

# Measure for measure: testing systems for new and future formats at dr.schwab

dr.schwab opened its doors for business in December 2002. Its two founders – Dr Leonhard Schwab and Johann Ostermayer (pictured) – had been leading figures in ContTec in the ‘old’ days of the Toolex empire, aeco and Dr Schenk. With that vast experience behind them, the company is rapidly strengthening its impact on systems for new formats. **TIM FROST**

**W**hen dr.schwab launched at the end of 2002, it already had a long history in the testing business. The company set up offices and a manufacturing site in Aichach, near the German city of Munich, taking over aeco's technology, business and service, and moved straight into production primarily with the DOMS and argus offline systems. It has since moved into inline scanning, with the new IQPC blu (see: OTO issue 154).

When I met with CEO Johann Ostermayer and his team, he explained that after aeco, the decision to start the new company with the existing people and technology was an obvious move; even though they knew it was going to be a slow start-up.

“After aeco, we decided to start this company as we had a lot of experience, a lot of skilled people and new product developments that were at an advanced stage. The first six months were not too easy – that is usual – but the work by our agents, especially in Taiwan and Japan, helped a lot. So after the first six months, we were back in business and aiming to increase our market share and the awareness of the name of dr.schwab. I now see our position growing.”

Even with the background of the engineering team at dr.schwab, Ostermayer admits that a new brand name will take some time to make an impact.

**“An important part of our philosophy is to use the right wavelength to measure the disc, and that approach goes all the way back to ContTec.”**

“In our business you need to have history, especially as our systems are a big investment; so the first thing that the customer has to believe in, is the company. A company with a long history has a better chance, but I think we have established ourselves now.”

The company's most established test system is the diffraction order measurement system, DOMS, whose first- and second-order diffraction measurements can deliver a mass of data about profile shape. This unit has sold well over the years and has gone through

several major updates. The latest version has moved it from the manual switching of test procedures, to becoming a fully comprehensive and automatic measuring system for mastering, says Ostermayer.

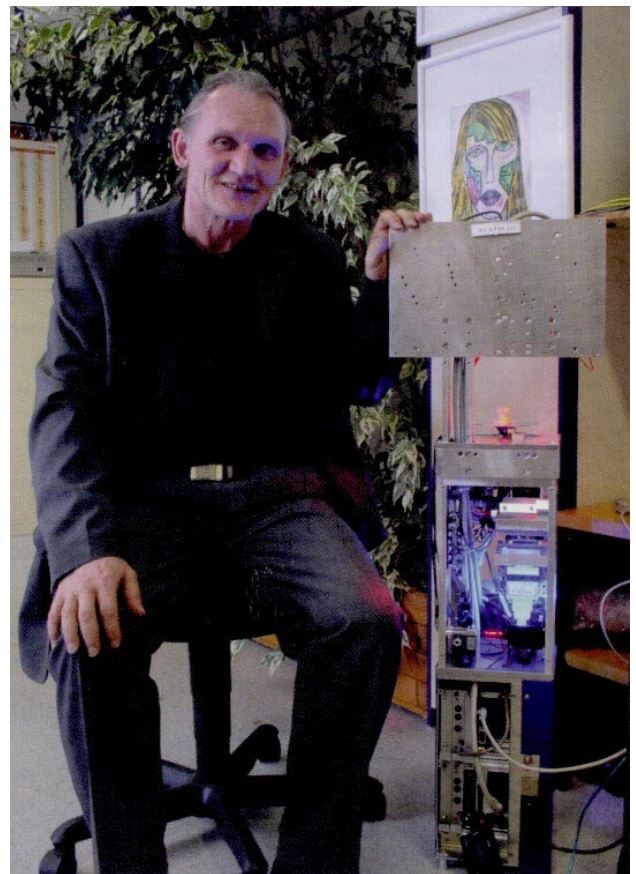
“There are more than 150 systems in the world, originating from ContTec, aeco and now dr.schwab. The latest version is the DOMS<sup>XE-blu</sup>, which combines the functionality of three previous systems: diffraction measurement, photoresist measurement for glass masters, and a camera for defect detection and analysis.”

