

## Positive material identification (PMI)



### OBJECTIVES

Customer: Ingenieurbüro Odenthal GbR

- | Positive material identification (PMI).
- | Metals analysis.
- | Issuing certificates according to standards.

## Measuring tasks of a test laboratory: material analysis experts use Hitachi instruments

Materials are becoming increasingly complex and their number is increasing rapidly, while quality requirements are getting ever stricter. Engineering on the other hand is under pressure to become faster, more cost-effective and efficient. Many companies therefore struggle to cope with the increasing demand for material testing, know-how, certification and even accreditation. This is where test laboratories like Ingenieurbüro Odenthal offer their expertise.

The Ingenieurbüro Odenthal test laboratory is accredited according to DIN EN ISO/IEC 17025:2005 and offers a broad range of material tests. Chemical material analysis for positive material identification (PMI) with X-ray fluorescence (XRF) hand-held devices and mobile as well as stationary optical emission spectrometers (OES/spark spectrometers) are also provided.

Odenthal only uses Hitachi devices for PMI: XRF hand-held spectrometers and mobile as well as stationary spark spectrometers. The latter can reliably detect nearly all important and relevant elements into the ppm range. Handheld XRF devices on the other hand cannot identify elements with atomic numbers < 12 (magnesium) due to their functional principle. Mobile/portable OES is therefore the only method for analysing carbon, boron, nitrogen, phosphorous and sulphur in small concentrations on site in addition to the main elements.

“ **The high quality and very good performance as well as reliable and fast service in more than 10 years of working together are criteria for us to trust Hitachi.** ”

Guido Odenthal, Owner Ingenieurbüro Odenthal



Duplex steel is gaining importance due to its outstanding material properties. The higher corrosion resistance and strength of this type of steel makes it popular in apparatus and pipeline construction. An elevated nitrogen content is characteristic for duplex steel, replacing expensive nickel through specific use as an austenite former. Odenthal analyses the nitrogen content of duplex steel with the FOUNDRY-MASTER Optimum stationary spark spectrometer.

The stationary device is also used to prepare 3.1 and 3.2 certificates according to EN10204 for customers engaged in material shaping.

The XRF hand-held device, which is very easy to operate and entirely non-destructive in application, is used whenever elements below the atomic number 12 are not relevant (304 - 316 separation for example), applying heat to the specimen is not permitted and non-destructive measurement on the surfaces of end products is required (OES devices always leave a visible burn mark).

## PMI IS INDISPENSABLE

Material mix-ups have repeatedly caused major accidents, for example with boilers. Serious accidents in petrochemical plants shocked the public in the 1960s and '70s. Aside from human error and a lack of safety awareness, they were mostly caused by unsuitable materials.

Seamless quality control and testing for mix-ups is therefore essential in metal processing today, especially when it comes to safety-related components and systems. For positive material identification (PMI), a chemical analysis is the best insurance to ensure quality and prevent disasters. PMI accounts for about 10% of the tests at Odenthal.

## REASONS FOR MATERIAL TESTING

Metals are tested to prevent mix-ups throughout the production process and to ensure that the supplied material matches the order. The carbon content (L-grades, for instance 316 L) has to be specified for stainless steel, supplied for example to the USA. Carbon, phosphorous, sulphur and other elements are determined to assess the welding ability in plant engineering and power plant construction in order to find the suitable filler metal. Nickel, aluminium, copper and titanium alloys are often tested for their chemical composition in addition to alloyed and stainless steel.



Non-destructive materials testing with the handheld XRF X-MET8000

# BENEFITS OF HITACHI DEVICES

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The spark spectrometers from Hitachi set themselves apart with their unique Jet-Stream technology. Normally OES that works with argon and where the sample does not fully cover the spark opening returns falsified measurement results. With the Jet-Stream technology, the electrode is protected by a flow of argon so that even samples with complex and irregular shapes can be analysed easily.

The spark spectrometers from Hitachi are also equipped with the world's most complete material database by default – the GRADE Database. This is a very powerful tool with approximately 339,000 materials and nearly 12,000,000 records for almost all national standards, especially for test services that often have to analyse unknown materials.

All models are straightforward and intuitive to use and the maintenance effort is minimal.

