

# JV «KTM-2000»

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Digital anodizing  
the technology of the future



Riga 03/2017



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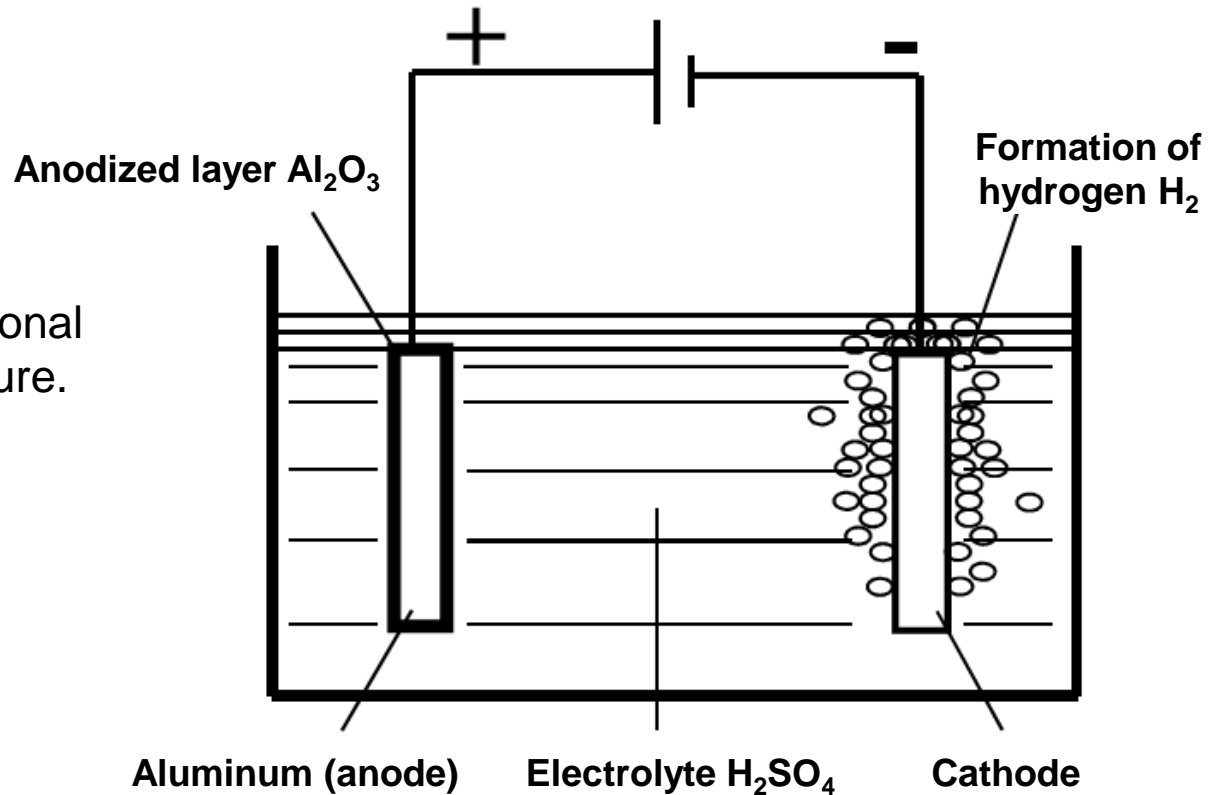
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# What is anodizing?

(classical process An. Ox. nv./ ClassicELOX™)

This is galvanic process, which most commonly occurs in aqueous electrolyte solutions (acidic or alkaline).

During the process of electrolysis surface of aluminum (anode) saturates with oxygen and converts into aluminum oxide with hexagonal (honeycomb) porous structure.



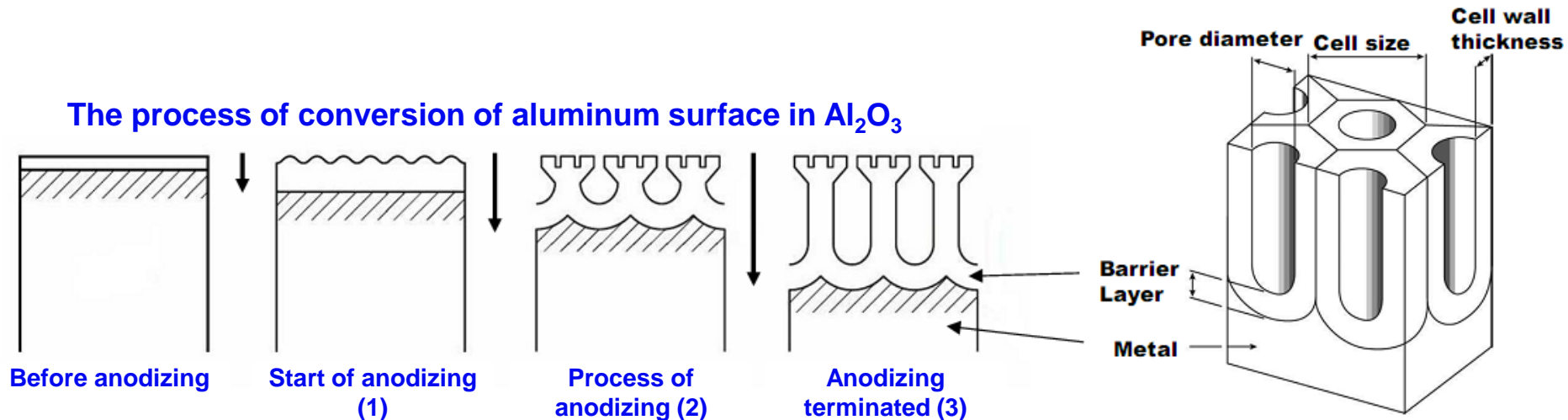
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# What is anodizing?

