



INTERGALVA

7-12 June 2015 Liverpool

Introduction

Intergalva, the large worldwide galvanizing conference held every three year, was this time located in Liverpool, England. The conference covers technical, commercial and environmental topics for the general hot dip galvanizing industry. Tim Straker, chairman of Galvanizers Association UK, told us in the opening speech: "Liverpool is a city known for music and football but not for holding big conferences, so many people was surprised about this decision. But it seems to be a popular choice; speakers included this conference has over 600 delegates from 53 countries".

Galvanizing in UK

Bill Smith, director of Galvanisers Association, GA, talked about the galvanizing industry in UK, which is over 150 years old. There are 62 plants owned by 26 companies, and the membership in Galvanizers Association covers about 95 %. "Our member company plants include the most modern galvanizing facilities within the UK and Ireland, the longest kettle in Europe, specialist powder coating facilities and semi-automated plant. Including the plants that are not members in GA, the overall throughput was approximately 670 000 tonnes steel galvanized in 2014. The bath capacity 2014 was 1887 m³ and the productivity 355 tonnes/m³, which is one of the highest productivities within Europe".

Galvanizers Association has 18 affiliate members, of which 6 is zinc suppliers. The largest market segments are construction with 241 000 ton, street furniture with 186 000 tonnes, and agriculture. The association was established in 1949, and today there are 8 in the staff. The customers have different profiles in different areas; in Scotland for example gas and oil dominate, in Ireland small components. Among GA:s activities are courses, works practice, health and safety, post galvanizing inspectors course etc. Important issues for the moment are legislation, CE-marking and competitive corrosion protection systems.

Galvanizing and its role for the society

Lord Digby Jones – formerly the director general of the CBI and Minister of State for UK Trade and Investment – had a very inspiring presentation about economy, work and the importance of industry for a society. Lord Jones is very well known in the public arena, especially for his candid, forthright attitude towards business and politics. "Industry people are important, they give jobs so people can earn money, but also create a group identity. People must learn to work to get what they want!"

- Bake the pie before you eat it, and add value to what you do, because there is always someone that can do cheap things cheaper! He told of an Indian chauffeur who drove him on a business trip, and who worked hard to save money for his son's education "In the future I want my son to sit where you sit, not where I sit", as an example of how the dream about improvement drive people to work hard for they believe in.

Development on the steel and zinc market

Dr Edwin Basson from World Steel Association had a presentation about the steel market today, and Duncan Hobbs from Noble Metals discussed the future for the zinc market. The steel consumption now reach 95 % of what it was before the economic crisis in 2007. Zinc prize is staying at a higher level in comparison with other metals like aluminium,



Kaj Steen from the Swedish company Progatec AB participated in the exhibition. Progatec AB is an engineering company which primarily work with the development, manufacture and installation of fully automatic zink plating plants. Other Nordic companies on site was C H Evensen Industriovner A/S, New Boliden AB and Recycleclean AB.



Some of the presentations was a little bit harder to understand! But with help from the simultaneous interpreters that renders the speech in a micron almost simultaneously it is possible to follow and learn also from the the Chinese and Japanes speakers.

lead and copper. The zinc market will be in deficit during 2015. Reported world zinc consumption will reach new record in 2014. Zinc mine output is running at top level. More than half of the zinc that is produced end up on a steel product (i.e.52 %). Steel, aluminium and now also carbon fibre are components that are coming in car industry. Light weight material are of high interest. There was a question from one of the delegates about the environmental impact from carbon fibre, and the answer was that 8-12 CO₂ per ton composite is produced. For aluminium the figure is 1,87 and for steel 1,2 tonnes of CO₂ per tonnes of the metal. If the metal production is scrap based the emission is much lower.

