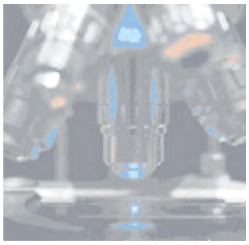

CONSTRUCTIONS MECANIQUES

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MECANIQUE GENERALE

EXAMENS METALLURGIQUES

TECHNICAL REPORT
N° 208-05-093

Grande Forge
RD 468
67114 ESCHAU
FRANCE

Analyses of constituent elements of ironwork products

Report prepared : June 25th, 2008

M BACH

Engineer ENSAIS
Doctor of Industrial Science and Technology
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1. Subject of the study

Upon request of Mr. KLEIN and on behalf of SCHUTT Grande Forge Company, 67114 Eschau, BACH Mechanical Construction Company was charged to verify the conformity of different ironwork pieces.

2. Tests carried out

- Tests with scanning electron microscope on cross-cutting micrographic cut of the coated parts. Elementary analyses through a micro-EDS probe of the constituent elements. (Base metal, sub-layer, surface).
Determination of the coating thickness.

- EDS analysis of the coating (coated parts).

- Chemical semi-quantitative analysis by X-ray fluorescence on the no coated parts.

The analysis of the surfaces was made after pickling the varnish.

3. Results

For the coated parts, the results are presented piece by piece.

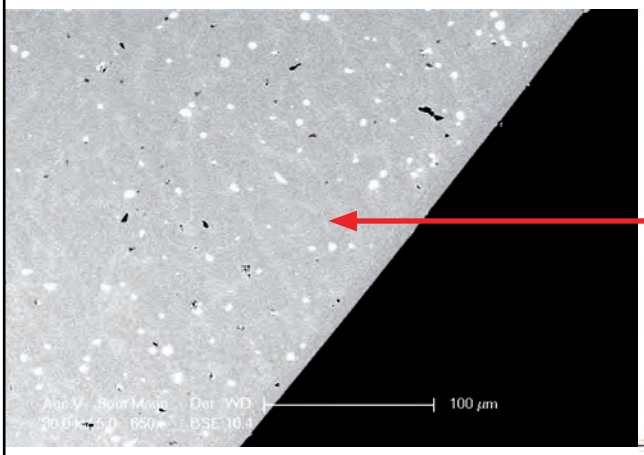
The electronic micrographics below, illustrate views representing a cross-cutting of each piece. The micro-EDS analyses of different components are also given.

The double red arrow that you can spot on the pictures, traces the cross-cutting realized for the tests.

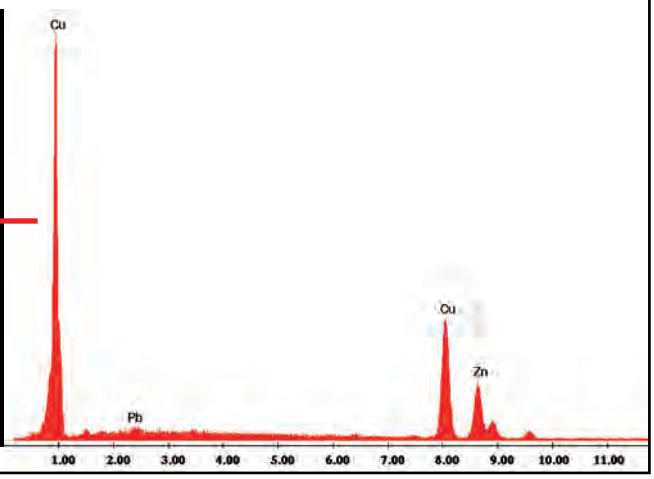
A summary table aggregates all results for the non-coated pieces in the last paragraph of the report.

ROYAL range PL142G

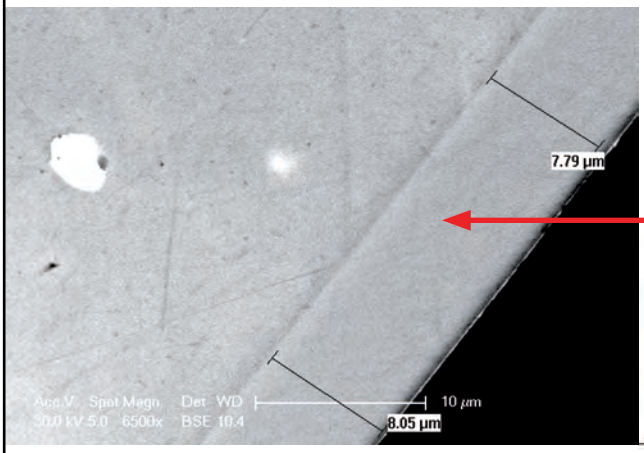
Base metal – overview :



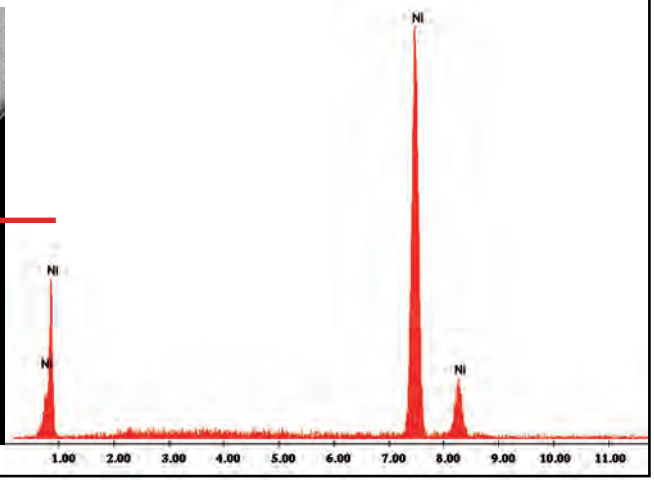
Microanalysis of the base metal: brass



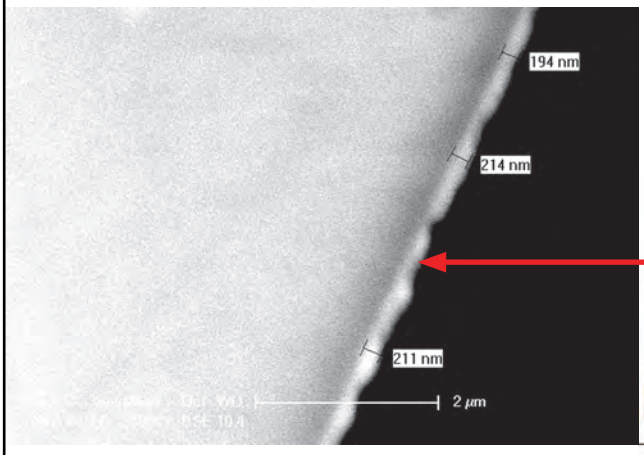
Details and thickness of the sub-layer:



