A UNIQUE LABORATORY

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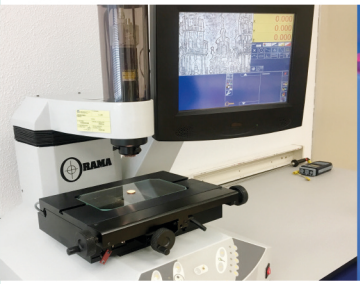
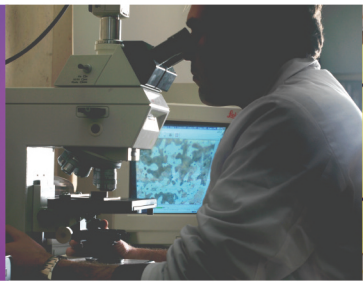
The Laboratory and its origin

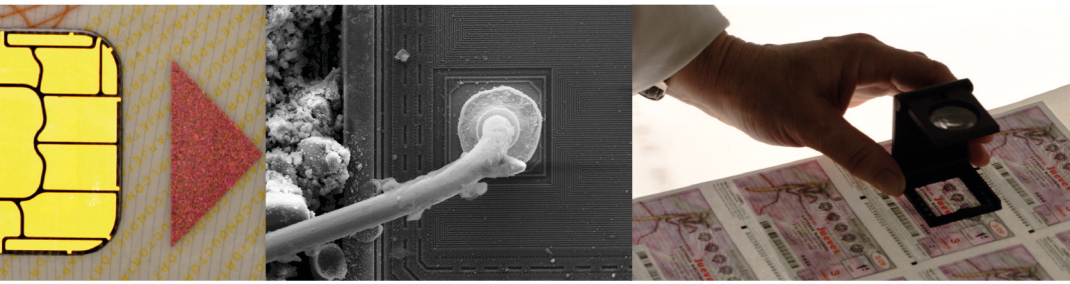


The Laboratory of FNMT-RCM, as it is today, was set up during the second half of the twentieth century, following the decision of starting to test paper and inks, in addition to the metals tests. Today the activity has increased significantly, in response to the new products manufactured by FNMT as well as the new needs. On top of tests and measurements, studies and research are an important part of its activity, which is conducted not only for FNMT but also for different public and private organizations, both in Spain and abroad.

We may consider the work of the assayer as the origin of the Laboratory. The task of this person was to verify the purity of the metals used for minting. This was a fundamental task when the coin was not fiduciary as its acceptance depended on the metal from which it had been minted. The assayer's work was of the utmost importance as the coin's acceptance depended on the value of the metal from which it had been made.

Accreditations and certifications



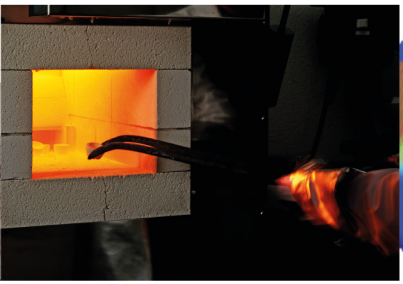
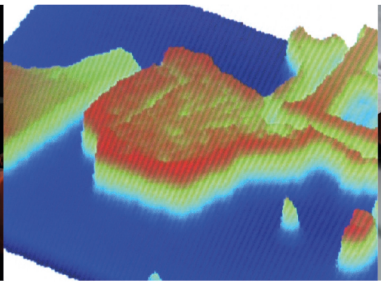
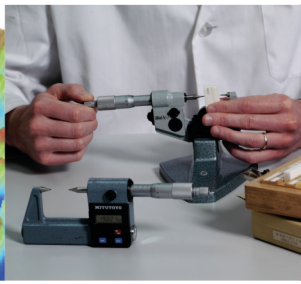
FNMT-RCM Laboratory holds the following accreditations

- Official Laboratory of the State Administration
- Arbitrator for laboratories of hallmarking of precious metals
- Technical expert of the Ministry of Justice
- ISO 17025 (ENAC, Spanish National Accreditation Body). Tests on precious metal alloys used in minting

The Laboratory has signed agreements for testing services with National Central Banks, Commercial Banks, and several public and private companies.

Another important task is the issuing of technical forensic reports for the Spanish Justice System, related to the verification of the authenticity of products manufactured by FNMT-RCM, as well as of other security documents and payment products manufactured by other companies. FNMT-RCM has several ISO certifications, ISO 14001 (Environmental Protection), ISO 9001 (Quality) and OHSAS 18000 (Health and Safety), and the Laboratory s included in the scope.

Services

Test Print Center. There is a certain number of printing equipment installed in the Laboratory facilities. Offset (wet and dry), intaglio, letterpress (numbering), silkscreen and hot stamping machines are ready to print, so proof printing is an option for any new security document design.

Substrates and inks analysis. Quality of raw materials used for any security document, such as banknotes (paper and polymer), tax stamps, lottery tickets, security labels, etc., can be tested. The same service is available for any ink, from the standard to the most complex security ink.