The Galvanizing Industry in China

Zhang Qifu, China Iron & Steel Research Institute Group (China) described the situation for galvanizing in China. China has had a very rapid development, with high expansion rate for construction, transportation and electricity. This changed the consumption structure and speeded up the development for the galvanizing industry. There are more than 1 200 general galvanizing plants in China. Most of them are located in Yangtze River delta and the Bohai region. The production and consumption of zinc in recent years can be seen in table 1. 55 % of total zinc consumption was for galvanizing. The zinc consumption will be now be stabilized. Two big markets for galvanized steel in China is power generation and transportation. Agriculture does not use galvanized products today, but it can be possible in the future. The use of high speed trains will expand, a lot of galvanized steel is needed for that. New motorway lines are planned, and also metro transits. Also new airports are planned. Other market areas that will use large amounts of galvanized steel are new municipals, ultrahigh voltage transmission lines and solar energy.

Table 1.

Chinese zinc production and consumption in recent years (million tons)

Year	2008	2009	2010	2011	2012	2013	2014
Output	4.04	4.28	5.21	5.0	4.63	5.1	5.61
Consumption	3.82	4.31	4.95	5.2	5.57	5.96	6.25

The Chinese government now have shaped up the requirements on the industries environmental responsibility. The new message is “Beautiful China, happy China”. A new environmental protection law was implemented in January 2015. A blue sky is wanted, and that require cleaner production. Several galvanizing plants have had to close down. The new law is a challenge for the Chinese industry.

A coming product for the future in China is galvanized rebar – there is a need, because of the long coasts, but there is no tradition in that area. In the future the Chinese galvanizers will improve the level of automation, and work with closed, clean production lines. The grow rate will slow down and the quality will increase.

Digital marketing at American Galvanizers Association (AGA)

Digital marketing is not only a way to avoid costs for printing and distribution. It is the way the millennial generation, i.e. future specifiers, wants the information. AGA's web site is a responsive site which means that it react to whatever device (laptop, smartphone I-pad) the user may have. “Millenials” don't pay for information, they expect it to be free, so AGA has loaded all their documents to the web, possible to download free of charge. AGA also work with Facebook, Twitter, Linked-In and You Tube. At Linked-In AGA is active in discussion groups about galvanizing.

AGA also has Webinars, where you can sit at home and follow a course or education about galvanizing. When engineers and architects take part in such an activity AGA get their mail address, which could be used for further contacts. AGA has also invested money in a consultant to improve the site ranking among search engines. That means that AGA's web site is in top when searching for information about galvanizing. Look at www.Galvanizeit.org to see how it works.

Galvanized Reinforcing Bar Market in Japan

80 million tons of steel bar for reinforcement in concrete is produced annually in the world. Among these steel bars 800 000 tons are galvanized. Japan is an island and the corrosion is high. In 1977 a guideline for design and construction of concrete structure using galvanized rebar was presented. Epoxy coated steel bar has been popular, since some early studies shown them to be a better alternative than galvanized steel. To get more information regarding this the galvanizing industry made more research work. The corrosion resistance was evaluated by exposure test, the mechanical properties by tensile test and the bound to concrete by pull out test.

The study showed that galvanized steel gives long life time and that the mechanical properties are not influenced. The bond strength is the same as for black steel. The requirement on life time for the concrete constructions in Japan are more than 100 years. To reach that there are two alternatives; protect the steel or improve the quality of the concrete. It is known that galvanized reinforcement, under identical exposure conditions, resist chloride levels in concrete which are at least 2.5 higher than what black steel does, and delays the onset of corrosion of the underlying steel by 4-5 times. In average, it is estimated a 20 % increase of the steel cost, but only approximately 1 % of the total building costs, to use galvanized rebar instead of black rebar.