(Classical process An. Ox. nv / ClassicELOX™)

Unlike all other galvanic processes, anodizing is the process of transformation of aluminum surface during which conversion of the surface layers of aluminum in the aluminum oxide happens. The depth of this transformation is directly proportional to the applied electric current.

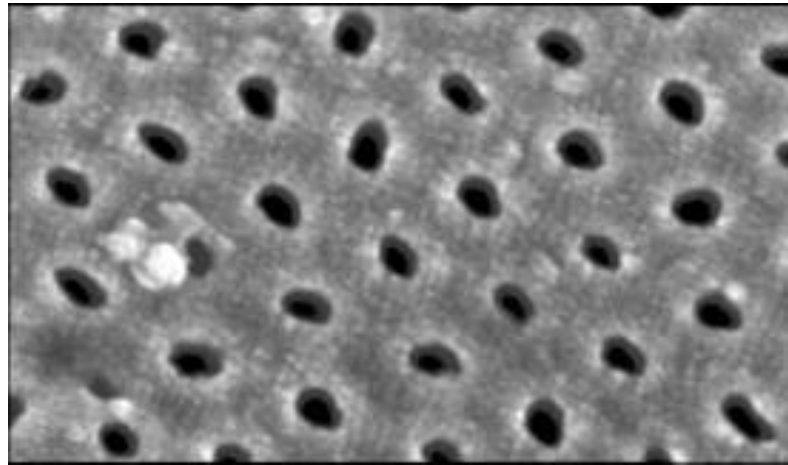
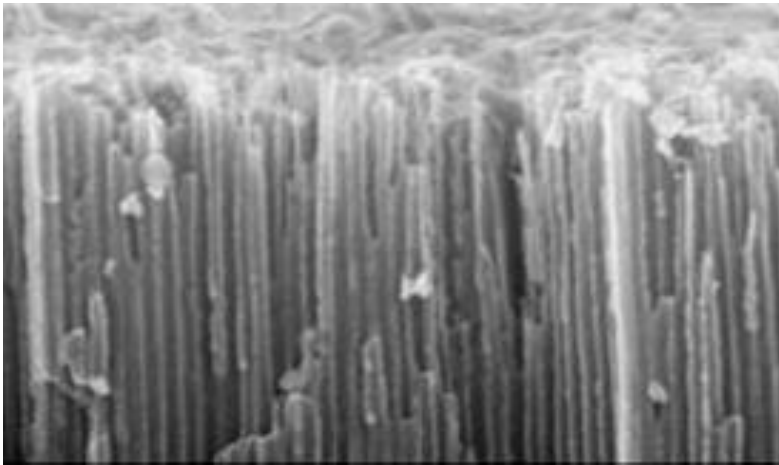
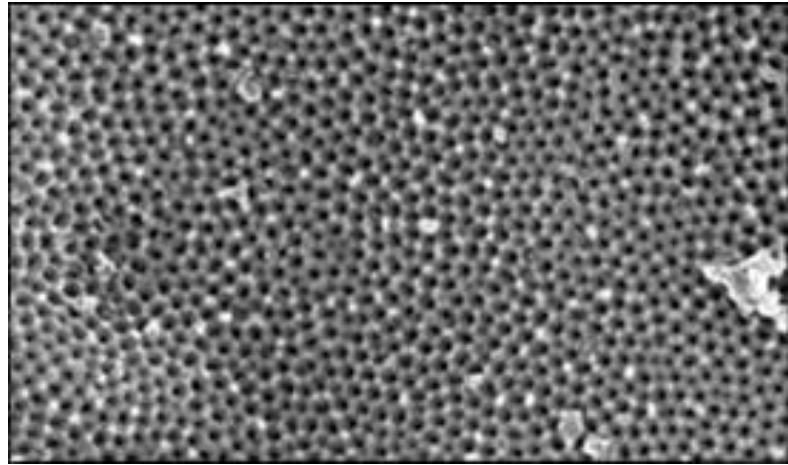
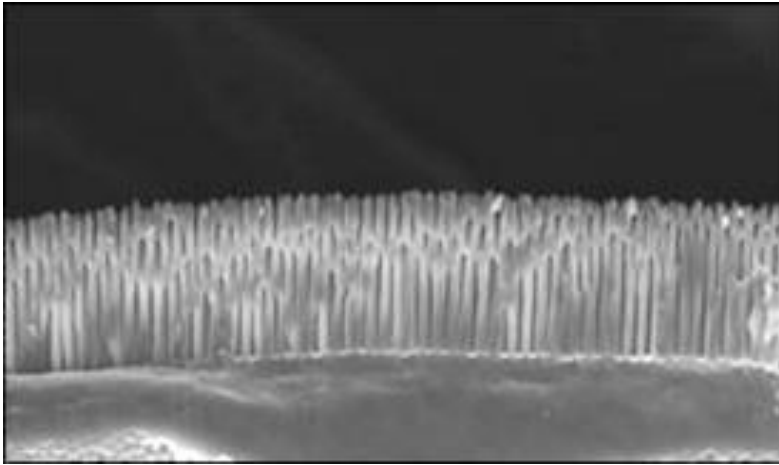