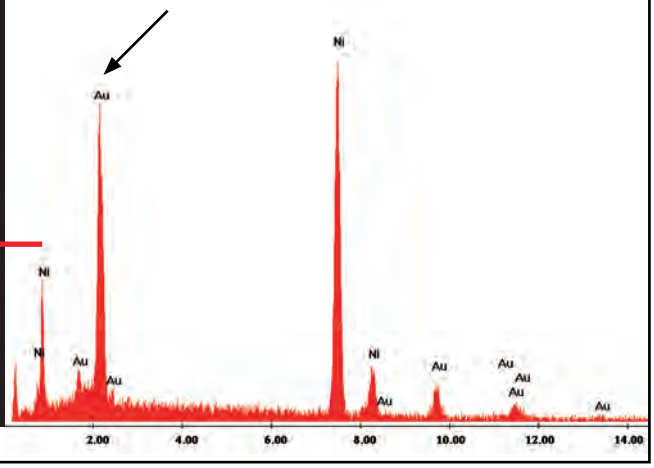
Microanalysis of the sub-layer: nickel (Ni)



Details and thickness of the coating:



Microanalysis of the coating: gold (Au)

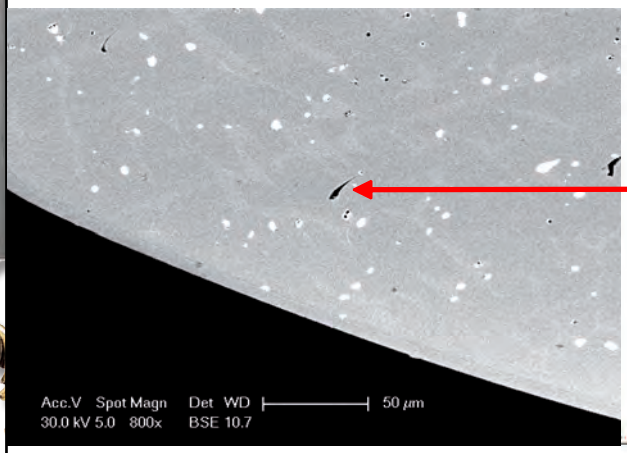


The base metal used for the realisation of the piece is **brass** (Cu/Zn – Pb).
A **gold** flash with 0.2 µm thickness was set on a **nickel** sub-layer with thickness of around 6 - 8 µm.

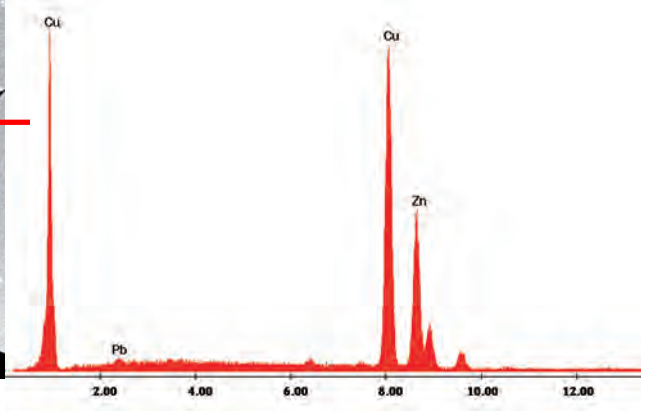
The entire piece is varnished.

ROYAL range BL149G

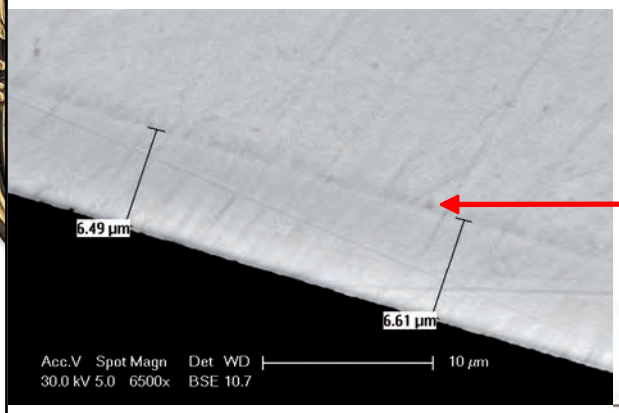
Base metal – overview :



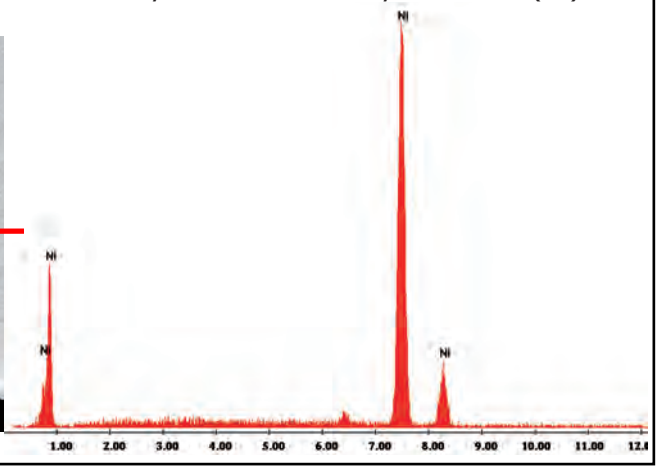
Microanalysis of the base metal: brass (Cu/Zn)



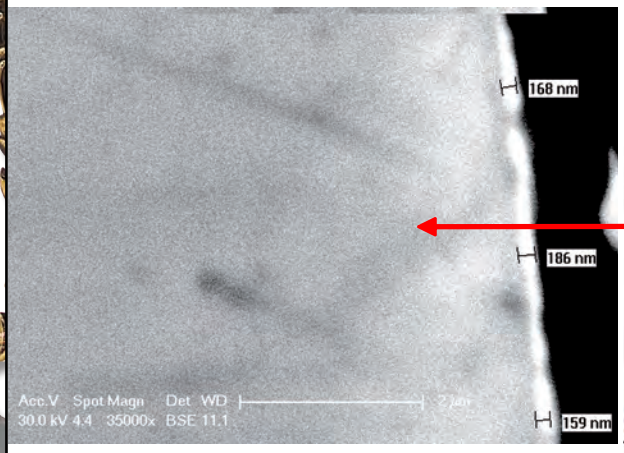
Details and thickness of the sub-layer:



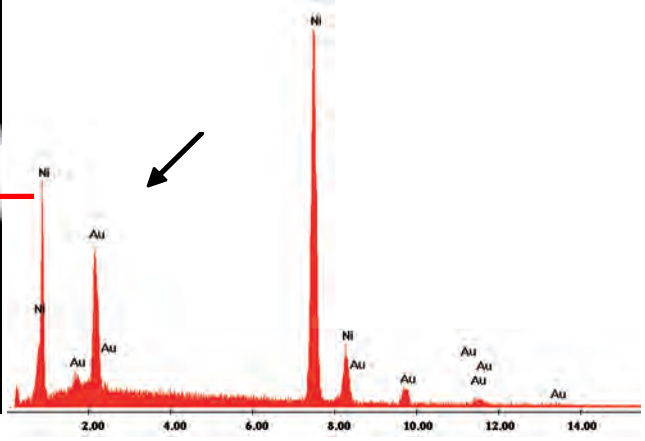
Microanalysis of the sub-layer: nickel (Ni)



