X-ray vision and more

The application of computer tomography is still limited in engineering, but one German mould maker is benefiting. Elsewhere, probing is paying dividends. Andrew Allcock reports *(http://bit.ly/uInUY9)*

Injection moulder Vema GmbH, Stuttgart, Germany, has employed Werth Messtechnik (01788 522060) computer tomography (CT – X-ray inspection) technology (online video) to support the precise moulding of LED lenses for the automotive industry.

CT is widely used in the medical field, but is still relatively new in the industrial world. Vema was recommended the technology as an alternative to traditional measurement methods, and a nearby service provider, HeMa-CT, located in Schönaich Germany, about 100 km from Vema, was able to support Vema's application, using a TomoScope 200 from Werth Messtechnik. (UK bureau service, visit *www.mantechgeometrics.co.uk*)

Werner Veser, Vema's managing director reports: "Even the first results were absolutely promising. After we communicated and adapted our requirements, we had measurement and correction results that I had never dreamed of."

LED SPECIALITY

Mr Veser explains the firm's LED speciality and the challenge: "We have developed very specialised expertise, so that many light designers come to us to have their ideas implemented in practice. Because we can provide mouldmaking and injection moulding from a single source, and our experience in both areas complements each other nicely, we are the ideal partner for mould development and initial series production."

The production of lenses and reflectors is no simple task. The products not only have to be as clear as glass, but the surfaces are also critical. They must be absolutely flat and at a defined angle to each other. Deviations of just over 0.020 mm result in a loss in transmitted light of about 30%. High precision is therefore required for the functional optical surfaces in the final product, with this challenge mostly involving the moulding, which must be designed for process reliability.

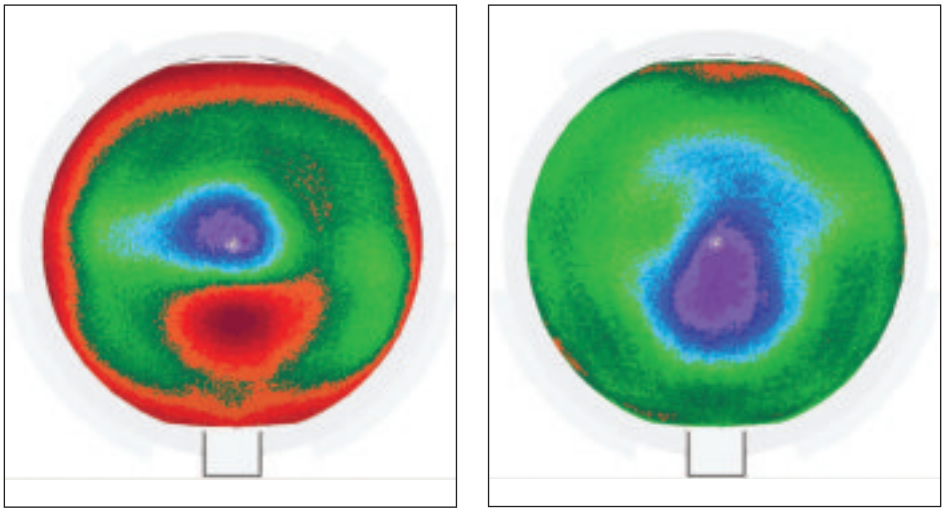
LED lights demand precision moulding

The mould tool is manufactured using CAD data to generate the required mould tool design, taking account of shrinkage, and NC programmes. Following manufacture of the mould tool, sample runs on an injection moulding machine are undertaken, as are simulations. Together, these result in a reliable production process; critical dimensions stay within a tolerance of 0.1 mm.

But then fine-tuning must be undertaken, which requires that the injection moulded products be measured. If deviations from the target data are found, the mould must be corrected. Thick-walled parts, in particular, which include the LED lenses, are subject to significant shrinkage. They require several correction loops when using typical tactile measurements, due to the relatively low resolution of the measurement data.

Besides the limited number of measurement points, measuring with probes or other methods has limitations, due to reasons of access to surfaces and undercuts. Typical methods also do not have any way to measure the assemblies, as a whole. This means that the only option is to integrate dimensions obtained from several measurement runs, which means further work and an additional source of inaccuracy.

Using computer tomography, it is now possible to measure first article parts precisely and meaningfully. The necessary corrections can then be transferred to the mould in just one step.



An LED lens before (left) and after tool correction – colour coding identifies errors