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# Photo of anodized layer under microscope

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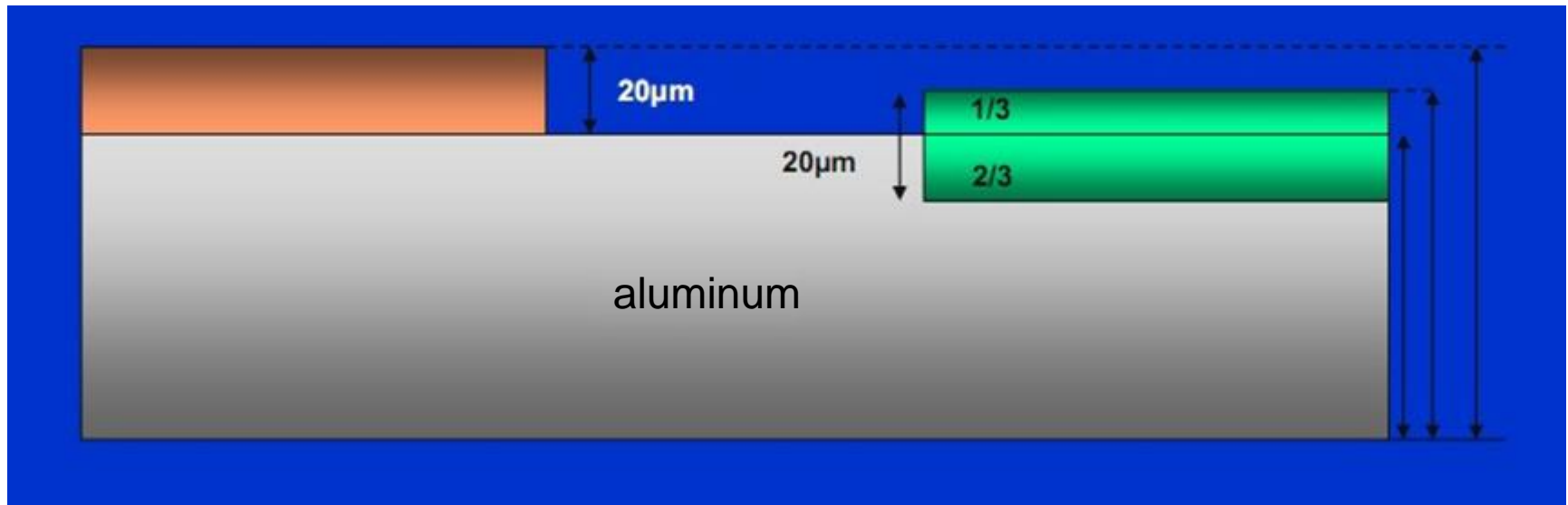
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# Difference between anodizing and other galvanic or powder coatings

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Galvanic or powder coating

Anodizing coating



Anodized layer is integrated into aluminum and is a single whole with aluminum, it is impossible to separate it (lifetime warranty). Precisely because of this, he has the unique anti-corrosion properties.



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# Existing problems of alternative coatings

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## Corrosion on polymeric or other coatings

reasons: unlike anodizing any polymeric coating is an independent layer, which can be separated from the metal due to poor surface preparation, low-quality coating, deformations damages, ...



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# Existing problems of alternative coatings

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# Why anodized aluminum?

## properties of aluminum

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Aluminum: the 3<sup>rd</sup> most common element on the Earth 7% (after oxygen 49% and silicon 26%) and the most common metal (iron 5%)

Aluminum has light weight and high strength:

Density: 2.700 kg / m<sup>3</sup> (copper 8.900 kg / m<sup>3</sup>, iron 7.800 kg / m<sup>3</sup>)

Durability: heat-treated 450-500MPa (raw 80-120MPa)  
(steel 600MPa, copper 200MPa)

Melting point: 660 ° C (Cu-1084 ° C, Fe-1538 ° C)

Conductivity: 38.0 \* 10<sup>6</sup> S / m (Cu-59.5 \* 10<sup>6</sup>, Fe-9.9 \* 10<sup>6</sup>)

Thermal conductivity: 235 W / (m \* K) (Cu-400, Fe-80)



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# Why anodized aluminum?

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- anodized aluminum = gorgeous decorative appearance, its natural metallic sheen creates a "living surface" which constantly interacts with the natural or artificial light playing across its surface
- anodized layer is a part of the aluminum which doesn't peel (lifetime warranty)
- protective coating - high corrosion resistance (20 years of guarantee, in this case, the anode coating is not necessary to restore periodically)
- hardness (3-4 times higher than that of raw aluminum)
- durability, abrasion resistance (in the nature aluminum oxide is corundum, ruby, sapphire)
- it doesn't burn, doesn't stain, it is easily washed from the dirt and graffiti
- weatherproof
- lightfastness (anodizing practically doesn't fade)
- resistance to high and low temperatures (from -100 ° C to 260 ° C)



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# Where aluminum is used today:

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- Architecture and construction
- Engineering, metalworking
- Aviation and space
- Transport terrestrial and maritime
- Mining equipment
- Military equipment
- Medicine
- Optics
- And many other spheres...



