

CONNECTING PEOPLE  
AND SOLUTIONS IN  
HARD ANODIZING  
FOR 25 YEARS



# 16<sup>th</sup> Technical Symposium

**Düsseldorf, Germany**  
**October 5 – 7, 2016**  
**Hotel Nikko Düsseldorf**





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## Düsseldorf, Germany

October 5, 6 & 7, 2016

## About IHAA

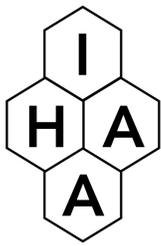
The International Hard Anodizing Association was formed in 1989 and is an organization of companies engaged in the production of hard anodized finishes on aluminum components, either for customers or for their own products. Other "associate" members may be manufacturers of semi-fabricated aluminum, companies engaged in supplying chemicals and processes or plant and equipment to the hard anodizing industry, or companies which are users of hard anodized components and products but do not have their own anodizing facility.

## Symposium Overview

Users of aluminum, hard anodizing companies and researchers will meet in Düsseldorf in October 2016 to discuss the latest trends and solutions for the aluminum surface treatment industry. The bi-annual technical symposium is an event for anyone who uses aluminum for technical applications. Our comprehensive symposium includes an opening-night cocktail reception and dinner, plus two full days of scientific and process-related presentations with a focus on functional oxide layers on aluminum parts. In addition to the technical presentations, a variety of networking activities are arranged to continue discussions with colleagues.

## Explore Düsseldorf

Düsseldorf has established itself over the last two decades as the European venue for aluminum-related exhibitions and conferences. The 2015 European Aluminum Congress was held in Düsseldorf in November 2015 and "Aluminum 2016", one of the largest global Aluminum exhibitions, will be held on 29 November – 1 December 2016. The German aluminum think tank GDA, (Gesamtverband der Aluminum Industrie) is also located in Düsseldorf. It is sited in close proximity to European aluminum foundries and two universities, RWTH Aachen and University of Dortmund, which are both known for research work in the aluminum field. GDA is also surrounded by a number of aluminum service companies including extruders, system suppliers, anodizers, engineering companies and other key suppliers to the industry. Düsseldorf is easily reached via train and its major international airport, which is one of the busiest in Germany.



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## AGENDA

### WEDNESDAY, OCTOBER 5, 2016

6:00 p.m. – 7:00 p.m. **Cocktail reception**

7:00 p.m. – 10:00 p.m. **Opening Dinner**

### THURSDAY, OCTOBER 6, 2016

8:30 a.m. – 9:30 a.m. **Registration & Breakfast**

9:30 a.m. – 9:40 a.m. **Opening Remarks**  
*Oliver Jäger, IHAA President, Aalberts Industries, Düsseldorf, Germany*

9:40 a.m. – 10:20 a.m. **Maximizing Process Control in an Anodizing Operation**  
*Presented by Matthew C. Akin, TrueLogic Company, LLC, Plano, Texas U.S.A.*



*To remain globally competitive, Anodizers must increase the efficiency and effectiveness of their processes and the processes of their supplier networks, while also reducing environmental impacts of those manufacturing operations. Reaching these goals requires a transformation from operations that are generally defined as reactive to operational mandates that move the company's operations, including those of its suppliers, to anodizing operations that can be described as majorly proactive. These changes require a total transformation of focus on "where we are" to a focus of statistical process control practices and continual process improvements. Most manufacturers have Quality as the goal in their operations, and in the operations of their supply bases. This focus on Quality in the manufacturing world leads to processes that are hit-and-miss and inconsistent. Quality needs to be discarded as the goal. The focus needs to be on Consistency. Once Consistency is achieved, then Quality can be reliably managed. Focus on Consistency will provide benefits to the company and its suppliers that come from processes that are reliable and more manageable. Some of the benefits of a process control focused operation are: using less materials because they no longer need to account for variability; more efficiency in utilizing the company's personnel, and; converting the operation from one that is reactive to one that is proactive.*



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10:20 a.m. – 11:00 a.m.

### Issues of Material Selection in Turbo Chargers

Presented by Christian Holzschuh, Bosch Mahle Turbo Systems GmbH & Co. KG, Stuttgart, Germany



Aluminum base alloys are used as material for compressor wheels of turbochargers in series production for many years. Due to increasing requirements a change from as-cast compressor wheels to milled compressor wheels based on wrought aluminum alloys took place.

The introduction of LP-EGR systems in modern diesel engines has necessitated the use of coated compressor wheels. During the last years there were large changes regarding the load of the part, which had a big influence on both, the coating technology and the coating itself.

