LEADING Technology for the HOT-DIP Galvanizing Industry

Electrically-Heated Furnaces and their potential for Sustainability

Nordic Galvanizers
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Key information – Our background

Name: **Nils Erik Faulhaber**  
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**CHE** is based in **Norway**, Fredrikstad

Founded in 1937
- Over **85 years of experience** with innovative solutions in Heat Treatment Industry
- Over **60 years of experience** with electric heated HDG applications
- Over **30 years of experience** with gas heated HDG applications
- Over **25 years of experience** with hybrid solutions.

Part of **VOW ASA Group** with operations in Europe and the US. Vow is a world leading provider of technology and solutions that prevent pollution and greenhouse gas emissions ([www.vowasa.com](http://www.vowasa.com)).
CHE Installations worldwide

Approx. 250 Hot Dip Galvanizing installations worldwide, over 4,000 totally for Heat Treatment Solutions in 45 countries
Global situation

More and more Hot Dip Galvanizers are focusing on their energy consumption – both economically, but also related to the source of the energy and sustainability.

Subjects of discussion:

- CO₂-foot print
- Availability
- Price
- Future
- Sustainability

Possible Solution: Electrically heated Systems
Electric energy production is not depending on a single energy source.

Different Energy sources can be transformed like:
- Gas
- Waterpower
- Photovoltaic
- Geothermal energy
- Wind energy, etc.

With the choice of the energy source the CO$_2$-footprint can be chosen as well.

Sustainable sources are available.
Challenges

80% or more of all galvanizing furnaces worldwide are not electrically heated (estimation).

Infrastructure/ Availability of electricity on site.

Gas optimized plants require adjustments for change of energy source.

Future perspectives

Long term goal will be carbon-neutral production.
Advantages

- **Even and homogenous heat distribution** on kettle walls (longer life span).
- **Lower nominal energy consumption** (No heat loss through chimney).
- Easy to fit two temperature regulation zones (less top dross).
- **Less maintenance**.
- **Long life span of heating elements**
- **Heating elements are easy to repair**
- **Less auxiliary equipment**.
Limitations

In general, there are **no size limitations** for electrifying the HDG furnace or other HDG equipment.

**Requirements:**

- **Availability** of enough electricity on site.
- **Stable grid** (can be compensated with safety measures).
- Energy load $\text{kW/m}^2$ same as for gas fired applications.
Standard electric heating methods for galvanizing:

**Electric Resistance heating**
- Heating element wire emitting radiant heat

**Induction**
- Induction coils induce heat
- Complicated and expensive installation on kettle/furnace
- 5% Energy loss for cooling inductors
CHE Standard electric heating systems:

**Immersion heating rods**
- Heating rods directly immersed in liquid zinc
- Most efficient heat distribution with direct heat transfer, less zinc

**Radiant heat**
- Heating elements around steel kettle wall
- Top heated systems (mostly ceramic kettle)
Fully electric heated HDG furnaces:

Electric heated HDG furnace with steel kettle

- Approx. 30% less nominal power required
- Independent of electricity generation min. 30% less CO$_2$-foot print

Electric heated ceramic bath

- Immersion heating rods – smaller bath dimensions, more effective heating
- Top fired, less nominal power
Hybrid HDG furnaces (gas/electric):

- Main power supply is gas
- Additional electric heating can improve CO$_2$-balance drastically

High velocity burners combined with electric heating element

Applicable electric sources

- Direct supply from local electricity supplier
- Surplus of own electricity production from
  - Photovoltaic
  - Wind energy
  - Fuel based emergency generator
  - Etc.

Extra production security!
Auxiliary equipment:

- Fume enclosure with integrated cover lid
- Fully electrically heated HDG dryer

- Simple covering of HDG bath in non-production hours, lunch breaks etc.
  - **approx. 70% less losses over bath surface**

- For fully electric HDG line.
Energy calculation

- Calculation of **Energy load** on kettle wall
- Calculation of **annual energy consumption** based on customer input
- **Clear picture** of required energy and where energy consumption and CO₂-footprint can be minimized!
Programming and control:

Remote control and remote assistance

- Full remote control for customer and service assistance on PC and Pads
- Smart solutions possible

Data logging

- Data logging of desired production parameters and information
Some of our customers
In order to achieve a carbon-neutral industry, the transition to electric heated systems seems to be a potential solution and feasible.

Both short-term and long-term measures can be taken.

The future will be probably be fully electric, but in a transition period there will be electric and hybrid solutions.

CHE delivers gas fired, electric and hybrid solutions.

Let’s make the Hot Dip Galvanizing Industry more sustainable together and get closer to a

Carbon-neutral Industry!
Thank you for your attention!