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# Usage of aluminum

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# Usage of aluminum

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Classical anodizing  
(An.Oks.)

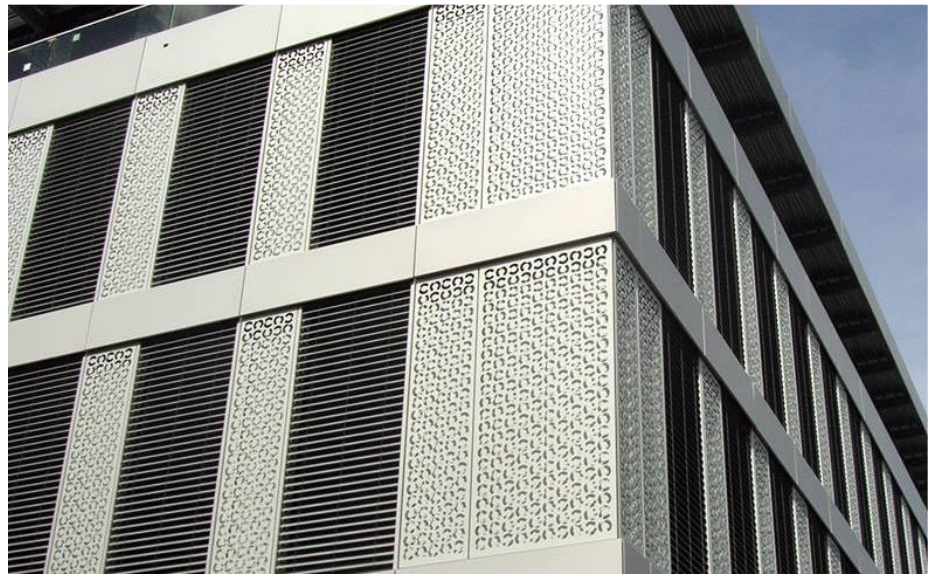
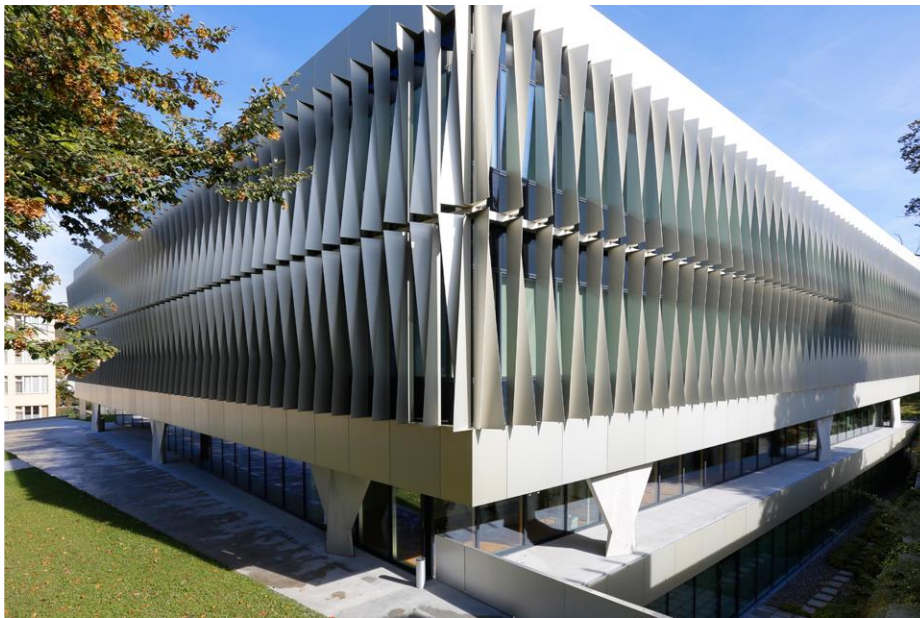
ClassicELOX™



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**Classical anodizing ClassicELOX™ (CH)**

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**Classical anodizing ClassicELOX™ (UK)**

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Colour anodizing  
(Anocvet)

ColorELOX™ (SANDALOR™)

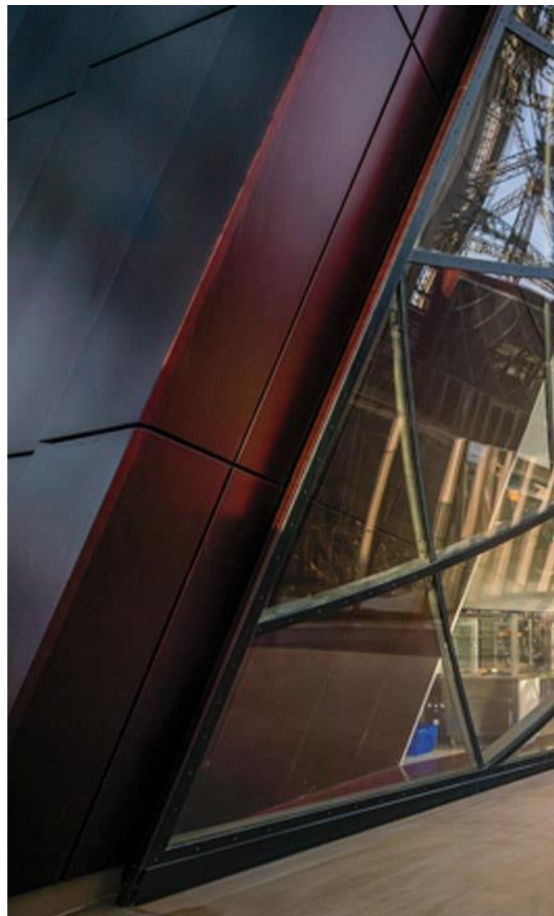


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**Color anodizing ColorELOX™ (Sandolor™) (F)**