The current requirements on the part need a differentiated choice of material and coating technology. The quality and design of the coating are important elements for the selection which have to be considered in interaction with the choice of the material.

The presentation will give a contribution to important issues on the choice of material for compressor wheels in turbo chargers and coating technologies in series production and wants to illustrate the potential of alternative coating systems.

11:00 a.m. – 11:20 a.m.

### Break

11:20 a.m. – 12:00 p.m.

### Ultrasonic Cleaning

Presented by Branislav Svehla, Dipl. Ing., Ph.D, ECOSON s.r.o., Nové Mesto nad Váhom, Slovakia

12:00 p.m. – 12:40 p.m.

### Anodizing of High Alloyed Aluminium

Presented by Kristin Pippig-Schmid, Pippig-Schmid, St. Gallen, Switzerland

12:40 p.m. – 1:00 p.m.

### Adapted ERP – A Chance to be Different!

Presented by Frank Fischer, Fischer Oberflächentechnik GmbH, Witten, Germany

1:00 p.m. – 2:00 p.m.

### Lunch

2:00 p.m. – 2:40 p.m.

### Precise De-Coating of Anodize Layers and Aluminum Surface Modification with Laser Light

Presented by Edwin Buechter, Clean-Lasersysteme GmbH, Herzogenrath, Germany



Cleaning and pre-treatment of the surface is an important prerequisite for a high-quality adhesive bond area. In the laser process only dirt particles, oxide layers and other contaminations are vaporized by bundled light only.

Lasers can also be used to remove absorbing metal oxides from aluminum such as anodize layers or hard-anodize layers. The precise laser treatment allows an exact removal of coatings and top layers without damaging the substrate. This presentation will review the applications and the opportunities of laser cleaning on uncoated surfaces.



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2:40 p.m. – 3:20 p.m.

### **Innovative Cr-Free Anodizing and Sealing Process**

*Presented by Laurent Arurault, CIRIMAT - Institut Carnot, Toulouse, France*



*Aluminum alloys are widely used in different applications fields but they are subjected to corrosion. Sealed anodic films act as an efficient solution for the protection of parts, anodizing and sealing using hexavalent chromium salts providing the best anticorrosion behavior so far. However, environmental laws lead to totally ban chromium (VI) based compounds which are carcinogenic, mutagenic and reprotoxic (CMR), thus forcing surface finishers to develop new alternative processes of both anodizing and sealing. This presentation will review these alternative processes, showing in particular the specificities of each one.*

3:20 p.m. – 3:40 p.m.

### **Break**

3:40 p.m. – 4:20 p.m.

### **Experimental Study and Modelling of Heat Transfer During Anodizing of Aluminum**

*Presented by Prof. Herman Terryn, Vrije Universiteit Brussel, Brussels, Belgium*



*Anodizing of aluminum is nowadays one of the most applied electrochemical surface treatments of aluminum products. This merit can largely be ascribed to the possibility to significantly alter the surface properties of aluminum by anodizing. The thickening of the well-adherent oxide layer on the surface of the aluminum allows for example to improve the corrosion resistance, the dielectric properties, the appearance and the mechanical properties of the surface. The present knowledge of this process enables to grow tailor-made oxide films by modifying well-chosen process conditions. However, despite this advanced insight into the anodic oxide growth on aluminum, industrial anodizers are still confronted with non-uniform oxide thicknesses. This is undesired and may for example lead to a reduced corrosion protection, local differences in appearance, etc. To overcome these problems optimization of the process and the reactor design is to be considered. Whereas the latter is still commonly performed by experimental trial and-error, an approach based on simulations, accurately predicting the evolution and outcome of the anodizing process would certainly be an improvement.*

4:20 p.m. – 4:40 p.m.

### **Mini Presentation The Unique Selling Points of ((Hard) Anodized) Aluminum Molds vs. Steel Molds**

*Presented by Henk Schreuder, Coatinc Anox B.V., Scherpenzeel, Netherlands*

4:40 p.m. – 5:00 p.m.

### **Closing Remarks**

*Oliver Jäger, IHAA President, Aalberts Industries, Düsseldorf, Germany*



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### **FRIDAY, OCTOBER 7, 2016**

8:00 a.m. – 8:30 a.m.

**IHAA Members Meeting**

8:30 a.m. – 8:50 a.m.

**Breakfast**

8:50 a.m. – 9:00 a.m.

**Opening Remarks**

*Oliver Jäger, IHAA President, Aalberts Industries, Düsseldorf, Germany*

9:00 a.m. – 9:40 a.m.

