OPTIMAL MAINTENANCE OF HOT DIP GALVANIZED STEEL STRUCTURES

Project presentation Programkontoret

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Corrosion Protection and Surface Technology

Optimal Maintenance of HDG structures

Project Consortium

- Svenska Kraftnät
- Trafikverket
- Nordic Galvanizers/ European General Galvanizers Acc.
- Svetskommissionen
- Tikkurila Sweden
- Zinga Sweden
- Agaria/ Clean Laser
- IPM Norden
- Pro Chroma/ St Control
- Dala zink

Funded by:

VINNOVA

Optimal Maintenance of HDG structures

The Aim of the Project

- Compare different methods for maintaining Hot Dip Galvanized steel
- Compare different pretreatment methods for in-field use
- Compare different coating products
- Inspection of reference objects
- Life Cycle Analysis (LCA) and Life Cycle Cost analysis (LCC)
- A holistic best practice will be sought
- Improve the current standardization framework within ISO

Damage and corrosion on HDG steel

Is it a problem?

- Expenditure for road and bridge fencing is about 600 mSEK/ annum.
- 30 000 street lights a 20 kSEK each may be exchanged in Linköping
- 8000 street lights shall be tested in Katrineholm
- Could a simplified procedure to repair/ refurbish HDG steel lead to savings for the Swedish infrastructure?

References
PIA –Produktivitets-och Innovationsutveckling i Anläggningsbranschen
Produktivitetsprogram Väg-och broräcken
http://sverigesradio.se/sida/artikel.aspx?programid=160&artikel=2973986
https://www.kkuriren.se/nyheter/varje-stolpe-ska-testas-for-rost/

Requirements for repairing HDG steel

- SS-EN ISO 14713-1:2009 (Sv)
  - Zinc coatings can be left without maintenance if the corrosion rate is such that the function is not affected by corrosion during the design life of the structure
  - Worn/ consumed HDG coating can be refurbished by:
    - Pickling and re-galvanizing
    - By painting, if 20-30µm zinc is left

- SS-EN ISO 1461:2009 (Sv)
  - Maintenance of HDG steel:
    - Thermally sprayed zinc, ISO 2063
    - Appropriate zinc rich coating (DFT 100µm), ISO 3549.

How is it done in the field today?