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**Color anodizing ColorELOX™ (Sandolor™) (D)**

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# Artistic anodizing and selective etching

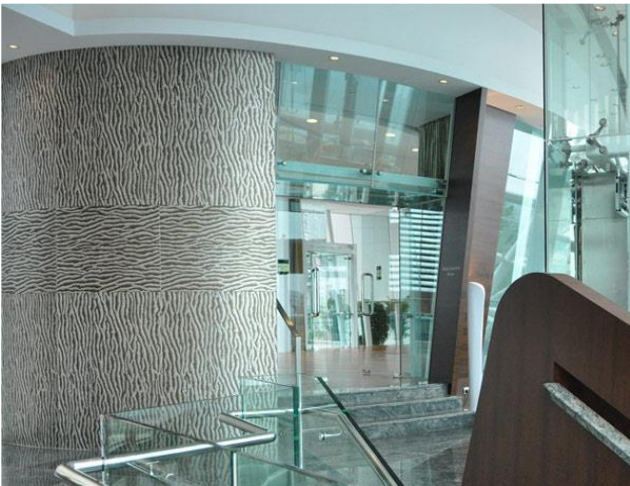
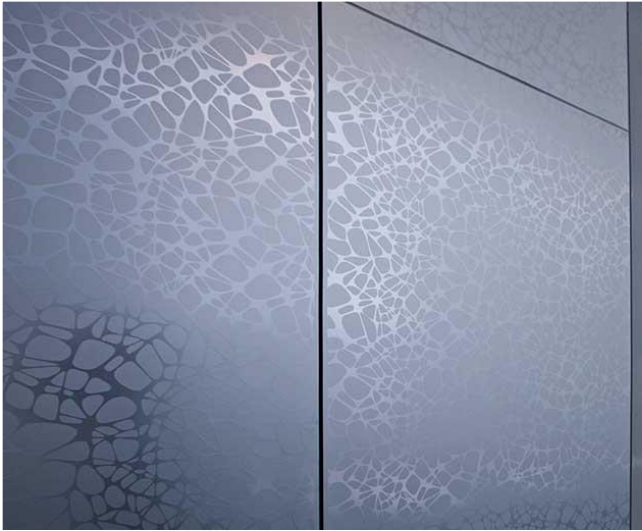
ArtELOX™



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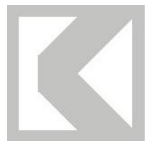
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**Artistic anodizing of aluminum ArtELOX™**

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**Artistic anodizing of aluminum ArtELOX™**

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Digital anodizing  
Printing inside oxide of aluminum

DigitELOX™

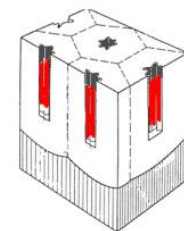
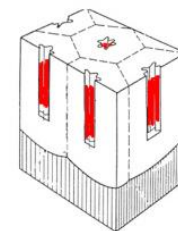
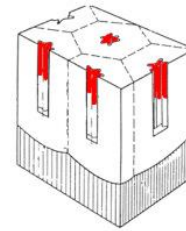
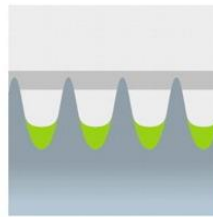
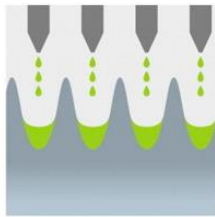
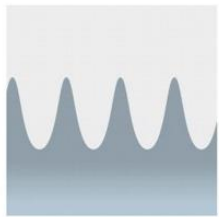
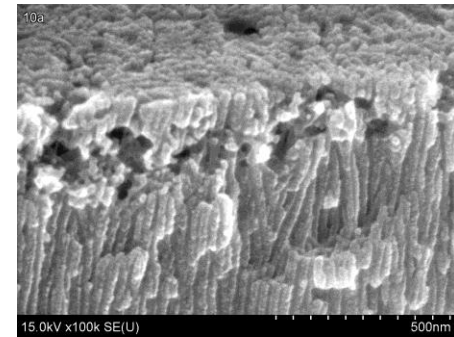
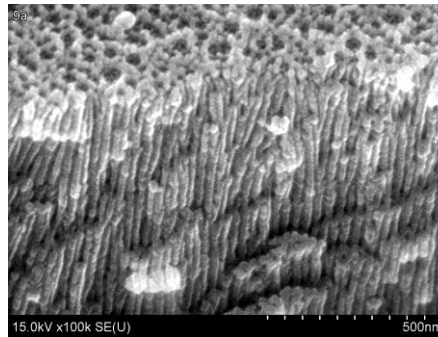
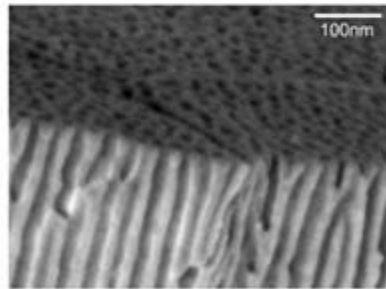
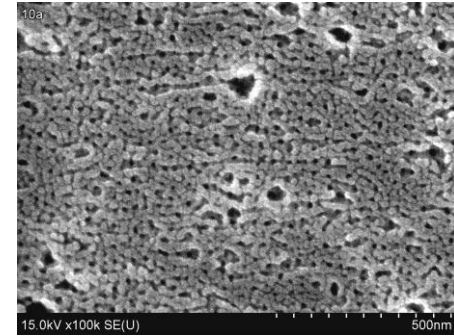
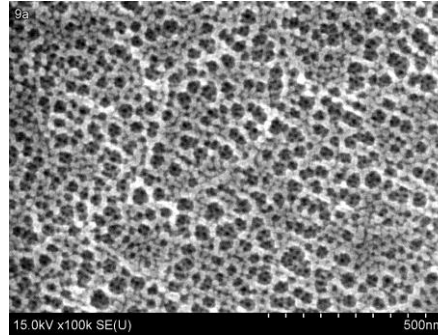
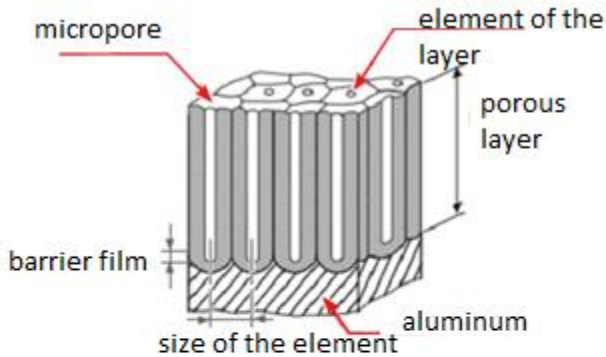


