

A LABORATORY IN A CLASS OF ITS OWN



**Real Casa de la Moneda**  
Fábrica Nacional  
de Moneda y Timbre

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## The Laboratory and its origin



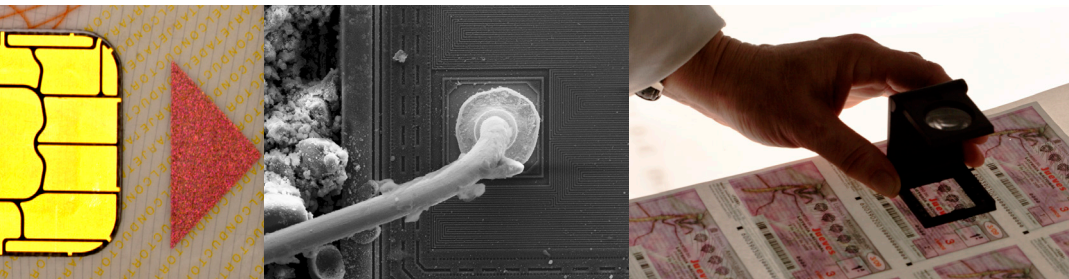
The Laboratory of FNMT-RCM, as it is today, was set up during the second half of the twentieth century, following the decision of starting to test paper and inks, in addition to the metals tests. Today the activity has increased significantly, in response to the new products manufactured by FNMT as well 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
- Accreditation ISO 17025 (ENAC, Spanish National Accreditation Body). Assays of gold and fine gold (880 - 920 ‰ / 990 - 999,9 ‰) and silver (900 - 950 ‰) monetary alloys.

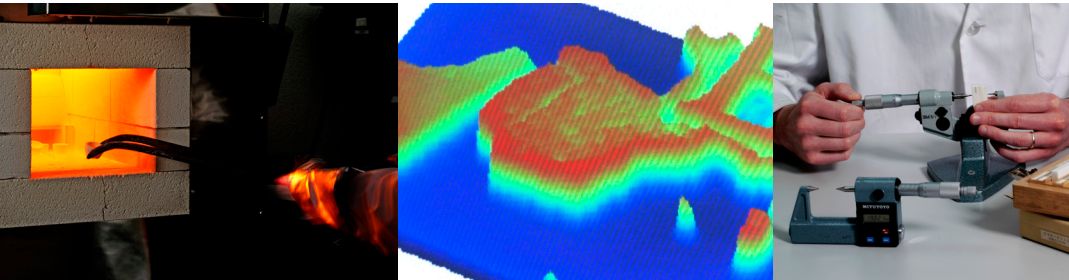
The Laboratory has signed agreements for testing services with National Central Banks, Commercial Banks, and several public and private companies.

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 is included in the scope.

**ISO 14001**



# Services

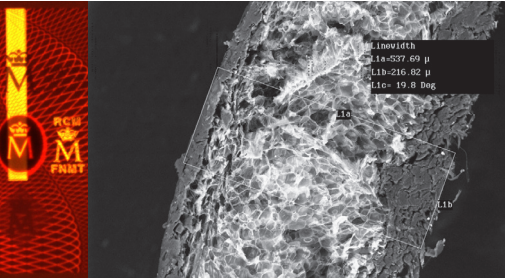


**Test Print Center.** There is a certain number of printing equipment installed in the Laboratory facilities. Offset (wet and dry), intaglio, letterpress (numbering), silkscreen and hot stamping machines are ready to print, so proof printing is an option for any new security document design.

**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



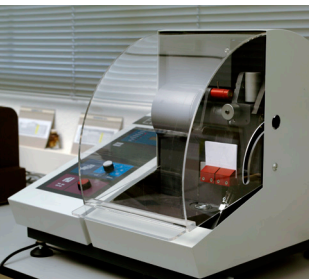
tickets, bank cheques, security labels, etc., can be tested.

**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

printing, letterpress, foil  
application.

## 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

## 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

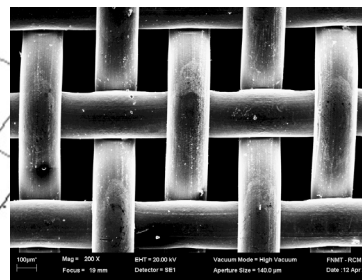
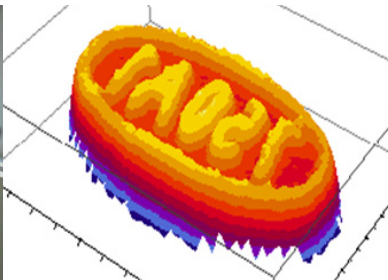
**Study of properties in different atmospheric conditions:**

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

Silver monetary alloys (900 - 950 ‰). Accredited by ENAC

### Cupellation

Analysis of Au-based alloys  
 Gold monetary alloys and fine gold (880 - 920 ‰ / 990 - 999,9 ‰). Accredited by ENAC

### 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.