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## Inspection of Multilayer Coating in the Automotive Industry



Today's automotive industry use a variety of decorative and functional treatment to improve the vehicles surfaces. Traditional quality control methods to inspect these multilayer samples have proven to be extremely time-consuming and bear the risk of missing defects. A new approach combining a target surface system and a light microscope offers new possibilities of speed and reliability.

F. Javier Ruiz Balbas, Laboratory Manager at Atotech Spain, explains his experiences with the system. Atotech is one of the world's leading suppliers of specialty chemicals, equipment, service and solutions for printed circuit board, advanced packaging and semiconductor manufacturing, as well as decorative and functional surface finishing.



### Authors

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Fig. 1: F. Javier Ruiz Balbas, Laboratory Manager at Atotech Spain

Could you please shortly describe the workflow of your Quality Control department and the tasks you are dealing with? What kind of defects are you looking at? Which type of coating are you checking?

**Ruiz Balbas:** Our QC workflow at Atotech Spain consists essentially on receiving parts, which have an identified defect. This defect is subjected to a

sequence analysis by metallographic preparation - cutting and polishing steps - in order to perform successive inspections. Once the appropriate sample preparation is achieved, we proceed to perform its inspection via light microscopy and scanning electron microscopy. Our work generally consists on metallographic examinations and measurements focused on surface defects generated in metal deposits such as copper, nickel, chromium, zinc, gold, etc.

### What are the particular challenges you are facing?

**Ruiz Balbas:** The most challenging task in our workflow is to acquire the maximum information about a defect in the shortest possible time.

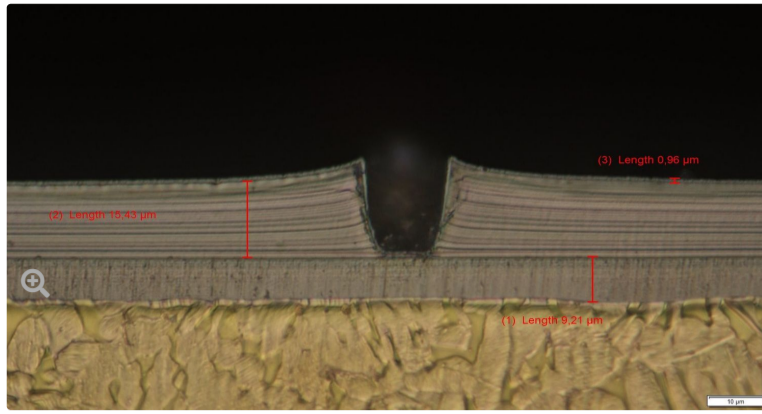


Fig. 2: Brass metal Ni/Ni/Cr coated. Semi-bright Ni, Bright Ni and Cr layer on the top. The sample was prepared using the Leica EM TXP. Photo: Atotech Spain

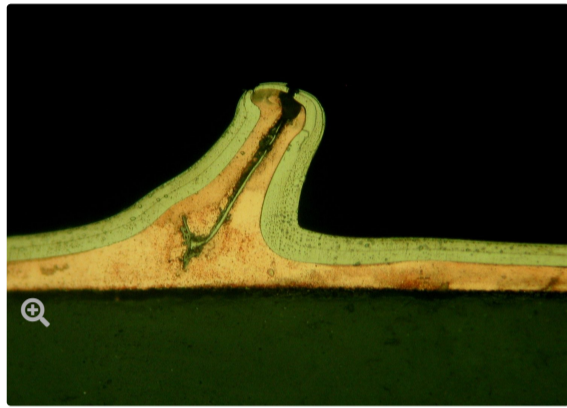


Fig. 3. Coatings of semi-bright nickel and bright nickel over a copper layer on ABS plastic. Photo: Atotech Spain

## In which way have the demands on QC in the automotive industry changed with the development of new materials?

**Ruiz Balbas:** Sustainability is the must in all areas of the automotive industry. This means we are now dealing with Non-CMR (Carcinogenic, Mutant and Reproductive) products with higher physic-chemical properties and at the same time going forward CO<sub>2</sub> reduction. All in all this has driven Atotech for more than 10 years to invest 10% of our annual turnover in R&D and Material Science. This enables us to stay the preferred surface treatment partner for the automotive industry.

## How does the Quality Control of your company make the difference?

**Ruiz Balbas:** We make the difference through our wide experience in working with metallographic techniques.

## How did the workflow look like before choosing the Leica EM TXP/DM2700 M system? Which were the weak points?

**Ruiz Balbas:** When working with the traditional methods for sample preparation, tiny defects and details are complicated to target. In many cases human-operating factors such as handling and preparation of the sample are prone to variation of its finishing or in some cases tilting of the sample during grinding-polishing processes. It also requires consuming complementary support materials for sample handling, such as encapsulating the sample with resin.

With the [Leica EM TXP target surfacing system](#) we have the possibility of progression during cutting and polishing of the material through controlled step sequence. We are able to indicate the number of microns that we want to move forward on the targeted detail. Controlled cutting-polishing forward steps can be selected from 0.5 microns to 100 microns. Before, we were not able to visualize at all the surface appearance and the exact level of the cross section on the defect profile.

Now with the implementation of [Leica EM TXP/DM2700 M](#) this is possible from the beginning of the cross section and during its preparation until its completion thanks to the integrated stereomicroscope, which allows viewing the sample from different angles.

## Your summary on the Leica EM TXP/DM2700 M after having gained some experience in daily routine? Which benefits of the system do support your QC process most?



Fig. 4: The Leica EM TXP is a target preparation device for milling, sawing, grinding, and polishing samples prior to examination by SEM, TEM, and LM techniques.



Fig. 5: The Leica DM2700 M upright materials microscope with universal LED illumination

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