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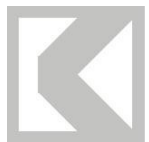
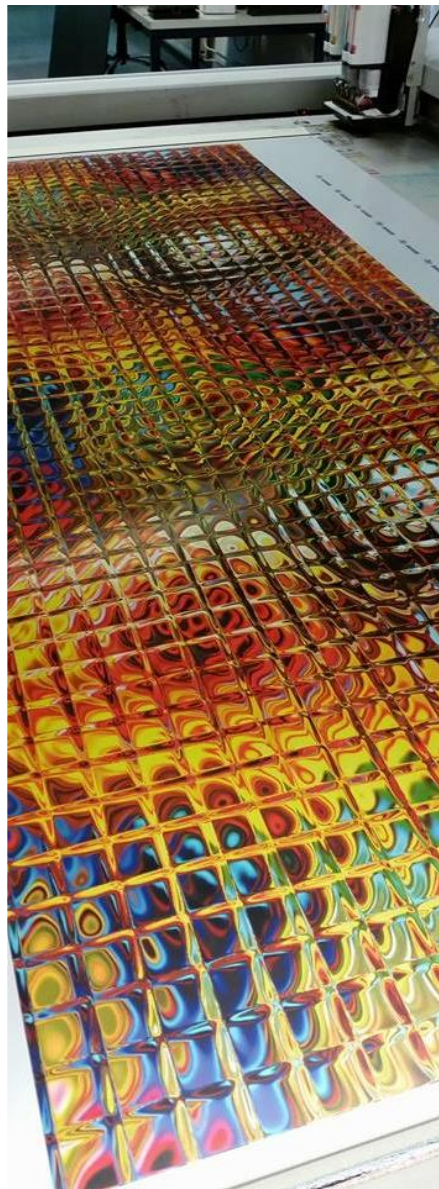
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# Technology DigitELOX under the microscope



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Digital anodizing of aluminum DigitELOX™ (CH)

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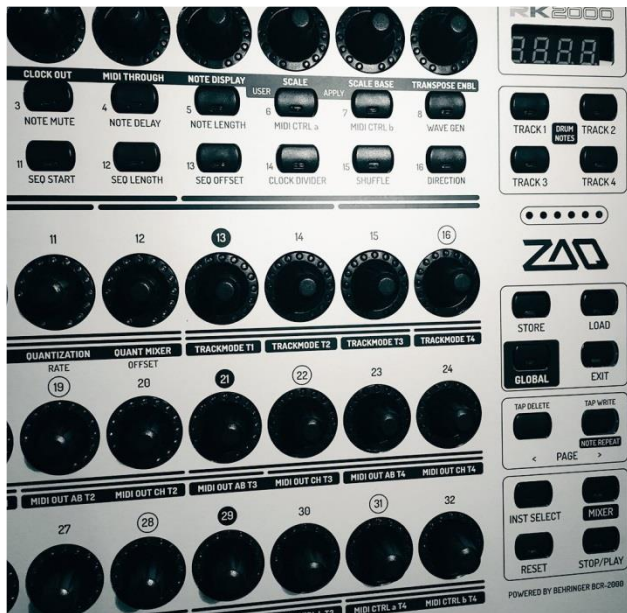