DOMS<sup>XE-blu</sup> measures all the parameters that make for a quality master. Some issues, such as clouding, while not affecting the technical performance of the disc, are still important to the acceptability of the end product, as customers are more likely to reject discs because of clouding than poor birefringence.

“We can use zero, plus-first and minus-first order measurements to give us some idea about clouding – which is a groove symmetry problem,” says Ostermayer.

The system measures groove profiles down to track pitch 230nm by using blue laser diffraction order measurements, glass master photo resist thickness down to 80nm – plus additional data, on groove profile – via a spectrometer, and an optional high resolution camera for defect detection.

During my visit, I got a sneak view inside it. Putting DOMS<sup>XE-blu</sup> through a range of tests, the fully automated nature of the beast becomes very apparent, with light sources and optics being realigned under software control for each new set of measurements.

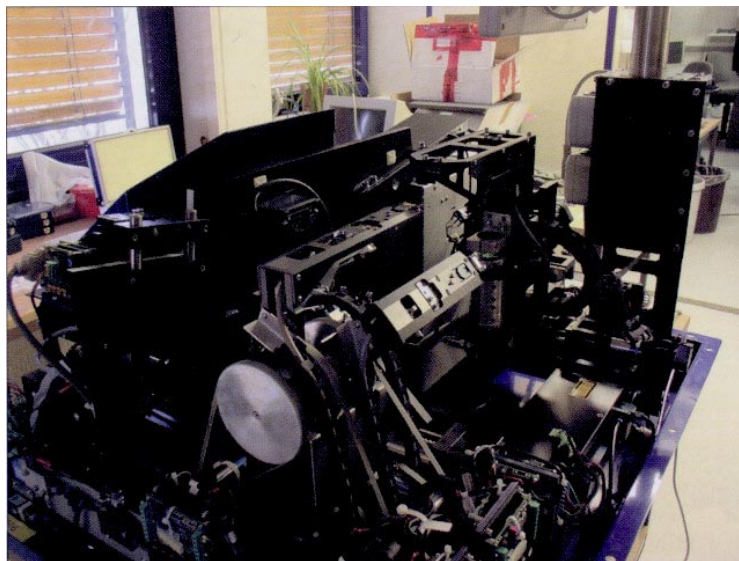


Whilst the fully loaded XE-blu is being used as a format development tool, the DOMS all-in-one tester concept's strength is for quality control in disc manufacturing, where it takes just a few minutes to run through a complete test procedure with little intervention by the operator.

## System development

The systems are all developed at Aichach, but Ostermayer says that a lot of the manufacturing is outsourced.

“We have a good company that builds the argus and DOMS for us, and that makes sense because we are making a relatively large number of them. That isn't the case at the moment for the scanner (IQPC series), but as the numbers go up, it will make sense to outsource the assembly of those too.”



Inside view of DOMS<sup>XE-bl</sup>

"Quality control is a very important thing. Systems like DOMS and argus are delivered here, but they are not adjusted and set up at that stage; we do all of that in-house."

The majority of the main components are outsourced, but dr.schwab builds its own cameras. This is something that Ostermayer has been doing for many years, he says. "The camera is our own development. We have a lot of experience in this area as the first camera I produced was in 1987, for one of my competitors. The camera we have now is especially designed for our application." Building and designing in-house means that they are not buying a general purpose camera with other functionality that isn't required. That can save a significant amount of money – the in-house 4k camera is under half the price of its commercially available equivalent.

The choice of light source is key to accurate measurement and dr.schwab uses a mix of red, green and blue lasers and high-power LEDs. Apart from a rather specialised Mini-disc test system, which needs extremely high levels of illumination, no white light sources are used in the systems.

"An important part of our philosophy is to use the right wavelength to measure the disc, and that approach goes all the way back to ContTec," says Ostermayer. "When we worked on Blu-ray in the beginning with DOMS, we had a combined light source of near-blue and infrared, and we had problems detecting bubbles. We had a lot of problems and then we simply switched off the infrared part and the signals were then very, very good. With dual DVDR, we found it very important to use red for some specific defects. If we used white light or infrared, it became impossible to detect these defects. So it is important to use the right wavelength."

