



ENERGY TRANSITION

REDUCTION IN THE USE OF NATURAL GAS IN
HOT-DIP GALVANIZING PROCESS



TABLE OF CONTENTS

- Introduction – Energy transition – Reduction of natural gas dependency in HDG
- Emergency electrical heating backup toolkit to keep zinc liquid in galvanizing baths
- Hydrogen blends in the natural gas
- Full electrical solution for galvanizing bathes
 - ▣ Heating by radiant panel for metallic zinc kettle
 - ▣ Heating by immersed heating tubes for ceramic zinc bath
 - ▣ Induction heating system for ceramic zinc bath
- Conclusion

*Ahead
Together!*



INTRODUCTION – ENERGY TRANSITION – REDUCTION OF NATURAL GAS DEPENDENCY IN HDG

- Fight against climate change – Green Deal
- Security of natural gas supply
- Dependency of Russian gas imports

→ SEARCHING SOLUTIONS FOR NATURAL GAS REDUCTION

*Ahead
Together!*

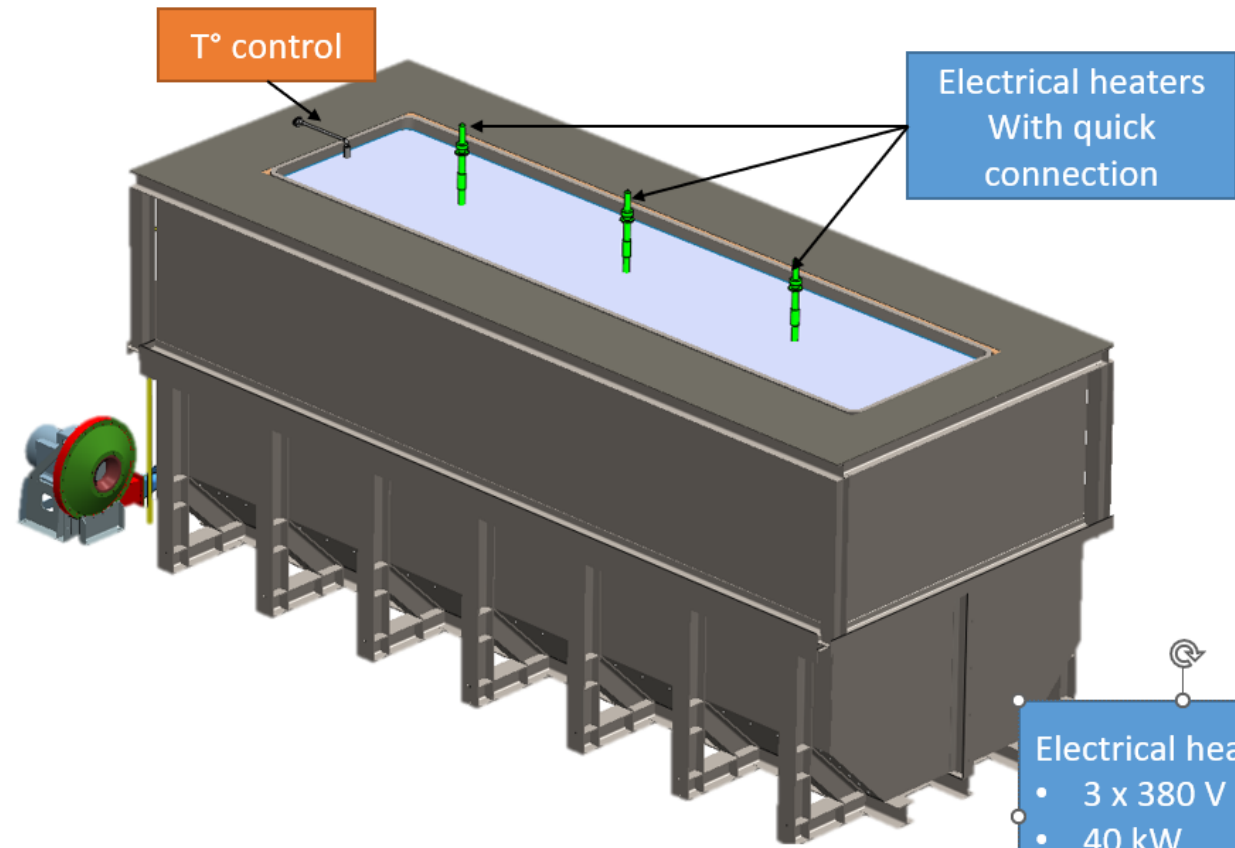
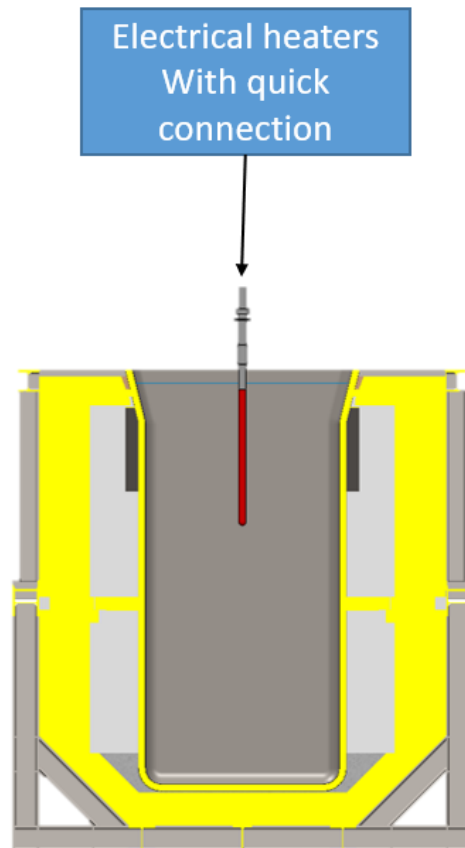