Hot Dip Galvanizing in Renewable Energy Applications

Frank E Goodwin from IZA (International Zinc Association) had a presentation about galvanized steel in wind, solar, hydropower and biofuel applications. The supply of renewable energy has increased rapidly during recent years. In the EU-27 plus Norway and Switzerland during 2013, 72 % of new electric generating capacity was based on renewable energy. China has four of the top ten wind energy suppliers, whereas Denmark has two and USA one. This types of installations require a lot of galvanized steel. It is a suitable market for galvanizing, since long life time is needed and the assembling on site can be done by bolting. In some cases the assembling is performed in snowy and cold weather, which not is a problem if galvanized steel is used. There is only for one application area, rooftop photovoltaic systems, hot dip galvanized steel have a strong competition from aluminium, especially for rooftops with load capacity limitations, such as in many industrial applications. Renewable energy is a very interesting market segment for the future.



Renewable energy – a market where galvanized steel is needed

Ray Thompson, Head of Business Development Offshore at Siemens had a presentation about how they work with galvanized products for renewable energy applications. Denmark has the highest level of wind energy in the energy mix in the world, 39 %. Also UK and Germany has quite high levels, 9,3 and 8,6 %. Constructions used for production of renewable energy are often exposed to a tough environment, also under installation, and a durable corrosion protection system is needed. Siemens are committed to use local suppliers when possible, so galvanizing of their products can be performed at different parts of the world.

Installation of solar panels. Renewable energy is a growing market in which a lot of galvanized steel is used.

Galvanizing in Energy from Waste Facilities

J Dowling from Tata Steel Construction informed about constructions used for “Energy from waste” (EfW) technologies. It is a very corrosive environment, and the material must have the ability to withstand attack from water, oxygen, salt, sunlight, chemicals and pollutants and also cope with abrasive exposure from sand and salt.

The external environment is generally well understood, but the internal environment, inside different parts of the building, is much more variable and less understood. It is important to have the right steelwork design, and to avoid entrapped dust and water. Corrosion categories C3-C5 is specified for one EfW plant in South of England. The building has over 40 m clear spans and is up to 40 m high with a fully galvanized structure. In the more corrosive internal environment paint is needed to protect the zinc surface. Tata gives 15 years guarantee on the internal building envelope Colorcoat HPS 200 Ultra, and advice about how to take care of the coating to extend the life time. Tata Steel has been involved in EfW projects for about 5 years, and they now have much better information about the internal environment in an EfW-plant.

AVCOP - Added value for metallic coated products

This is a project partly performed in Finland, in which a sol-gel process is used to create a white rust protection and extended corrosion protection to a galvanized surface. With the technique it is possible to create very strong colours, for example for guard rails where orange colour is used to increase the visibility of the rail. Studies has shown that time to zinc corrosion is much longer than with commercial varnish. Another benefit is the possibility to get very strong colours. The price is from 10-50 euro per litre of sol-gel depending on complexity.

Galvanized steel in UK offshore

Offshore activities in UK started already in the 1960s. Many of the old fields is still in production today. A large number of installations have exceeded their design life, and new developments have slowed down. Re galvanizing of existing structures is a way to upgrade the old installations in a very cost effective manner. Example of galvanized components on an offshore platform is among others: Handrails, gratings, firewater, lifeboat, air distribution system, air pipework, bolting and lighting brackets.

A case study was described. It was about a new process deck consisting of 400 tonnes of new structural steel. Galvanizing was specified to minimise the risk of damage during handling. Bolting was used for assembling, which has the key benefit that it was possible to avoid hot work in dangerous areas. Galvanizing also has an important role to play in reducing costs. The speaker ended his presentation with an advice to the audience: “Galvanizing industry should talk to Engineering Companies who are designing and placing orders for new equipment. Sell the benefits of galvanising vs painting to Oil and Gas Operators. Coating specifications need to include galvanizing as an alternative to painting. Build relationships with fabrication companies. Invite representatives from Oil and Gas Operators and Engineering Companies to witness galvanising process. Raise profile of benefits by using galvanising: greater resistance to handling damage and no requirement for remedial painting!”

Galvanizing Awards

Four projects out of more than 45 from around the world was selected as winners by a group of architects. The projects was a Cliff Walk in USA, a Health Centre in Spain, a Sugar Warehouse in Brazil and a Water Tank in Spain.