It's only a few years since practical solid-state blue lasers became available at all, and the price and longevity of blue lasers is still an

issue. They are still expensive, says Ostermayer. "The size is going down but not the price. I'm sure when the Blu-ray comes they will all need blue lasers and the price will drop then. But, of course, the lasers we use will always be expensive compared to the mass market products."

The really new baby that *One to One* had the first glimpse of, is the argus<sup>bl</sup>. This takes argus into the next generation of blue laser disc technology and is already proving popular with format developers.

dr.schwab has placed five already, says Ostermayer – all into R&D divisions of disc developers.

"The first one was shipped in August last year. This is aimed specifically at Blu-ray disc and other HD DVD formats. It is fitted with a blue laser, so it measures perpendicular birefringence

## **"Working with the format developers should stand us in good stead when the lines go into mass production."**

and cover layers; it has been tailored specifically for that. You have to measure birefringence with the blue laser because the reflectivity of the disc is very low and the specification is for blue. Of course, measuring tilt with red or infrared is not an issue, but birefringence has to be done with blue."

Its ability to function as an R&D tool shows the flexibility of argus, which after all was primarily developed as a universal offline disc measurement systems. To span the two activities, the company has built in three separate user software interface levels. R&D teams can get into 'manager' and 'super manager' levels to work with all the system's parameters. But for normal replication testing, there is an operator level with a simple pass/fail result according to parameters set up by the replicator's production managers. This allows non-specialist operators to comprehensively test discs, when only knowing how to close the lid to start the test procedure.

On the inline scanner side of the business, the IQPC scanner is a good product, but the limitation on its business is not to do with the quality of the product, but more to do with the sales channels available.

When it was ContTec, the group was part of Tooltex, which offered an automatic outlet for the inline test systems. But as an independent, it is difficult to break through to line manufacturers who are already content with

their existing alliances or have their own products to choose from.

Sales direct to the replicator are unusual, so that leaves Ostermayer's team trying to convince replicators to specify dr.schwab when they order new lines. "Going directly to the disc manufacturers is more difficult, because the scanner is already integrated into the line when it is delivered. But we want to raise awareness that we have a good product and create a pull-through, as well as the push from the replication line companies."

dr.schwab has had some success with Krauss-Maffei, which has now standardised on their scanners, but now it is trying to keep in contact with the line producers. "We are keeping in contact with all the manufacturers, but if they are happy with the systems they have, then it's not easy to get them to change."

The one glow on the horizon for Ostermayer is the work with new formats in Japan, so that when the early lines start running for new formats, hopefully they will be using the scanners that they have effectively helped to develop.

"Working with the format developers should stand us in good stead when the lines go into mass production," he says. "What we are looking to is a situation where they come

up with the first new products, and their lines will have our scanners and then the next units will also have them."

### **New formats**

In developing these high-density test systems, dr.schwab has been working closely with a number of the developers of the new formats. This presents a quite different set of challenges to producing test systems for developed formats. With a developed format you know what you're testing for and have a clear idea of cause and effect – what processes generate which defects. With a new format, there is an element of working out which measurements are important and which defects, and at what level, are going to be important. And often this is done

dr.schwab's DOMS test system





Testing the test systems

blind, with the new format's engineers asking for new measurements without being at liberty to tell Ostermayer exactly why they need them.

"We get questions about whether we can measure this or that factor, and go back to the company and discuss it with them. Some of their requests are not understandable for us. Why would they want to measure some of these things? I'm sure they have a good reason, but they can be very secretive on these areas. They come up with difficult questions and we have to try and work out why they want some of these measurements."

They find themselves testing samples coming from Japan and that helps in their investigations into a new format. Working out how to analyse the disc means that they are able to produce test tools that tells the media manufacturer of the future which part of the process needs attention.

"We can measure a lot of things," says Ostermayer, "but we have to learn a little more about their impact. There are a lot of features in our systems that are generating statistics to analyse the different defects for, say, different mouldings and electroforming.