Details and thickness of the coating:

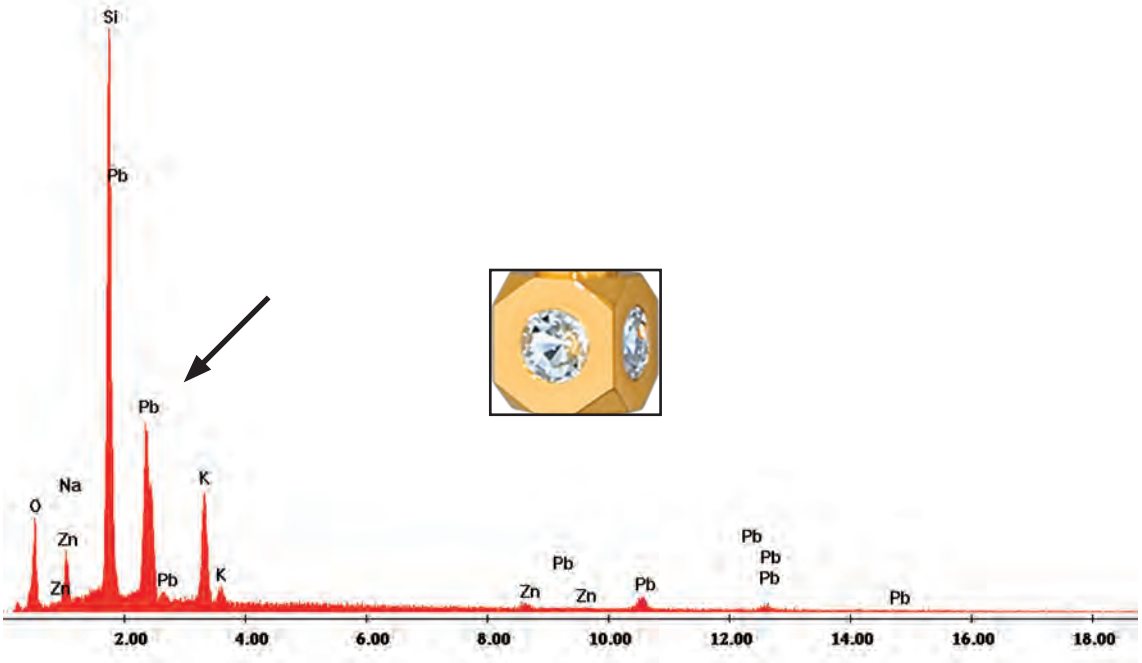


Microanalysis of the coating: gold (Au)



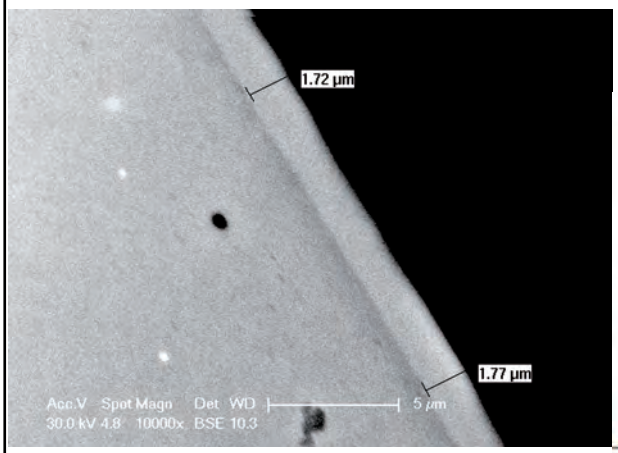
The base metal used for the realization of the piece is **brass** (Cu/Zn – Pb).
A **gold** flash with 0.1- 0.2 µm thickness was set on a **nickel** sub-layer of between 5 - 7 µm.
The entire piece is varnished.

Micro - EDS analyses of crystal DIAMOND range

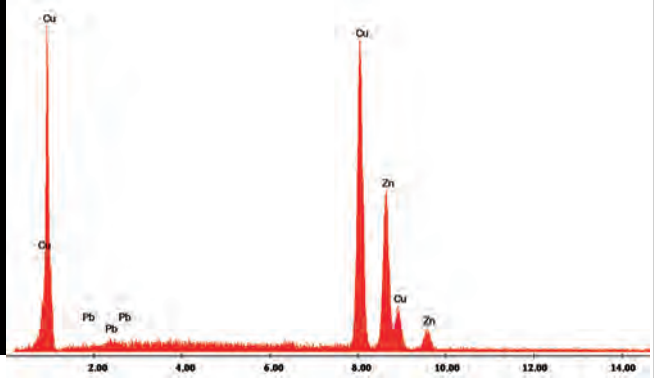


The central piece ref.BL244 is composed of **crystal**.
The **lead content exceeds 25 %**.

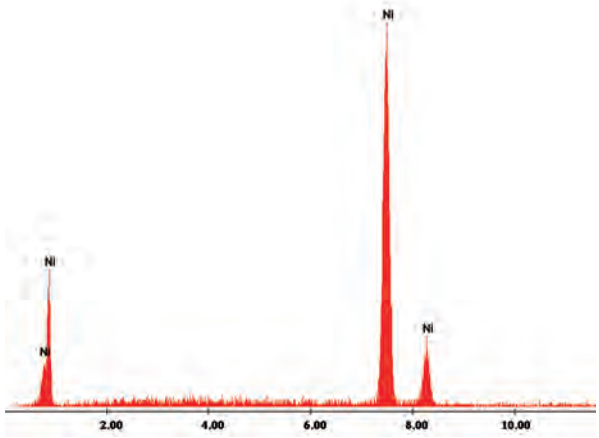
Details and thickness of the coating:



Microanalysis of the base metal: brass



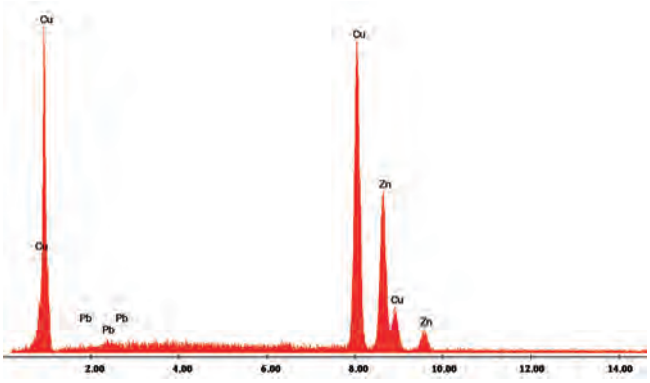
Microanalyses of the coating: nickel



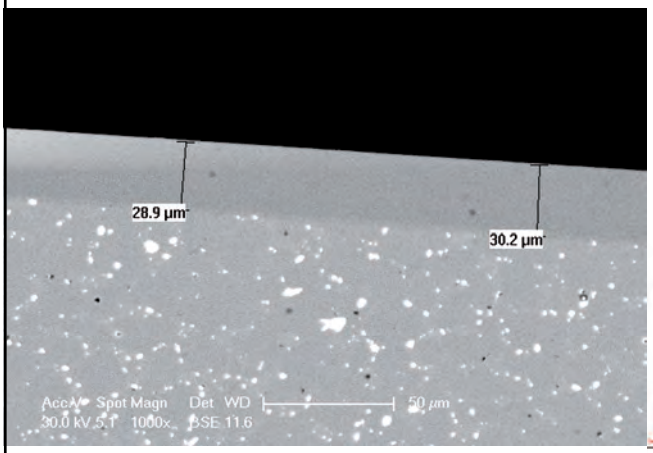
Reference BL244: The base metal used for the realization of the piece is **brass** (Cu/Zn – Pb).
A **nickel** coating with thickness of around 2 µm was set.

The entire piece is varnished.

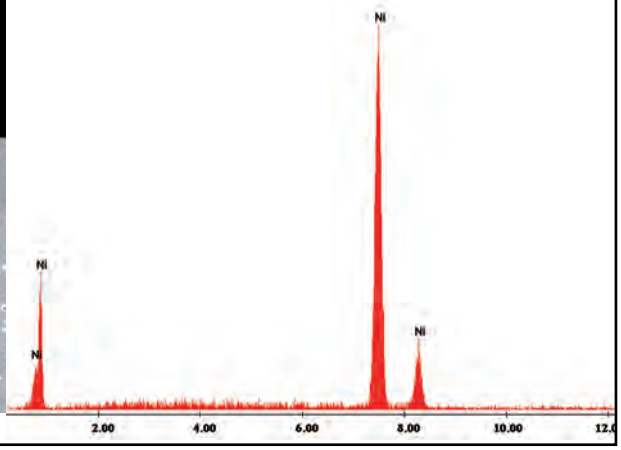
Microanalysis of the base metal: brass



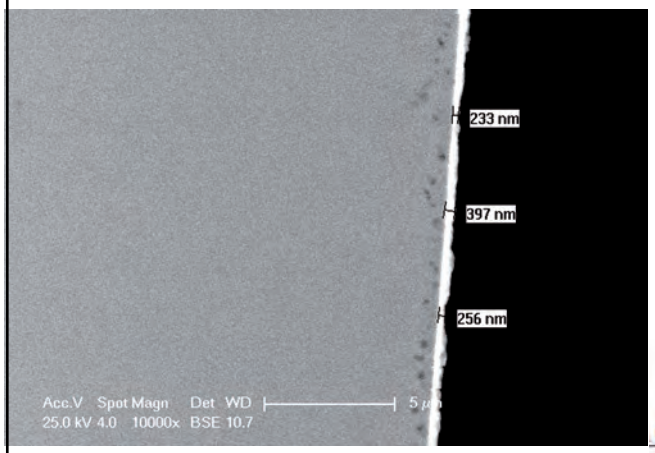
Details and thickness of the sub-layer:



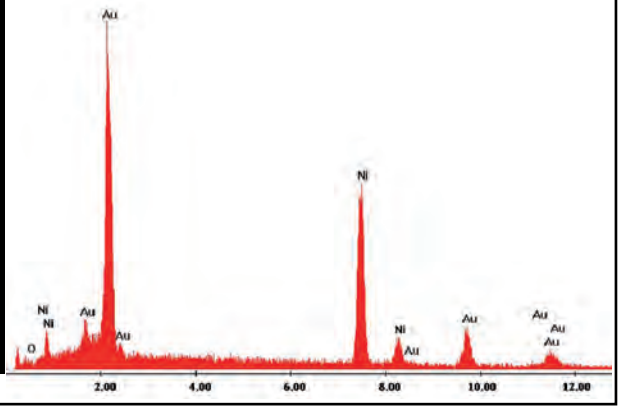
Microanalysis of the sub-layer: nickel



Details and thickness of the coating:

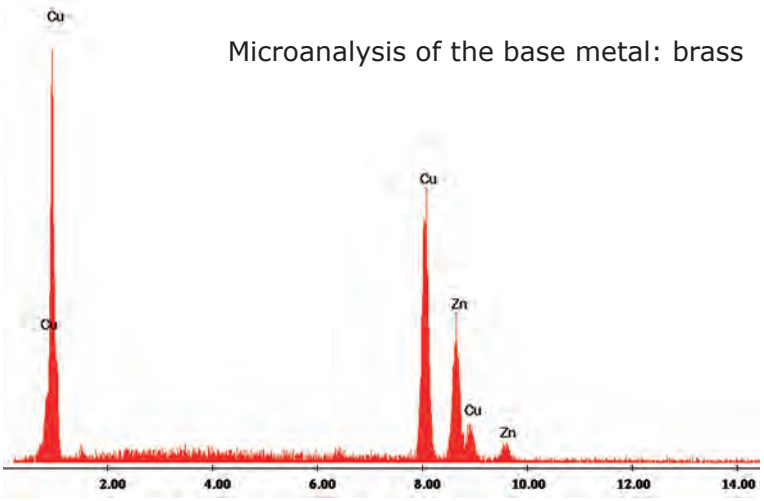


Microanalysis of the coating: gold

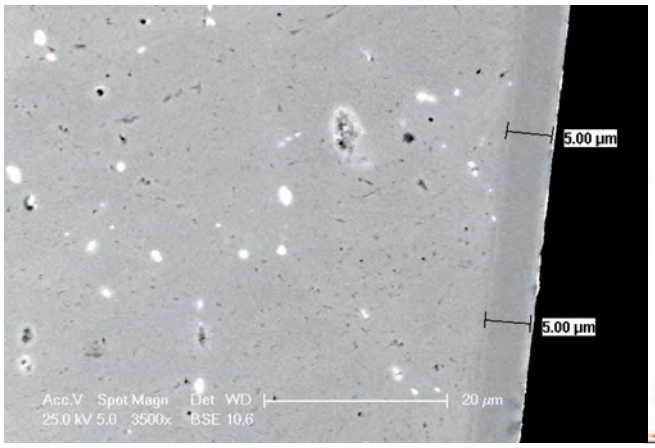


The base metal used for the realization of the piece is **brass** (Cu/Zn – Pb).
A **gold** flash with 0.2 - 0.3 µm thickness was set on a **nickel** sub-layer of between 30 µm.
The entire piece is varnished.