Field exposure of coated samples

Bohus-Malmön, Kvarnvik

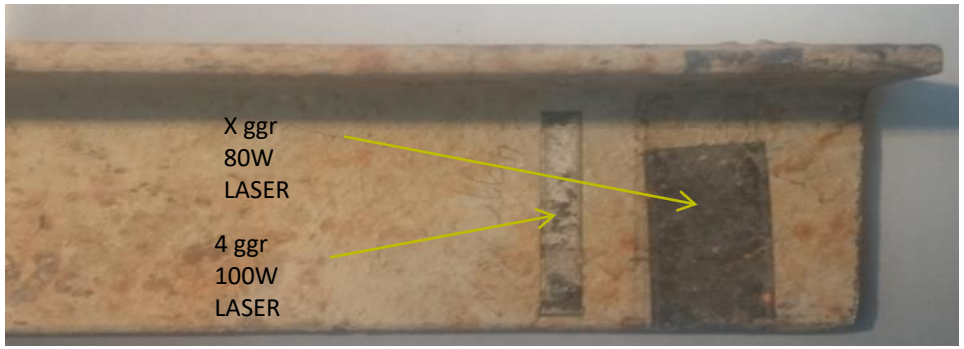
Riksväg 40, Borås

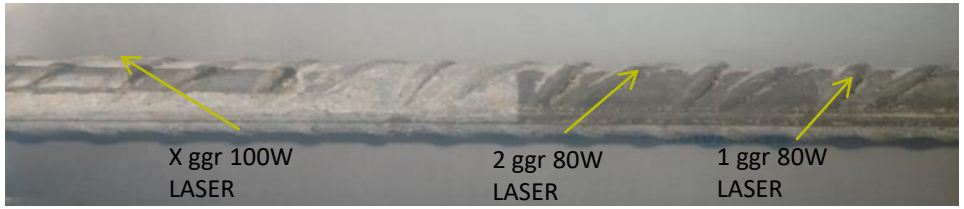
Ryda, Enköping

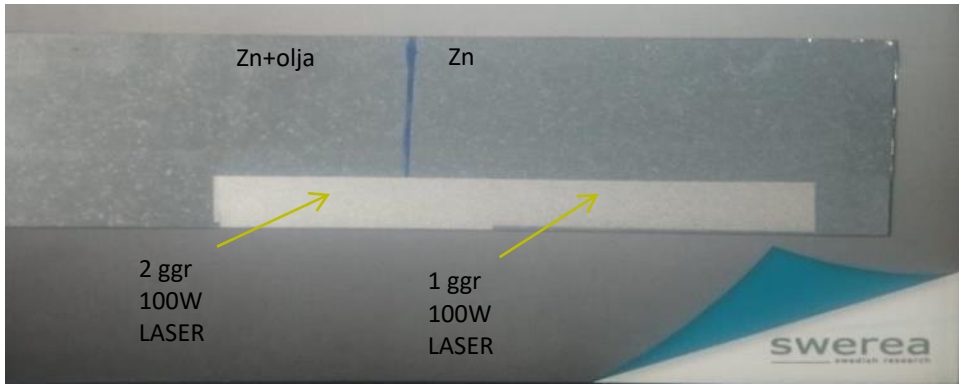
Alternative Technology

Laser-cleaning

- No containment neeed
- No hazardous waste
- One-step pretreatment



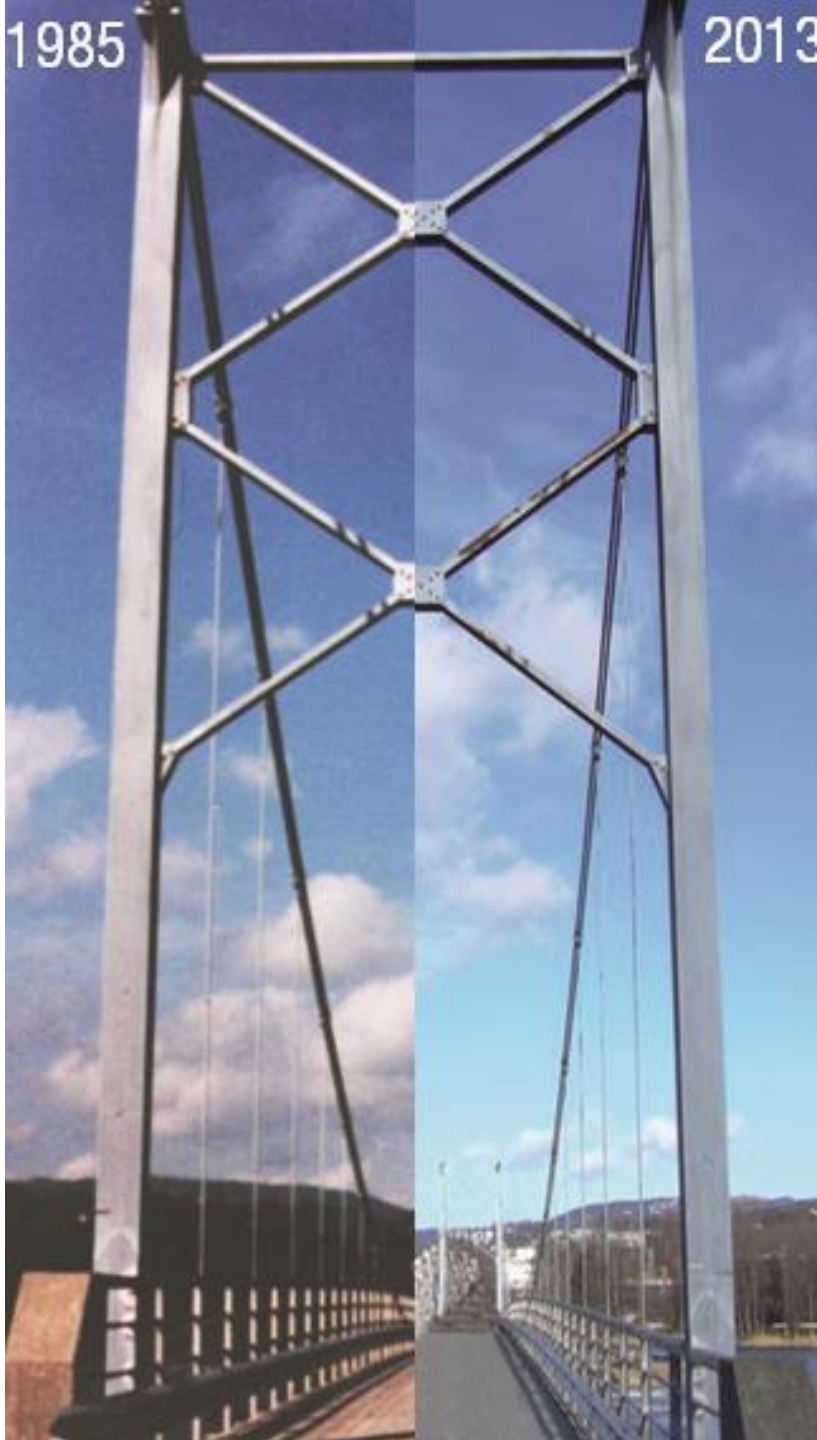




Alternative Technology

Zinga – a quick and easy zinc-rich coating

- One component zinc-rich coating 97% zinc
- Fast drying 1-4h
- Robust -10 °C
- Robust RH +90 %
- Relatively high VOC

