

# Understanding Surface Technology

## - the key to optimized and sustainable design

Course program 13<sup>th</sup> of April 2012

- 09.00-09.30 **Electroplating nickel**  
Technical electrolytes - Semi bright electrolytes – Gloss electrolytes - Duplex nickel – Micro cracked chrome as post treatment – Galvanic forming with nickel - Alternatives to nickel and demand for allergy-free surfaces.
- 09.30-10.00 **Electrolytic deposition of copper**  
Types of electrolytes – Galvanofforming with copper
- 10.00-10.15 **Coffee break**
- 10.15-10.45 **Electrolytic tinning**  
Types of electrolytes - Tin coatings (properties and applications) - Tin coatings and soldering.
- 10.45-10.50 **Short break**
- 10.50-11.20 **Electrolytic deposition of alloys**  
The theory behind alloy plating - Normal alloy plating - Abnormal alloy plating - Examples of the increasing use of alloy plating to substitute for nickel, used for soldering, etc.
- 11.20-11.25 **Short break**
- 11.25-11.55 **Electrolytic precipitation of noble metals**  
Silver - Gold - Other precious metals, Platinum - Ruthenium - Osmium - Iridium – Rhenium  
How precious metal coatings are used and at what cost?
- 11.55-12.40 **Lunch**
- 12.40-13.10 **Chemical precipitation of metals**  
Autocatalytic plating - ion exchange plating - Electroless copper plating - Electroless nickel plating – Selection of electroless nickel coatings - Internal stresses in electroless nickel coatings - Electrical and magnetic properties – Dispersion plating
- 13.10-13.15 **Short break**
- 13.15-13.45 **Hard chrome plating**  
Physical and chemical properties of chrome coatings – The chrome electrolyte
- 13.45-13.50 **Short break**
- 13.50-14.25 **Chemical-electrochemical polishing**  
Applications of chemical and electrochemical polishing - electropolishing mechanism - Electropolishing of aluminum - Electropolishing of stainless steel - Electropolishing used as a deburring method

14.25-14.40 **Coffee break**

14.40-15.25 **Conversion Coatings (processes changing the surface)**

Anodizing of aluminium – the anodizing process - coloring of anodized aluminium - Plasma anodizing, coloring titanium, hard anodizing - Chemical conversion coatings - Passivation - Phosphating - Chromate coatings

15.25-15.30 **Short break**

15.30-16.10 **Hot dip galvanizing (Dipping in metal melt)**

Hot dip processes (in general) - Hot galvanizing - Reactions between iron and zinc - Parameters affecting hot galvanizing - Galvanized steel properties - Construction of hot dip galvanizing - Standards for galvanizing

16.10-16.15 **Coffee break**

16.15-16.35 **Enamelling**

Properties and structure - Production of enamel products - Applying enamels - Quality requirements and testing methods for enamelling

16.35-16.45 **Mechanical plating**

Mechanical plating (introduction) - Mechanical plating of steel

16.45-17.00 **Rounding the lectures.**

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