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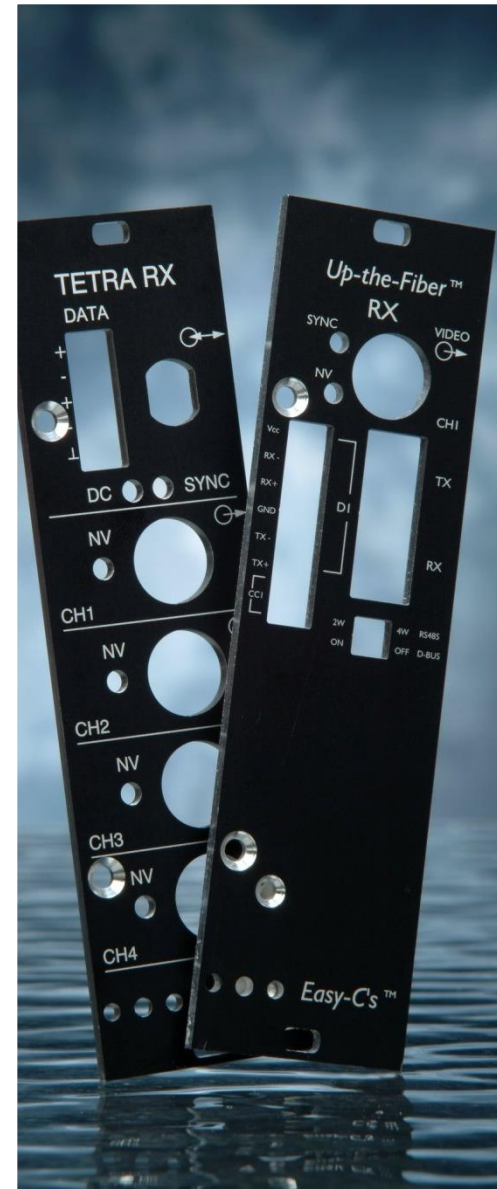
Digital anodizing of aluminum DigitELOX™ (NL)

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## Digital anodizing of aluminum DigitELOX™ (NL)

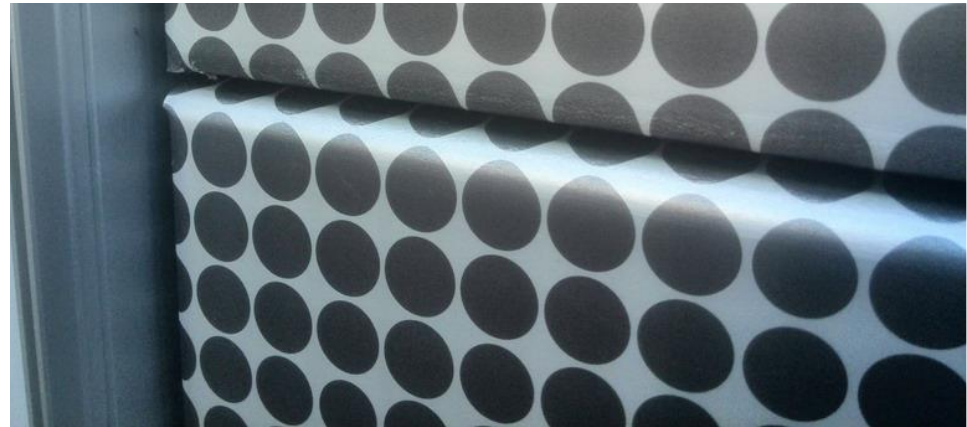
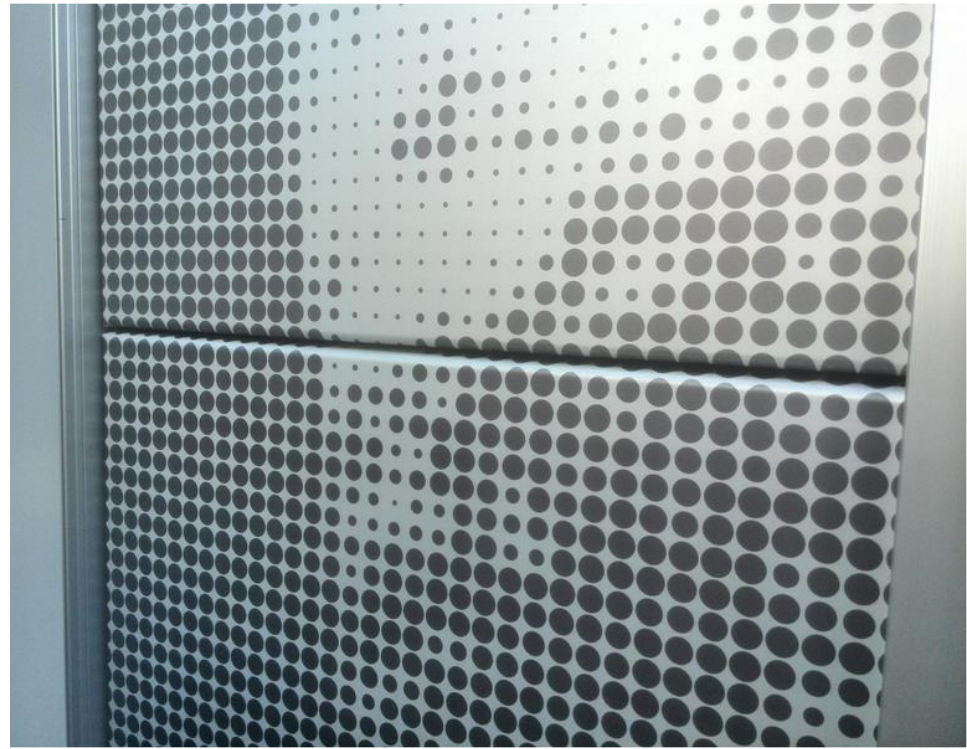
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Digital anodizing of aluminum DigitELOX™ (NL)