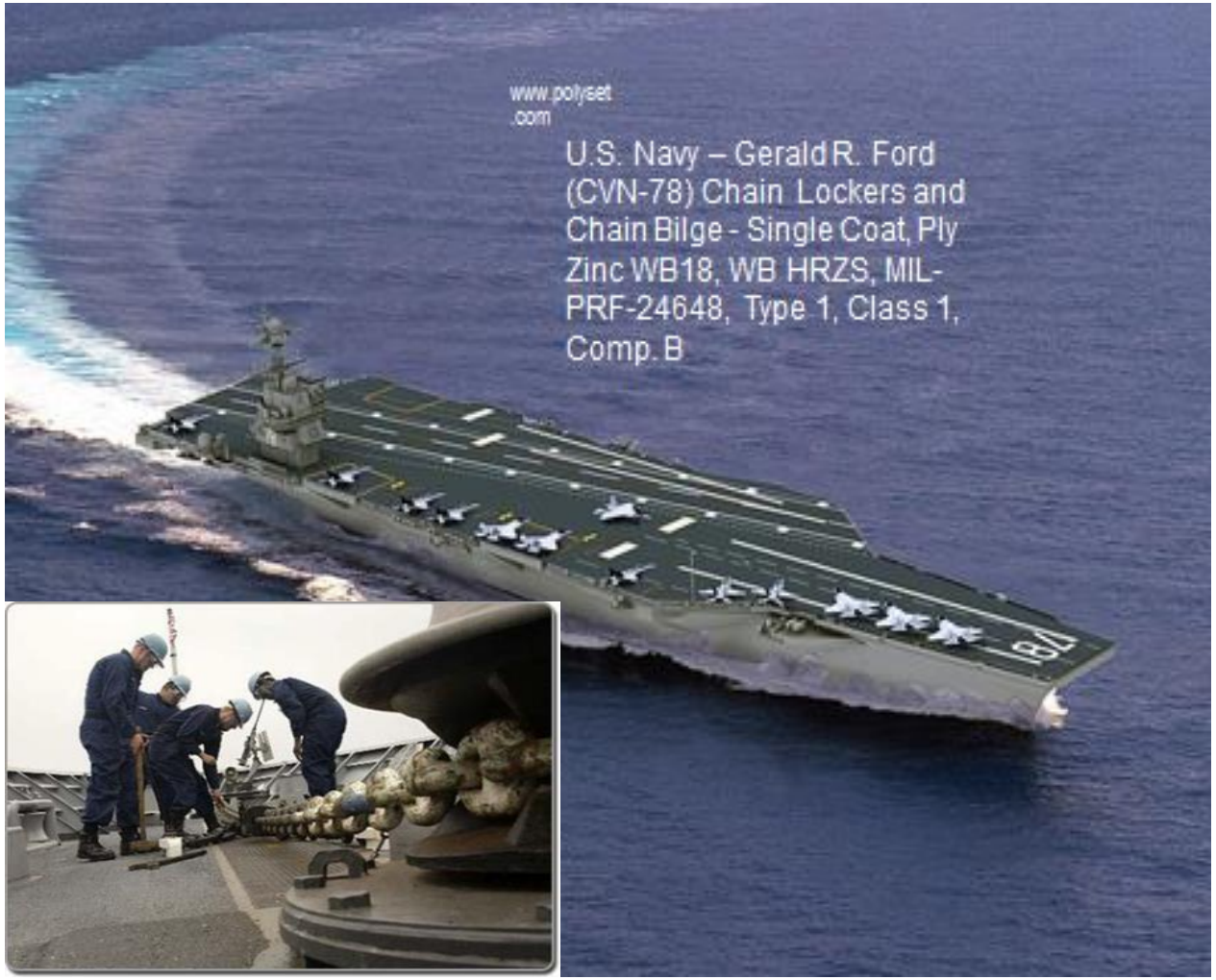


Kalvoya, bridge in Oslo was painted 1985

Alternative Technology

Fontezinc HR

- Water-borne
- o % VOC
- No sensitizers
- Resistant to impact
- Extremely efficient
- Tricky to apply