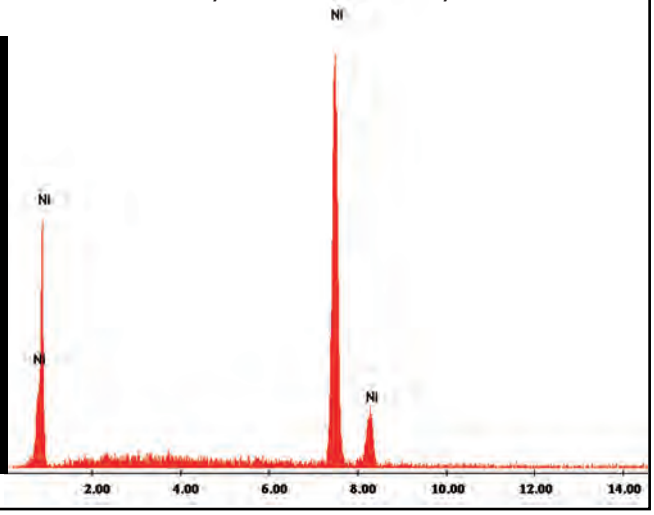
Microanalysis of the base metal: brass



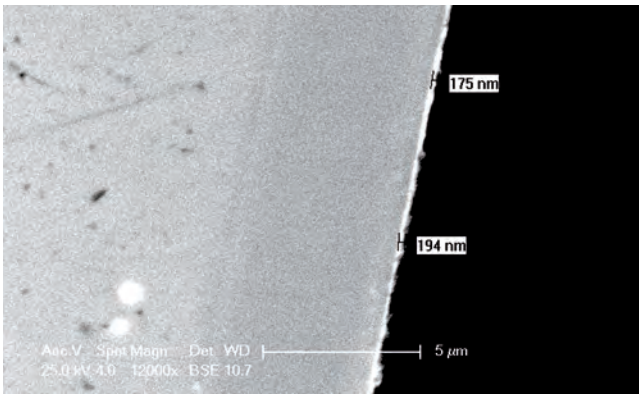
Details and thickness of the sub-layer:



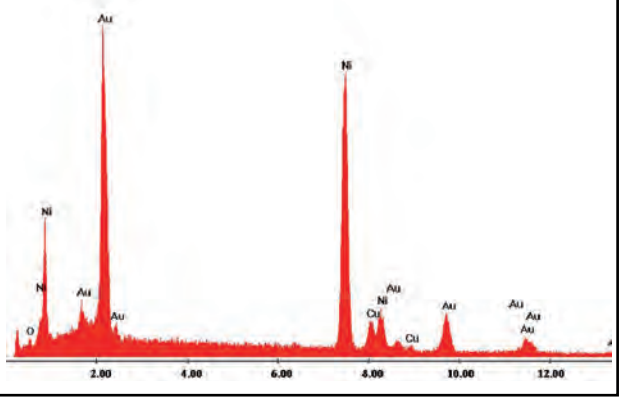
Microanalysis of the sub-layer: nickel



Details and thickness of the coating:



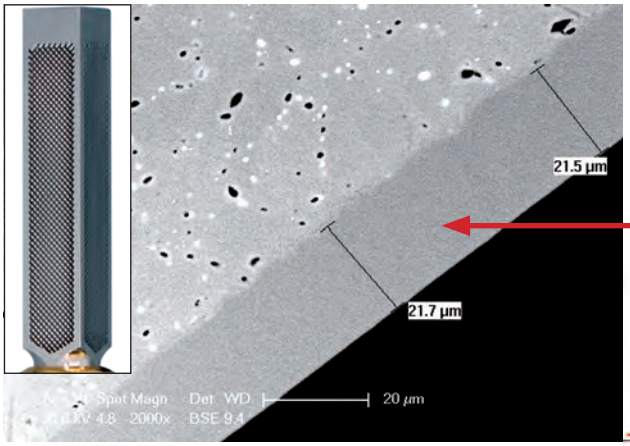
Microanalysis of the coating: gold



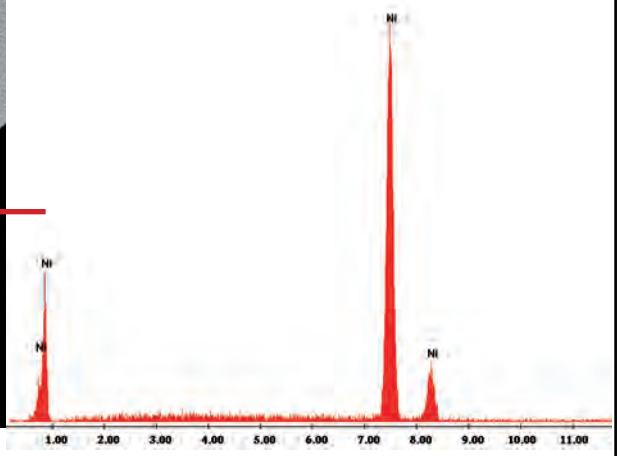
The base metal used for the realization of the piece is **brass** (Cu/Zn – Pb).
A **gold** flash with 0.1 - 0.2 µm thickness was set on a **nickel** sub-layer of between 5 µm.
The entire piece is varnished.

PARIS range PL530

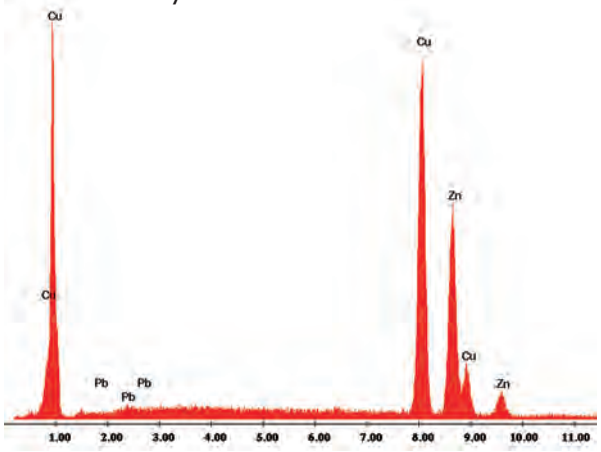
Details and thickness of the coating:



Microanalysis of the coating: nickel



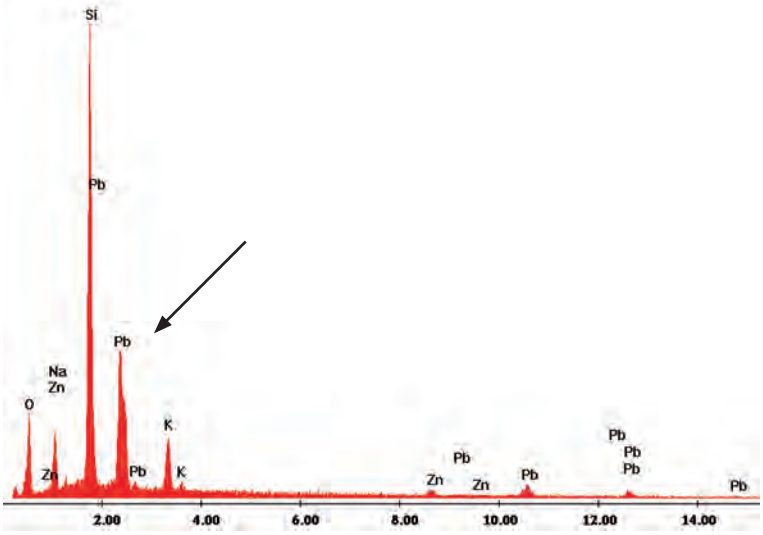
Microanalysis of the base metal: brass



Référence PL530: The base metal used for the realization of the piece is **brass** (Cu/Zn – Pb).
A **nickel** coating with thickness of around 20 µm was set.

