller surfaces. Mounted on the roller's spindle alongside the probe, the disc is used to compare probe results to previous precise measurements of the standard, so verifying the installed probe performance.

The project also investigated factors that contribute to confidence in achieving a true measured value for paper roller surface smoothness, and developed recommendations on how best to determine this. The project derived factors have now been incorporated into written ISO standards to assist with determining measurement uncertainties.

Impact

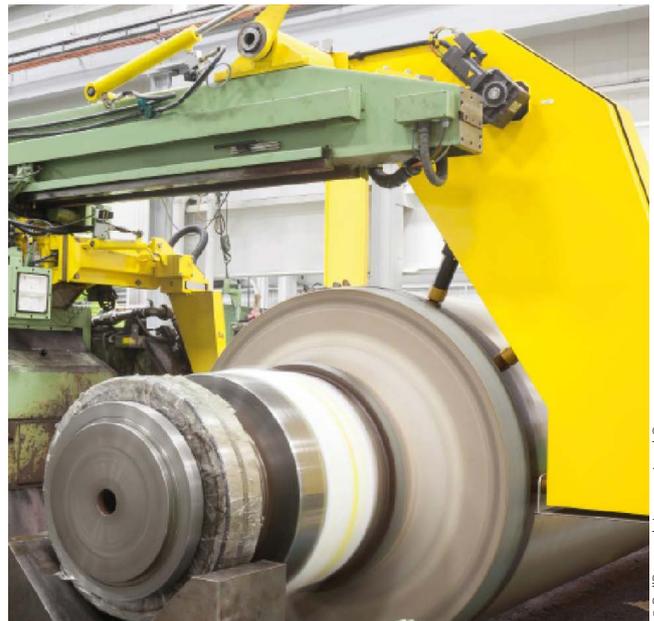
RollResearch, a Finnish manufacturer of high-tech roll measuring and re-grinding control systems for paper and steel milling, is launching a new calibration service for roller maintenance, as a result of the project.

RollResearch has a four point measuring system that can evaluate wobbles and dimples in rollers as they are being reground, ensuring an optimised surface finish. It uses one of the project reference artefacts, a round disc suitable for in-situ calibration of its measurement instruments. Staff have received training, developed in the project, on determining measurement uncertainties in accordance with the recently updated ISO standards. As a result, RollResearch can now confidently confirm the 'roundness' of rollers as they are being reground, and can now provide customers with a test report for the rollers performance after remedial work has finished.

The new RollResearch calibration service will provide reliable in situ calibration of roll measurement probes to the paper industry. This will improve accuracy and allow corrections to be made during regrinding to reduce roller variations, leading to greater paper uniformity. RollResearch's customers in the Finnish paper industry, as well as across the EU, Asia and USA, will now have an advanced tool to improve paper quality, helping them to stay ahead of the game in a very competitive market.

On machine in-process dimension measurement

The EMRP project, *Traceable in-process dimensional measurement*, developed new reference artefacts with well characterised and complex geometries to confirm the performance of measurement and positioning systems used in industry. The project also investigated the sources of in-process measurement errors and developed guidance and training to transfer measurement best practice to industry. Ensuring the accuracy of in-process dimension measurements by early identification of drifts towards production tolerances has the potential to increase the productivity, and hence competitiveness of European manufacturing and machine tool industries by 20%.



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