**Practical Issues in Pre-Treatment and Coating of Aluminium**

*Presented by Matty Wijnen, AHC Benelux B.V., Eindhoven, Netherlands*



*One of the most used surface treatments of Aluminum is without any doubt anodizing. Anodizing and especially hard anodizing improves the corrosion resistance and wear resistance of the treated aluminum parts. Disadvantages of these anodize layers are however the chemical resistance of the formed aluminum oxide and the insulating effect of this material.*

*To overcome this disadvantage it is possible to apply other types of surface treatments on the aluminum parts. Surface treatments like chemical plating and electro-plating are often used for this purpose. With metals as for instance nickel, chromium, copper or silver properties like chemical resistance and electric conductivity are combined with corrosion and wear resistance.*

*The main problem of plating these metals on aluminum substrates is the electronegativity of the aluminum. Due to this electronegativity the pre-treatment of this material is a difficult and very sensitive process which can cause a lot of problems with the adhesion of the metal on to the aluminum substrate.*

*This presentation will go in to the practical issues and difficulties of the pre-treatment of aluminum and will try to explain how the common problems can be solved. Also the methods of plating the several metals will be discussed and explained.*

9:40 a.m. – 10:20 a.m.

**Challenging Applications for Functional Coated Aluminium in Automotive and Mechanical Engineering**

*Presented by Uwe Franz, AHC Oberflächentechnik GmbH, Weiterstadt, Germany*



*Extensive applications of anodic coatings are placed in the field of vehicle technology and mechanical engineering. These applications in vehicle technology are located in the engine, motor control gear, brake systems, chassis, etc. This presentation provides an overview of different applications and indicates a specific application, the substitution of an anodic layer system, by another, more powerful system.*



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10:20 a.m. – 10:40 a.m.

### **ESTAL and the Challenges of Aluminum Surface Treatment in Europe**

Presented by Michiel Koot, Director of ESTAL



Presentation of ESTAL, the European association for Aluminum Surface Treatment on Aluminum, its members and its activities. Overview of the current challenges facing the European aluminum surface finishing, i.e. regulatory, technical and economic challenges.

10:40 a.m. – 11:10 a.m.

**Break**

11:10 a.m. – 11:50 a.m.

### **Cr(VI)-Free Anodizing for Structural Adhesive Bonding in the Aerospace Industry**

Presented by Shoshan Abrahami, Delft University of Technology, Delft, Netherlands



For more than six decades, chromic acid anodizing (CAA) has been the central component in the surface pre-treatment of aluminium for adhesively bonded structures in the aerospace industry. However, to comply with the new European REACH regulations, CAA has to be replaced by environmental friendlier processes. It is well known that anodizing in candidate Cr(VI)-free electrolytes such as sulphuric acid (SAA), phosphoric acid (PAA), and their mixtures (PSA) modifies both the chemistry and morphology of the oxide. Although the incorporation of  $\text{PO}_4^{3-}$  and  $\text{SO}_4^{2-}$  anions from the respective anodizing electrolytes has been well documented, their percentage at the surface was quantified by means of X-ray photoelectron spectroscopy (XPS) analysis and reported for the first time.

11:50 a.m. – 12:30 p.m.

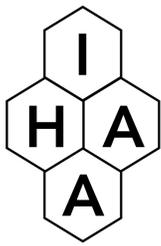
### **Characterization of Anodic Alumina Coatings by Luminescent Methods**

Presented by Rastko Vasilic, PhD, University of Belgrade, Belgrade, Serbia



During the past several years our group conducted a number of investigations about galvanoluminescent (GL) and photoluminescent (PL) properties of anodic alumina oxide coatings and showed that nature of the luminescence and its intensity depend of many factors, such as type of electrolytes (organic or inorganic), surface pretreatment, and anodizing conditions. GL and PL of anodic oxide films formed on highly reflective aluminum surfaces in either organic or inorganic electrolytes feature clearly pronounced interference maxima that can be used as a tool for determining oxide film thickness and inherent optical parameters. Following this finding, two methods (based on a particular observation angle) for determining such properties are developed and presented. Developed methods can be used for either GL or PL measurements, however only galvanoluminescence technique can be used to estimate the thickness of porous oxide films on aluminum during the anodization.

Further anodization of aluminum above the breakdown voltage leads to a formation of plasma, as indicated by the presence of sparks on the metal surface and gas evolution. Sparking luminescence combines with GL and as a result, total luminescence intensity



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increases. Spectroscopy characterization of microdischarges allows the determination of electron temperature and electron number density.

12:30 p.m. – 1:30 p.m.

**Lunch**

1:30 p.m. – 1:50 p.m.

**IHAA Board of Directors Meeting**

1:50 p.m. – 2:30 p.m.