Two special projects were presented during the prize ceremony. The first was German Central Bus station in Haldensleben, designed by Schulitz Architekten. Since it was a low cost project, the architect had to convince the customer to choose galvanized steel. Normally that is hard because the customer wants to save as much money as possible. But in this case something sustainable was needed, since they wanted to avoid maintenance. Another benefit with galvanized steel was that it was possible to store and assemble the steel outdoor in cold and snowy weather, "We love to work with steel and especially with galvanized steel" the representative from Schulitz Architekten ended his presentation.

The other project that was presented was about Vienna railway station, Austria. The old station was totally torn down and a brand new was built up. The lozenge roof of the new Vienna Central railway station is very spectacular and was the worthy winner of the Austrian Steel Construction Prize. The roof structure, about six times the size of a football pitch, can be seen for miles around. It is one of the most complicated and beautiful steel construction projects in Austria and incorporates approximately 7 000 tonnes of steel. The complexity of the roof structure meant that it would be virtually impossible to maintain, so the design allowed for individual members to be galvanized and bolted together to form the complex rhombus for each subsection of the roof. It was therefore possible to avoid costly maintenance work which would entail closures along with health and safety issues.

For the architect, the central station is more than an important traffic hub: "It's a turntable in a Vienna which is open to Europe. The lozenge roof makes an important contribution to this as, with its dynamic design, its rhythm and the way it seems to float in the air, it acts as a structural synonym for Vienna, the world-renowned city of music."

Steel wire for hanging of steel in the galvanizing plant

The consumption of steel wire is about 100 ton/year for a medium sized plant in Italy, which galvanize around 15 000 tonnes of steel. About 70 % of the wire surface is covered with zinc. In the investigation zinc consumption, mechanical strength and safety of the tying have been studied. Three different types of steel have been included, with the silicon contents 0,07 % (A) 0,014 % (B) and 0,14 % (C).

As expected, it was shown that wire A, with a silicon content in the Sandelin range, was the most reactive one. By using a wire with low reactivity, up to 5 % zinc can be saved. To put together small wires consumes more zinc than using a thicker one. It is important to adopt a more conservative safety parameter for the wires; for example that every ligature is subject to a force less than 75 % of that corresponding to the yield strength of the wire, which is usually provided, as certified, by the manufacturer of the wire itself.

Immersion gas heater tubes – Increased efficiency in galvanizing

The immersion gas heater tubes that are immersed in ceramic galvanizing bath to warm it up, offer a great efficiency and are used since many years with success in numerous galvanizing applications, such as the steel wire industry. The efficiency is high which means that the zinc consumption is going down, and case studies have shown that the reduction is of the magnitude that over 100 000 euro a year could be saved on zinc. The case studies also show that the useful bath area is 3 m x 1,1 m and the maximal depth is 1,35 m. Energy consumption savings of about 25 to 35 % is possible.

The reduction in creation of aches is large, up to 70 %. For a plant with 4 000-5 000 kg of steel galvanized per hour means around 300 kg aches a week. Re-sale only gives about 40 % of the LME-prize, so the reduction in ache creation means savings of about 8 000 euro per year. It is a specific system that lift and handle the heaters. The material in the heaters is silicon carbide with nitride, which is resistant to combustion fumes and to melts consisting of Zn, Al and Zn-Al-Mg. The material can cope with temperatures up to 500 °C. The life time of the tubes is 2 years.

New environmental friendly pre treatment for Hot Dip Galvanizing

Jurgen Kader from Stockmeier Chemie GmbH gave a presentation about some new products for pre treatment without phosphates. Phosphates have a lot of usage in the pre treatment before galvanizing, but they fertilise the aquatic environment, and it is therefore an advantage if they can be avoided. Often there is demand for energy in the pre treatment, for example degreasing at 80 °C. Acid based systems working at 25-30 °C, which of course is a benefit.