Tests of identification and payment documents. Durability, resistance and quality of identification and payment products, such as passports, driving licenses, id cards, etc., can be tested. The Laboratory count on all the equipment needed to fulfill national and international standards on the field. The expertise gained during years allows us to undertake quality improvement projects for these types of documents.

Banknotes and other security documents Durability, resistance and quality of any security documents such as banknotes (paper and polymer), tax stamps, lottery

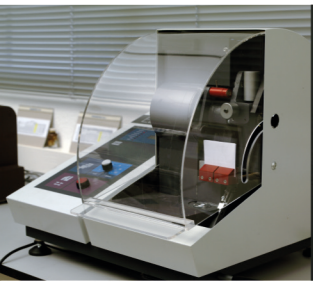
tickets, bank cheques, security labels, etc., can be tested.

Coins and metals. Tests can be performed on all properties specified for coins such as: euro, collector coins, and any other coin of any currency in circulation all around the world. It is possible to measure different alloys, including certain low alloy steels, used frequently for commercial applications (copper used for railway tracks, security shelving for the Army, etc.). Authenticity tests carried out on questioned coins are a very important task, which gives a high added value to the services provided by the Laboratory.

Forensic analysis: As a consequence of our high skilled technicians, sophisticated instruments and equipment in a high security environment, the Laboratory can offer an authenticity verification service for a wide range of security products, standard applied. Comparison of the questioned sample with a reference product is the methodology used for such analysis.

Metrology, Calibration and Quality Assurance. This service is mandatory to maintain a well-controlled analysis system. All Measurement devices installed at FNMT-RCM have the relevant calibration certificates.

FNMT-RCM Laboratory Test Directory



PAPER AND POLYMER

Paper and polymer

Grammage
Thickness
Tensile strength
Folding resistance
Tear resistance
Ash content
Coating properties
Smoothness
Porosity
Roughness
Porometry
Whiteness
Optical opacity
Colour
UV luminescence
Surface resistance
Printability
Ageing
Stiffness and bending
Fibres composition
Paper fillers
Absolute moisture
Misalignment
Watermarks
Magnetism and security thread coding

INKS AND VARNISHES

Inks and varnishes

Colour
Fluorescence
Phosphorescence
Magnetism
Opacity by printing
Ink printability
Peeling
Drying
Stiffness
Viscosity
Infrared transparency
Gloss
Optical density
Optically variable and iridescent (OVI) inks
Surface tensile strength
Chemical analysis by SEM/EDX, EDXRF or FTIR

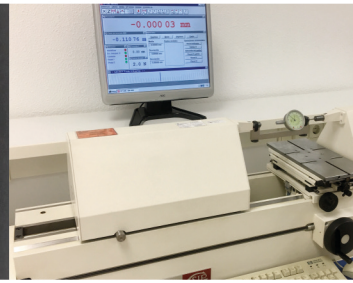
Test Print Centre

Offset, intaglio, silk-screen printing, letterpress, foil application.

ID DOCUMENTS AND OTHER MEANS OF PAYMENT

Cards and passports

Study of composition by means of the following tests:
Chemical
Organoleptic
Infrared spectrometry
FTIR + microscope
Study of properties in different atmospheric conditions:
Chambers: environmental, light, thermal shock, saline fog
Study of security elements, including:
Visual light test:
Ultraviolet, infrared, polarised, etc.
Magnetic stripe
Embossed relief
Electrical properties, card with and without contact (RFID)



Adhesion of inks on plastic supports:
Adhesion, friction resistance
Adhesives:
Adhesion, Shear, Ageing

BANKNOTES AND OTHER SECURITY PRODUCTS

Resistance and ageing
Abrasion resistance
Dry and wet crumpling
Heat resistance
Light resistance
Chemical resistance
Foil or patch resistance
Resistance by the application of adhesive tapes
Ironing resistance
Freezing resistance
Ball-vibration resistance
Washing machine resistance
Lightfastness
Abrasion resistance
Soiling resistance
Ad hoc developments
of new testing procedures

Characterization
SEM/EDX. Surface and transversal analysis
Confocal- interferometry
Relief surface analysis

COINS, METALS AND OTHER

ICP- OES Technique
Analysis of pollutants in the air
Analysis of waste water
Analysis of copper-based alloy metals

Atomic Absorption (AA)
Base alloys:
Copper, iron, nickel, aluminium, lead, zinc and tin

Optical Emission Spectrometry (OES)
Base alloys:
Copper, aluminium, iron
Impurities in pure metals (Cu and Ni)

SEM/EDX
Blanks and coins
Gold and silver alloys

Potentiometry
Silver alloys

Cupellation
Analysis of Au-based alloys

Other
Brinell, Rockwell and Vickers hardness
Metallographic testing
Magnetism
Electrical behaviour

ADDED VALUE

Environment and Health and Safety
In air:
Metals, Organic vapours
In waste water:
COD (Chemical Oxygen Demand), metals, organic vapours, cations, anions, pH
Metrology and calibration:
Dimensions, temperature and relative humidity, mass.