**Hard and Functional Anodizing**

*Presented by Dr. Dieter Brodalla, ALCON Aluminium Consult GmbH, Düsseldorf, Germany*



*Hardness of an oxide layer is simply a function of the anodizing conditions: low temperature and high current density (however, not the temperature of the electrolyte, the temperature inside the oxide layer during anodizing is the affecting factor). The solid state chemistry and structure of an oxide layer is meanwhile understood: the ratio of the structural elements,  $\text{AlO}_4$ -Tetrahedra and  $\text{AlO}_6$ -Octahedra will determine the hardness. But it is not only hardness what counts: wear/abrasion and corrosion resistance are other essential properties for practical applications. As examples of new electrolyte compositions "Polymeroxide" and the resulting "Low-Friction-Anodizing" will be presented. The composition of the wide variety of alloys is an additional challenge: e.g. how to produce thick layers on high copper containing alloys; which fundamental limitations are given by the composition of an alloy. The better the surface quality, the better the functionality of an oxide layer, all the better for your business.*

2:30 p.m. – 2:50 p.m.

**To Be Determined**

2:50 p.m. – 3:10 p.m.

**Break**

3:10 p.m. – 3:50 p.m.

**Selective Coatings for Functional Applications**

*Presented by Dr. Herman H. Urlberger, AHC Oberflächentechnik GmbH, Kerpen, Germany*



*Functional Coatings on parts for automotive and mechanical engineering applications to prevent surfaces from wear and/or corrosive attacks have been grown to a basic supposition for operating conditions and for getting reliability on functionality for long term use. In most cases functional coatings determine, that parts or modules gets their ability to fulfill the performance requirements safe and sustainable during estimated life time.*

*The presentation will give a contribution on the actual approaches, implementations, applications and want to illustrate some examples for effective and environmental friendly coating-technologies "Coating-In-a-Box" for anodic and other coating-procedures.*



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3:50 p.m. – 4:30 p.m.

### Surface Quality Matters

Presented by Frank Munk, Munk GmbH, Hamm, Germany



*One outstanding characteristic of aluminum is, by its very nature, to create a highly ordered oxide layer, which can be enhanced by an electrochemical anodizing process. This fact provides the designer with the unique opportunity to improve the appearance or the functional performance of an aluminum part. The surface finish of the aluminum part can be designed according to the specific needs applicable to the use of the respective part, for example, by reinforcing the naturally built-up oxide layer.*

*However, divergent objectives, whether decorative or functional, as well as the wide range of aluminum alloys require different treatment programs to achieve the requested result.*

*This paper presents a solution of how both new and existing anodizing rectifiers can be upgraded by specific process controllers that support the user in improving the anodizing result. Universal treatment programs can be created and stored for the respective alloy or aluminum part. Process parameters can be recorded and archived to achieve more foreseeable and reliable anodizing results. This improvement makes the performance of the aluminum part more predictable, to the benefit of the users and anodizers.*

4:30 p.m. – 4:40 p.m.

### Closing Remarks

Oliver Jäger, IHAA President, Aalberts Industries, Düsseldorf, Germany



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### HOTEL INFORMATION

**Hotel Nikko Duesseldorf** is a 4-star-superior hotel within the very heart of the City of Dusseldorf. The hotels excellent location, only a ten minute walk from elegant Konigsallee Boulevard and Dusseldorf old town, Rhine River promenade and main station, distinguishes it from other Dusseldorf hotels. This Nikko hotel is also conveniently located only a 10 minute drive from Dusseldorf International Airport. Designed with the business executive in mind, this 4-star-superior hotel in downtown Dusseldorf is held in high regard, particularly by international business clientele.

A room block has been reserved at the **Hotel Nikko Duesseldorf**.

Comfort Room for Single Occupancy	€125,00
Comfort Room for Double Occupancy	€145,00
Executive Room for Single Occupancy	€175,00
Executive Room for Double Occupancy	€195,00

**Comfort Rooms** are approximately 22,5-24m<sup>2</sup> and feature two twin beds or one queen size bed.

**Executive Rooms** are larger rooms with approximately 45m<sup>2</sup> and feature two twin beds or one king size bed. In addition, the executive rooms include admission to the Nikko Spa Club.

#### Hotel Nikko Düsseldorf

Immermannstr. 41  
40210 Düsseldorf  
Germany  
T: +49 211 834-0  
F: +49 211 161216

To make your reservations, please call or email the hotel and mention "**IHAA**" to receive our discounted room rates:

Room reservations: +49 211 834-2111  
[reservations@nikko-hotel.de](mailto:reservations@nikko-hotel.de)

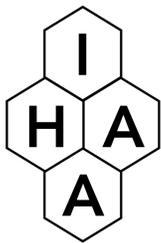
**DEADLINE FOR RESERVATIONS IS 5 SEPTEMBER 2016.**



*Executive Room*



*Comfort Room*



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### REGISTRATION FORM

Deadline for registration is Friday, September 16, 2016.