EMERGENCY ELECTRICAL HEATING BACKUP TOOLKIT TO KEEP ZINC LIQUID IN GALVANIZING BATHS

This system will be installed in case of emergency situation with the gas
Operability in less than 2 hours

Gas power cut: a potential reality :

Facing the risk of temporary **gas power cut**, many concerns are faced by the galvanizers to keep their zinc molten.



- Electrical heaters:
- 3 x 380 V
 - 40 kW
 - 3 pieces

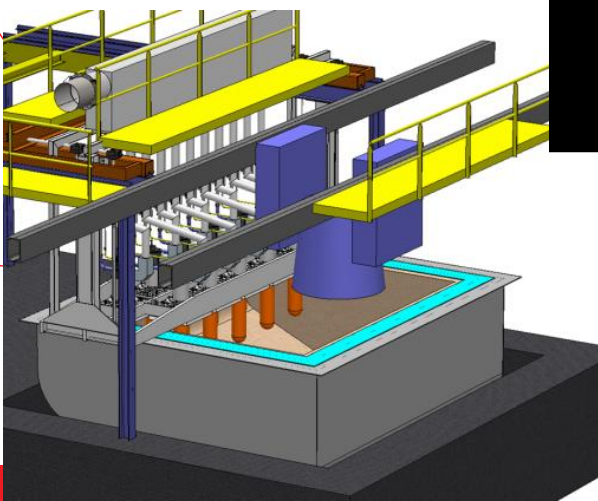
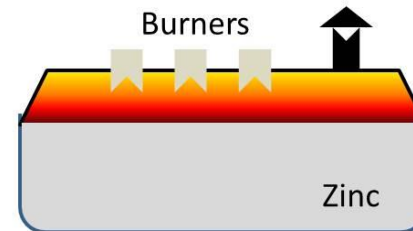
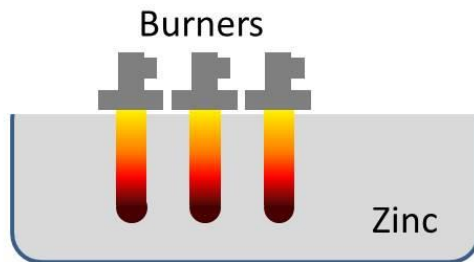
Ahead
Together!



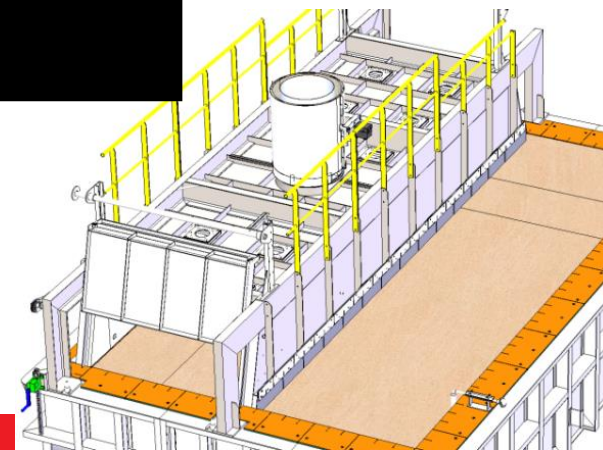
HYDROGEN BLENDS IN THE NATURAL GAS

- Technology using **nozzle mix burners using self recuperative burners** accept very high level of hydrogen in natural gas up to 100% . Such technology find their advantage in some specific configurations and must be assessed case by case.

→ Immersion burners: a technology saving energy and space and zinc !