The entire piece is varnished.

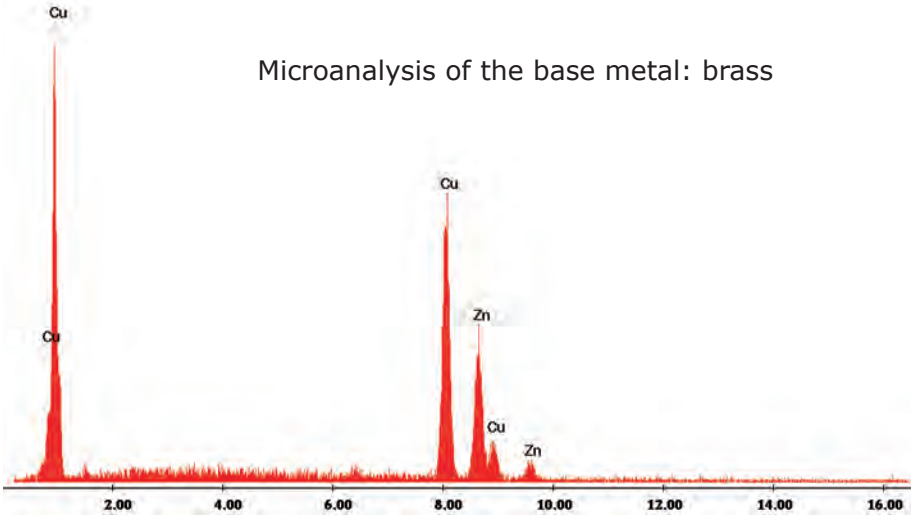
Micro- EDS analysis of crystal reference PL530



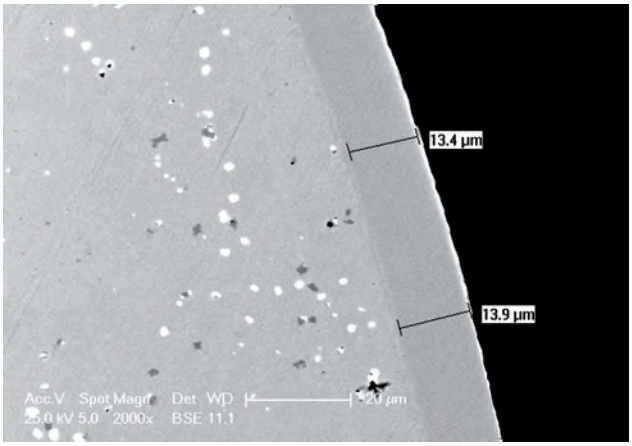
The central piece ref. PL530 is composed of crystal.
The lead content exceeds 25 %

PARIS range PL530

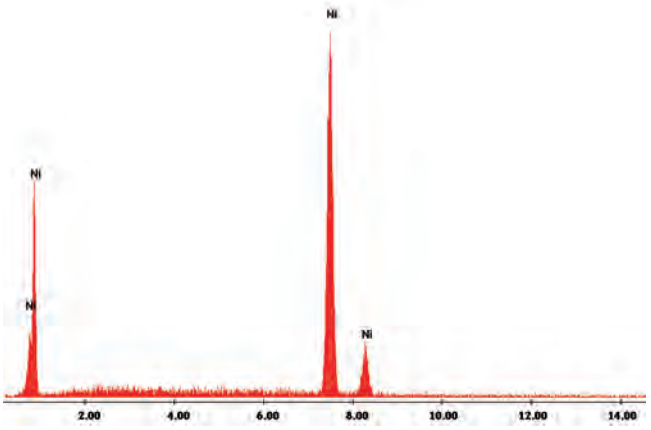
Microanalysis of the base metal: brass



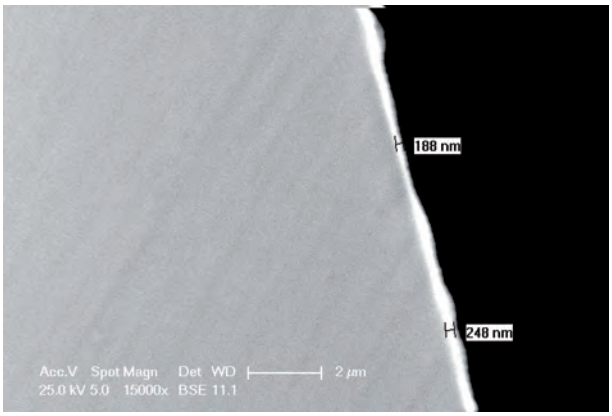
Details and thickness of the sub-layer:



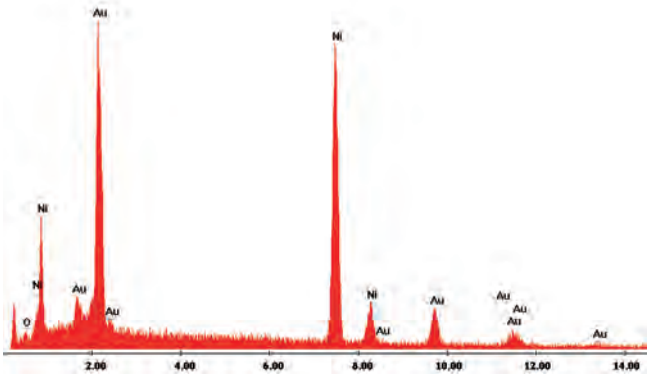
Microanalysis of the sub-layer: nickel



Details and thickness of the coating:



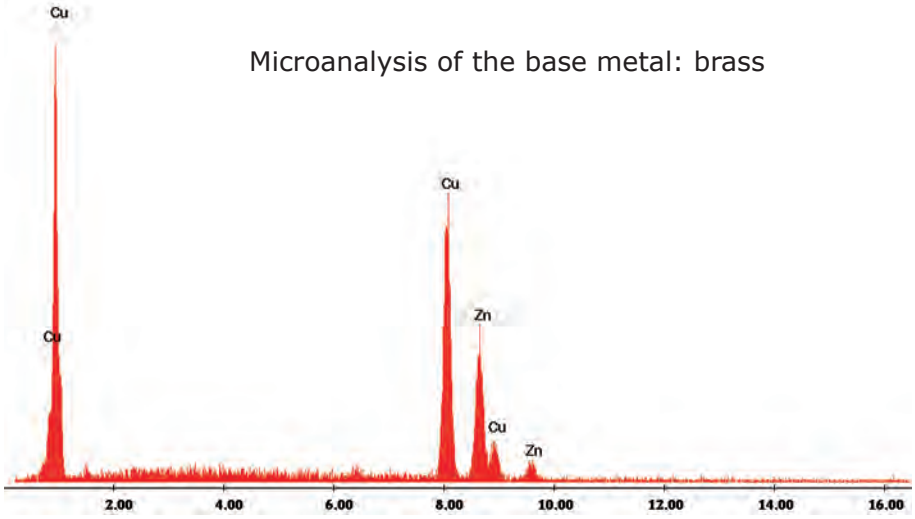
Microanalysis of the coating: gold



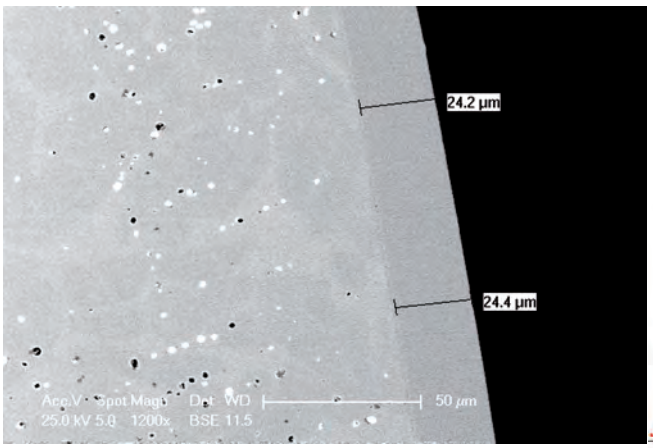
The base metal used for the realization of the piece is **brass** (Cu/Zn – Pb).
A **gold** flash with 0.2 µm thickness was set on a **nickel** sub-layer of between 13 µm.

The entire piece is varnished.

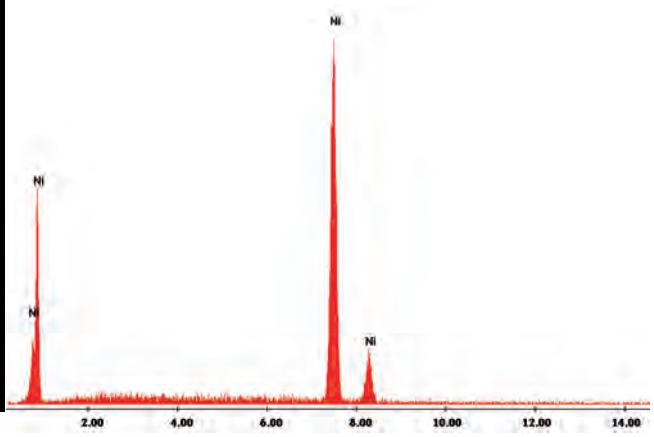
Microanalysis of the base metal: brass



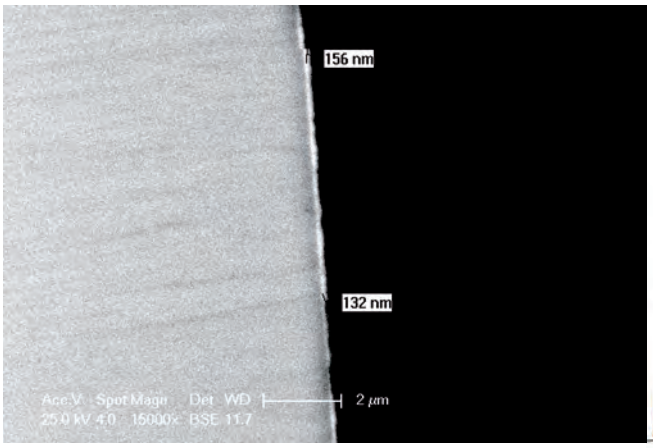
Details and thickness of the sub-layer:



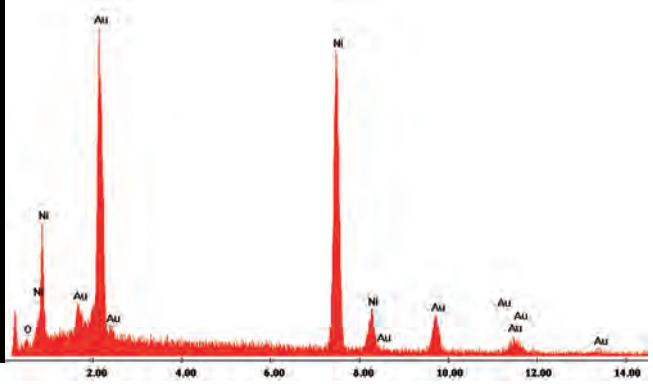
Microanalysis of the sub-layer: nickel



Details and thickness of the coating:



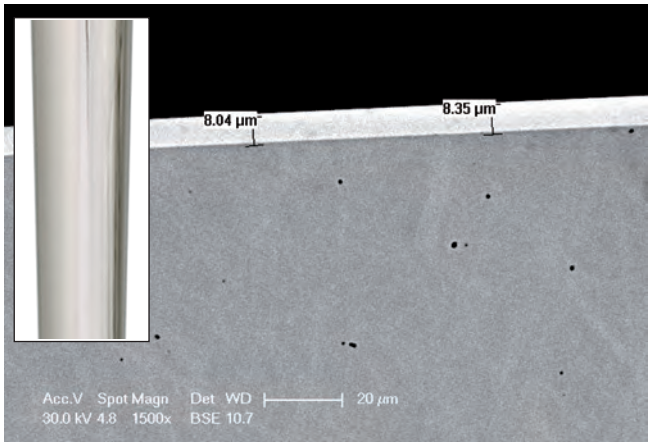
Microanalysis of the coating: gold



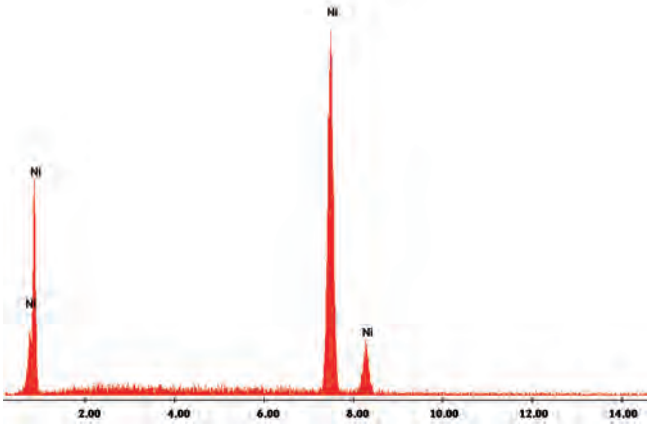
The base metal used for the realization of the piece is **brass** (Cu/Zn – Pb).
A **gold** flash with 0.1 µm thickness was set on a **nickel** sub-layer of between 24 µm.