Company Name: \_\_\_\_\_  
Name of Attendee: \_\_\_\_\_  
Name of Partner/Spouse: \_\_\_\_\_ (see next page for partner activities)  
Attendee Email: \_\_\_\_\_  
Company Address: \_\_\_\_\_  
City/State or Province: \_\_\_\_\_ Post/Zip Code: \_\_\_\_\_  
Country: \_\_\_\_\_  
Telephone: \_\_\_\_\_  
Date of Arrival: \_\_\_\_\_ Date of Departure: \_\_\_\_\_  
Membership Status:      \_\_\_ IHAA Member      \_\_\_ Non-Member

#### REGISTRATION FEES

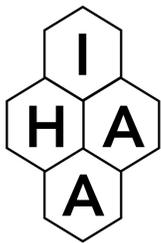
The symposium registration fee includes the cost for the welcome reception and dinner on Wednesday for all attendees and their guest. It also includes breakfast, lunch and all sessions during the symposium for all attendees (spouses not included for lunch or breakfast). Presentations will be made available in electronic form for all attendees following the symposium.

1<sup>st</sup> Representative from IHAA Member Company:      No Charge  
Additional Representative(s) from IHAA Member Company:      \$450 USD per person  
Non-Members:      \$900 USD per person  
**Total Payment: \$** \_\_\_\_\_

#### PAYMENT TYPE

Check (please make checks payable to IHAA)  
 Credit Card:    \_\_\_ Visa    \_\_\_ Master Card    \_\_\_ Amex    \_\_\_ Discover  
Card Number: \_\_\_\_\_  
Expiration Date: \_\_\_\_\_ CCID: \_\_\_\_\_  
Name on Card: \_\_\_\_\_  
Billing Address: \_\_\_\_\_

<p><b>Please return the completed registration form with payment to:</b></p> <p><b>Questions? Call 856-234-0330</b></p>	<p>IHAA P.O. Box 579 Moorestown, NJ 08057 U.S.A. Email: <a href="mailto:Denise@NeffDowning.com">Denise@NeffDowning.com</a> Fax: 856-727-9504</p>
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### PARTNER/SPOUSE ACTIVITY REGISTRATION FORM

Deadline for registration is Friday, September 16, 2016.

Name of Partner/Spouse: \_\_\_\_\_

Company Name: \_\_\_\_\_

Name of Attendee: \_\_\_\_\_

#### ACTIVITIES/REGISTRATION FEES

Thursday, October 6 (10:00 a.m. – 4:00 p.m.)

Guests will enjoy a sightseeing walk from the hotel to the K20 Museum via the Königsallee, to discover one of the world's most famous and exclusive shopping boulevards. The K20 Museum is the art collection of the German Federal State of North Rhine-Westphalia. There we will have a 90-minute guided tour with an English speaking guide. Following the museum, guests will take the subway to Schlosscafé Benrath for lunch and a 90-minute guided tour of the castle with an English speaking guide. All stations are in a short walking distance. However, a shuttle service from the hotel to the museum can be organized.

Friday, October 7 (10:00 a.m. – 4:00 p.m.)

Guests will enjoy a 90-minute guided tour of Villa Hügel with an English speaking guide. The Villa Hügel is a mansion in Essen in Germany. It belonged to the Krupp family of industrialists and was built by Alfred Krupp in 1873 as a residence. Following the mansion tour, guests will enjoy a three-course lunch/meal at Jagdhaus Schellenberg, a first-rate restaurant with a panoramic view of Lake Baldeney. A mini tour bus is available which accompanies the group the whole day.

**Thursday, October 6 - K20 Museum and Castle** \$60.00 USD per person  
(does not include cost of lunch)

**Friday, October 7 – Villa Hügel Mansion and Lunch)** \$95.00 USD per person  
(includes cost of lunch)

**Total Payment: \$** \_\_\_\_\_

#### PAYMENT TYPE

Check (please make checks payable to IHAA)

Credit Card: \_\_\_ Visa \_\_\_ Master Card \_\_\_ Amex \_\_\_ Discover

Card Number: \_\_\_\_\_

Expiration Date: \_\_\_\_\_ CCID: \_\_\_\_\_

Name on Card: \_\_\_\_\_

Billing Address: \_\_\_\_\_

**Please return the completed registration form with payment to:**

**Questions? Call 856-234-0330**

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