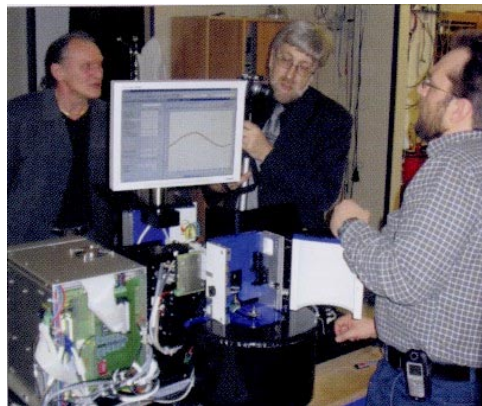
### The customer base

dr.schwab's active representation in Japan by Alech Company has helped the company to build its contacts with the Japanese manufacturers. It seems that Alech is as demanding as its customers, says Ostermayer.

"Our agent is really demanding; they see their job to fully represent their customers, and near or near-about is not good enough, it has to be spot on."

Overall, he sees a lot of interest and sales in DOMS<sup>XE:blu</sup> over a broad range of customers who are mostly high quality independents in both the pre-recorded and blank media markets. Although the offline test systems can be configured with more or fewer functions, the demand focuses on the more fully configured packages.

"It is the fully spec'd ones that include the camera that are popular. Users like to have something that has an all-in-one aspect to it. This is getting more popular because this sort of thing wasn't available earlier.



Editor, Tim Frost, gets a closer look at the unit

Nobody offered this facility and people like a cost-effective solution, against buying everything individually."

So where does Ostermayer see their company in five years time?

"Five years is a long time. If you look back five years, we were still part of Toolex, so it is almost impossible to guess what the market will have in store for us in the next five years. I think we will stick with optical disc - there is no time or spare capacity to look at other markets and go into totally new businesses. My feeling is the market for test systems is growing along with the whole market, and the way that China is opening up is unbelievable."

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Whilst we can produce, for example, 64 different statistics, what is important is that we are able to tell the customer where the problem is. For established processes it is relatively simple, but for new process we have to do a lot of work."

Could Ostermayer confirm from the measurements of the samples he has seen, that the general belief is that the Blu-ray film cover layer is not proving to be a great long-term solution for Blu-ray? On this, he is tight lipped, and on issues surrounding dual-layer DVDR he is not a great deal more informative, except to say that there is a little way to go yet; but expect to see the first discs later this year.

The development process is complex and time consuming he says, but Ostermayer hopes that the long-term benefit will solidify the relationship between his company and the new format's developers - who will also be the media's first producers.

"It takes a lot of time to do the tests and the reports. Over the past six months, we have had a lot of samples to test and make reports on the IPQC<sup>blu</sup>, the argus and the DOMS<sup>XE:blu</sup>. We work out how to do something, then we do a report, and only then do we get the sample to work on and check it out. But in my view, this work that we are doing is an investment for future years. We can live with this, and it's very important to have these connections. I think we will be in a strong position when these formats come out."

Ostermayer believes that there is some level of market education required to convince the new Chinese manufacturers that test systems and scanners are not a luxury; but will help their bottom line.

"The first reaction is that they say 'we are spending this money, and what's the return?'

If they use the test systems in the right way, then they have information about their production and what they need to do, before they end up producing bad discs. We need to tell the Chinese customers that it's important to test discs, and they might get profit out of this by making it possible for them to produce more good discs."

Of course, Ostermayer is looking to move forward with all the test systems, but he will also be continuing to concentrate on the format development area, which generates good technology now and good business in the future. "Development is the main part of what we do, working with the format developers. Naturally, we know when the new formats really go into production our competitors will also work in that market, but I hope we will be one step ahead, having built a good relationship with these companies."

Of course, that depends on the format actually taking off, which is something that no-one in the industry has any real control over. "It's difficult to say when Blu-ray would become commercially successful, maybe in 2005, but we wait to read more information on the developments in *One to One!*" ■