PARIS range PL530

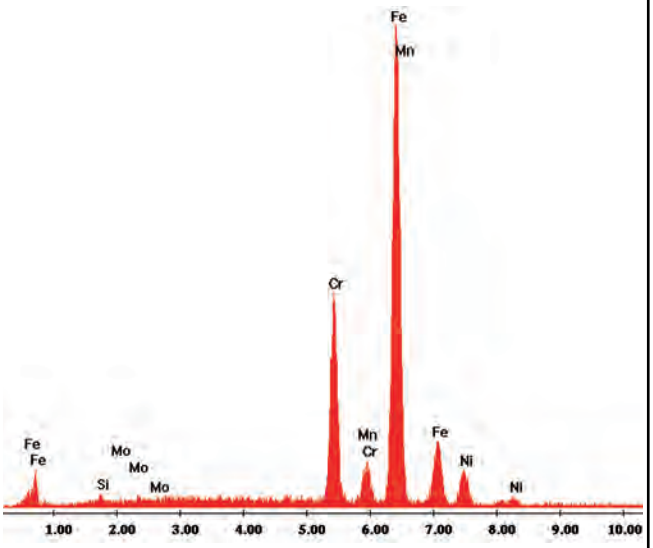
Details and thickness of the coating:



Microanalysis of the coating: nickel



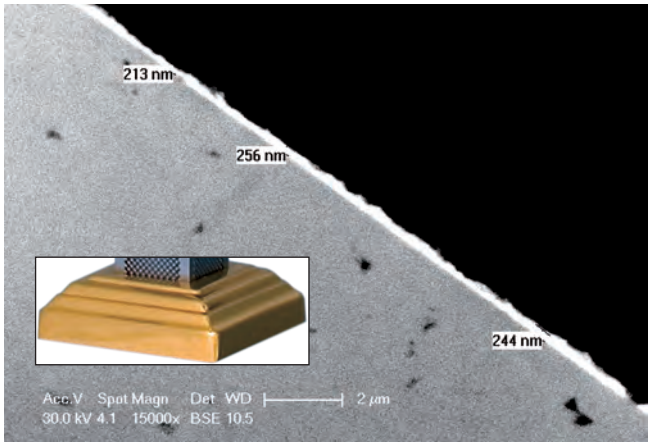
Microanalysis of the base metal: inox stastainless steel



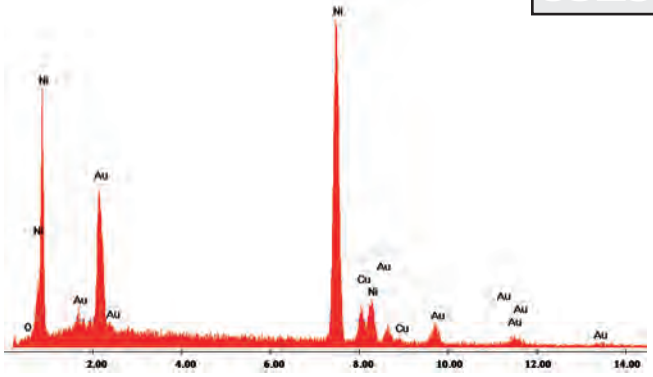
The base metal used for the realization of the piece is **stainless steel** (type 18-8).
A **nickel** coating with 8 µm thickness was set.

The entire piece is varnished.

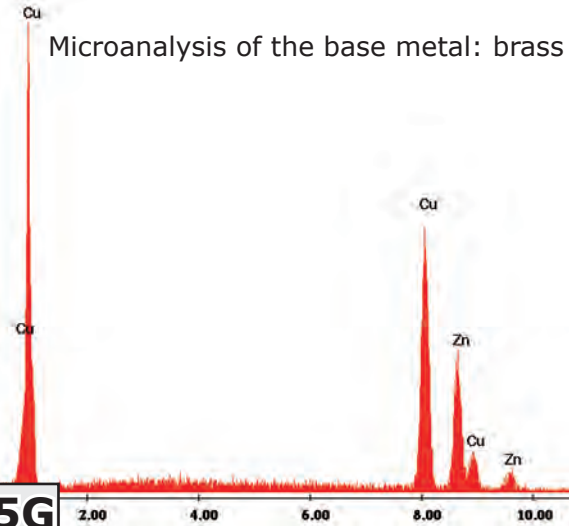
Details and thickness of the coating :



Microanalysis of the surface: gold + nickel



Microanalysis of the base metal: brass

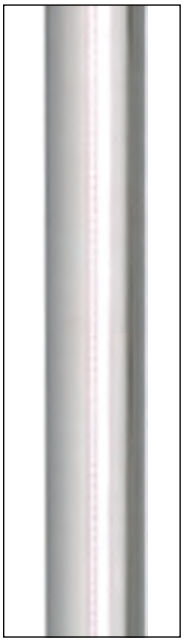


CSL835G

The base metal used for the realization of the piece is **brass** (Cu/Zn). A **gold** flash with 0.2 µm thickness was set on a **nickel** sub-layer of between 1,5 µm.
The entire piece is varnished.

HARMONIE range BL103

Brass
type CuZn39 – Pb2



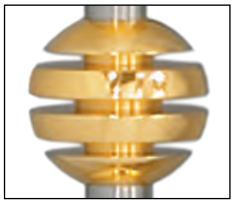
Stainless steel : X12CrNi 17 7

C : 0.04% S : 0.016% Cr : 17.5%
Cu : 0.27% Mn : 1.62% Ni : 8.24%
Si : 0.27% P : 0.028% Ti : 0.029%
Mo : 0.21% V : 0.07%

MODERN range BL177

Brass

type CuZn39 – Pb2



Brass

type CuZn36

Stainless steel :X12CrNi 17 7

C : 0.1% S : 0.009% Cr : 17.6%
Cu : 0.22% Mn : 1.16% Ni : 7.95%
Si : 0.37% P : 0.034% Ti :<0.001%
Mo : 0.14% V : 0.056%

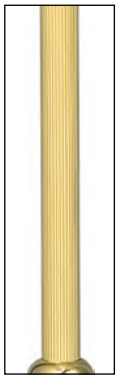
COMTESSE range BL113

Brass

type CuZn39 – Pb2

Brass

type CuZn39 – Pb2



Brass

type CuZn36

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