Reference Objects- Fontezinc HR

Statue of Liberty after 33 years

US Army Causeways after 29 years

Bathing ramp in Varberg

Tempe Lake dam gates

Reference Objects- Zinga

Kalvöya, recoated 2014

Rånofoss, recoated 2014

Seimsbrua, recoated 1992 after 29 years

Hausmanns bru, recoated 2014

Reference Objects- TSZn/Al, Zinc ethyl silicate

Åsbobron, TSZn/Al after 20 years

Crown Crucifix of Uppsala Dome Church after 45 years

State of the art refurbishing of power transmission towers

- New Zealand
- Australia
- US
- UK
- Norway

NACE INTERNATIONAL IEEE

NACE International and IEEE Joint Standard Practice for

Atmospheric (Above Grade) Corrosion Control of Existing Electric Transmission, Distribution, and Substation Structures by Coating Systems

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Standardization work in ISO

Revision of SS-EN ISO 14713-1:2009

- Swedish votes are cast and influenced via Nordic Galvanizers
- The revision work is being lead by representatives from EGGA
- An EGGA ad-hoc working group has contacted the project leadership for advice
- The project has comunicated relevant additions to the revised version (New Annex)
- The project has comunicated relevant spcifications of ”shall-requirements”

Project comunications

- Presentation at EGGA annual meeting Antwerpen 2019
- Presentation at Ytskydd Göteborg 2018
- Article in Ytforum 2020 By Nordic Galvanizers
- Co-funding with MRC
- Summary report

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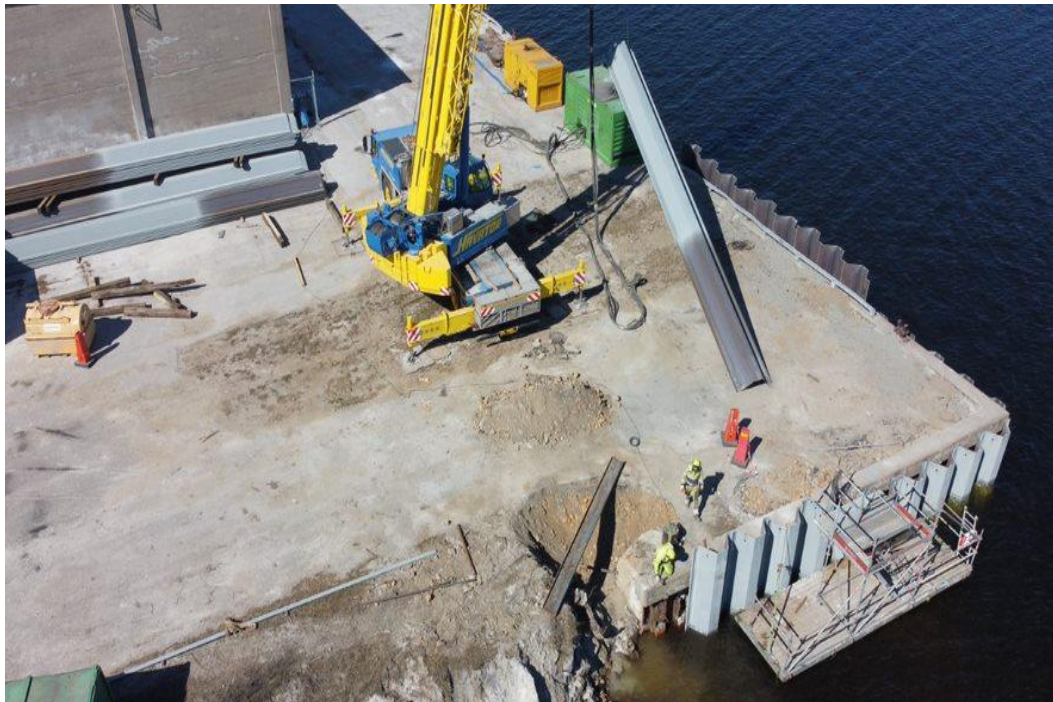
Early applications

- The Zinga system has been trialed by Trafikverket for refurbishing railway bridges
- The Induron product has been trialed by anonymous company (NDA-agreement)
- The NASA product has been used on docks in
  - Karlstad
  - Söderhamn
  - Silja terminal



Innovation Readiness Level

Expected project results