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Digital anodizing of aluminum DigitELOX™ (CH)

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**Digital anodizing of aluminum DigitELOX™ (B)**

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# Prehistory of digital anodizing

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- **Metallographic**

black-and-white and color vector images can be applied manually through a stencil made by application, lighting and washing down of photoresist  
+ medium accuracy, inexpensive equipment  
- long term of training and process, qualification of staff

- **Silk-screen printing**

black-and-white and color vector images can be applied directly through the classic stencil  
+ ease of operation, inexpensive equipment, speed, serial production  
- prices of stencils, the possibility of appearance of "sags", low accuracy

- **Photomechanical printing (Metallophoto)**

black-and-white vector and bitmap images can be applied photolike on anodized aluminum with embedded light-sensitive particles  
+ highest accuracy and UV resistance  
- prices of materials, negatives, process duration, expensive equipment



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# Alternatives of the printing on aluminum

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- **Solvent printing**

full-color printing with solvent ink on de-oiled surface  
+ medium accuracy, relatively inexpensive equipment  
- easily damaged and washed away

- **Sublimation printing and thermal transfer**

full-color printing inside the polymer base applied on the surface of aluminum, ink or powder penetrates into the polymer under the influence of temperature  
+ medium accuracy, relatively inexpensive equipment  
- the possibility of thermal damage of the product, weak resistance to aggressive media and ultraviolet

- **UV printing**

full-color printing by polymeric material on the surface of aluminum  
+ universal equipment, prints practically on any material, good accuracy  
- poor resistance to aggressive environments



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# Alternative methods

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- **Laser and mechanical engraving**  
monochrome images can be applied on anodized aluminum by laser impact or milling cutters
  - + good accuracy, high resistance to mechanical influences
  - risk of corrosion, expensive equipment
- **Chemical etching**  
monochrome images can be applied on anodized aluminum by the action of corrosive substances (acids or alkalis)
  - + medium accuracy, cheap equipment, harmful production
  - prices of stencils, the possibility of appearance of "sags", low accuracy



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# Plant «KTM»

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Anodizing of aluminum alloys  
and production of articles from aluminum



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# General characteristics of the company

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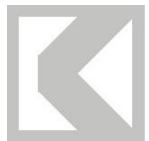
- **Factory “KTM” – Logoysk, Belarus**
  - 4'000 sq.m. of own production area;
  - quantity of staff – 75 person;
  - production facilities – 720 tons of aluminum alloys per year
- **Production of thresholds for floor coverings**  
more than 1'000'000 meters/year of profiles, thresholds, joint profiles
- **Galvanics**  
anodizing of different parts from aluminum alloys:  
facade elements, sheets, profiles and ready products.  
Possibilities of anodizing- more than 300'000 sq.meters per year
- **15 years of perfect reputation**



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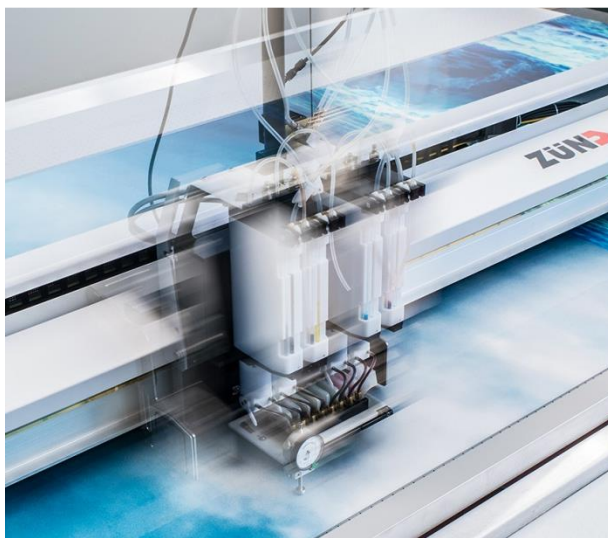
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**Automatic galvanic line KTM (An. Ox.)**

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## Workshop of digital anodizing DigitELOX

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# Optimization of the processes

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**Education of engineers, cooperation with Clariant and Omya, CH**

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# Certification, control and audit

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**International certificates Qualanod, Sandalor**

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# Promotion of new technologies

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**Exhibitions, forums on architecture and construction**

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# International partnership



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# Main sales markets of the company

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## ❖ Export of the company:

- Russia, Kazakhstan
- Moldova, Transnistria, Ukraine
- Armenia, Georgia
- Lithuania, Latvia, Estonia
- Serbia
- **Slovakia**
- (Hungary, Romania, Bulgaria, Czech Republic, Austria)
- **DigitELOX:**
- England, Holland, India, Switzerland,
- Norway, Sweden, Denmark, Germany, Israel



# Thank you for your attention

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