The Stockmeier product Lerapur 268 is a low temperature phosphate free alkaline degreasing. It is a builder for production of an alkaline, low temperature degreaser, in combination with special surfactants, which gives a silicate-free, phosphate-free liquid with very good degreasing performance. The low temperature, degreasing is possible at 30 °C, saves energy and reduces the evaporation steam.

Why use phosphoric acid for degreasing? Rinsing is not necessary, it is a never dump system, gives mild pickling effect, i.e. the benefits are several, but as mentioned above it is also a large disadvantage. For those that want an acid based system, but want to avoid phosphates, Stockmeier has developed a new acidic degreasing without phosphorus, named Leraclen PF 10.1. The product is based on mineral acid with very good degreasing performance, self-regenerative and phosphate-free, said Jurgen Kader.

Cleaning of the flux

Indufinish is a Dutch company specialised in surface treatment technology. They focus their work on five segments:

powder coating, e-coat, pre treatment for hot-dip galvanizing, anodising and plating technology. Their presentation was about two different products. Fluxcleaning 1.0 is a product with standard chemistry, to getting the iron out of the flux. It is easy to maintain and handle and leaves no sludge in the tank. The other product, Fluxcleaning 2.0, has a lower pH than what is normally used. Normal pH in a flux is 4,5. On the question why that pH is used, most galvanizers answer; "Because we have done so for ages". Lower pH, like 2,3 gives a more active flux which polish the surface. Iron building is not an issue, the filter cake is dry and the reaction faster. The formation of dross and ashes in the galvanizing bath goes down, according to the speaker from Indufinish.

Pin holes in Powder coatings on galvanized steel

Geoff Crowley from Highland Galvanizers and Colour Coaters had a very interesting presentation regarding a problem that is quite common; pin holes in powder coatings. Pin holes shows up, sometimes random, sometimes on a line. Highland Colour Coaters has performed a three year investigation by a full time scientist, taking part in the work at the plant. The influence from both the galvanizing operation and the powder coating operation has been studied. Some important conclusions:



Surface contamination before galvanizing. This "A" was not visible after galvanizing, but after powder coating!

- The gas that evaporate from galvanized steel is actually water, and drying is a way to solve the problem. Instead of talking of degassing of the galvanized steel it should be called drying.
- Steel that is to be powder coated after galvanizing should be cleaned by additional degreasing before galvanizing.
- Store galvanized steel that is intended for powder coating away from the weather when possible, and particularly after fettling.

The conclusions from the study are the following:

- Reactive steel has a structure that traps moisture
- Contamination on the black steel cause gassing
- Severe fettling open up the surface
- Storing in rain or snow cause gassing

All of these is not a problem in galvanizing only, but they become a problem when powder coating the steel.

Zn-Al-Mg coating for batch galvanizing

Japan is surrounded by sea, and the environment could be very corrosive. Because of that a technique to use Zn-Al-Mg alloys for batch galvanizing has been developed. The method is called SG Mekki and has high corrosion resistance in salty environments. Two baths are used. First bath is a normal galvanizing bath. In the other zinc bath aluminium and manganese are added. There have been some practical problems, for example using the same tools make the Al content in bath 1 to increase. Ten years of full scale test has shown that SG Mekki has very high corrosion resistance, and the coating is wide spread in Japan.

Concluding remarks

Intergalva in Liverpool was a nice event with a lot of participants. The exhibition was large and had companies from all around the world showing their products. This time it was also several delegates from Nordic Galvanizers taking part in the conference. Actually all our countries were represented, which is really nice. Progatec AB, C H Evensen Industriovner A/S, Recyclean AB and of course also New Boliden AB took part in the exhibition.

Happy Norwegians in Liverpool. Bjarne Kihle and Johnny Theigmann from DuoZink A/S with their ladies.



Liverpool is among other things known as hometown of the pop group Beatles. At the welcome reception some Beatles look alike entertained us.