Efficiency
70% vs 50%





HYDROGEN BLENDS IN THE NATURAL GAS

- However special attention for NOx emission with nozzle mix burners : With H2-NG blends → increase of adiabatic flame temperature and faster flame speed → increase of NOx formation through the ZELDOVICH mechanism (THERMAL NO)
- The impact on NOx may become not acceptable for blends with more than 60% hydrogen (with some burners in some area where NOx limitation are drastic)
- Additional attention to safety should be performed by a specific risk assessment while using 100% Hydrogen . No standards exist yet regarding safety for 100% Hydrogen burners .
- Not (yet?) clear strategy for the distribution of hydrogen in the grid.



*Ahead
Together!*



FULL ELECTRICAL SOLUTION FOR GALVANIZING BATH

- ▣ Heating by radiant panels for metallic zinc kettle



ADVANTAGE :

- Homogenous heating surface (pure radiation)
- Easy tuning of the power
- Better efficiency compared to gas burner and induction heating system
95% electrical efficiency with radiant panels compare to 70% combustion efficiency and 70% for induction efficiency
- Designed to be able to easily change a module

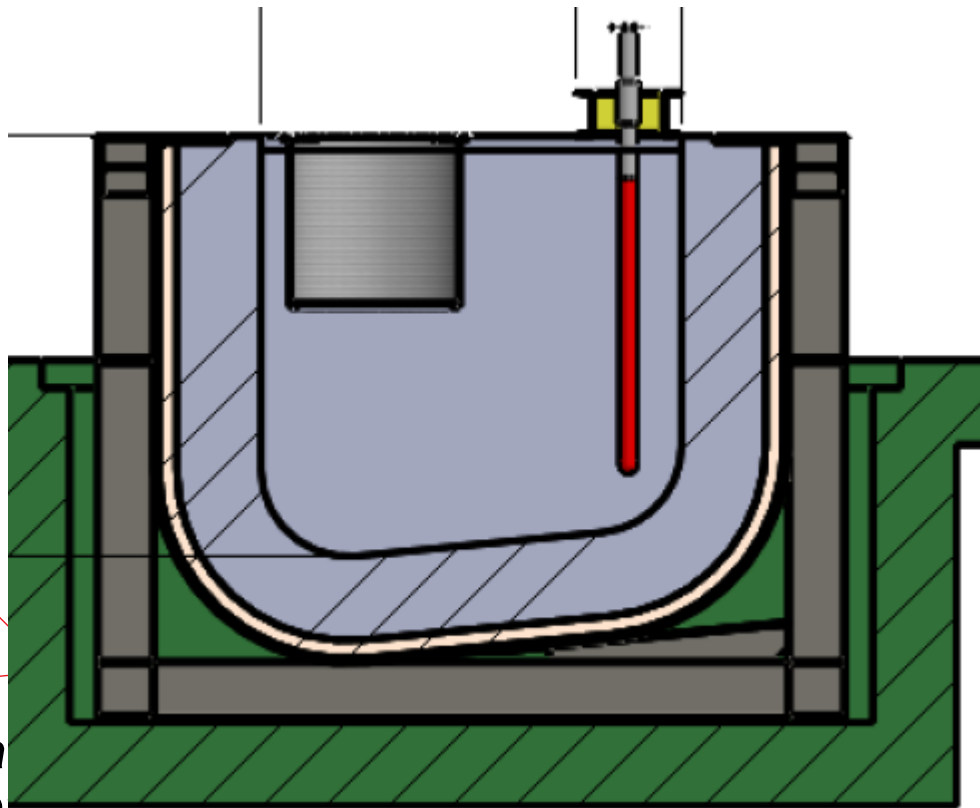
Inconveniences :

- Infrastructure of electrical power supply
- Preventing following of wearing of the kettle must be well done



FULL ELECTRICAL SOLUTION FOR GALVANIZING BATH

- Heating by immersed electrical heating tubes (for ceramic zinc bath)



Ahea
Toge



Typical power per element : 40 kW
Compact solution
High efficiency
Easy maintenance



FULL ELECTRICAL SOLUTION FOR CERAMIC GALVANIZING BATH

- ▣ Induction heating system for ceramic zinc bath

Main advantage :

- Solution with heating elements on specific location on one side of the bath
- Complete bath surface accessible for operators
- Not big maintenance for 5 years

INCONVENIENCES

- Efficiency not as high as other electrical solution (70% compared to 95%)
- Required to empty the bath and rebricking one part for maintenance every 5 years
- Lost of a consequent power to heat is taking place if one element has a failure (50% of power)

*Ahead
Together!*



CONCLUSION

Technological solutions exist to reduce natural gas dependency

However necessary to study case by case by considering several parameters

- Conversion or new installation
- Government subsidy - CO2 tax
- Acceptable emission (NOx emission by local authorities)
- Working condition (zinc temperature)
- availability of energy (NG, hydrogen, electricity)
- CAPEX OPEX study taking into account assumption on energy price

*Ahead
Together!*



FIB BELGIUM S.A.

Avenue Landas 4
B-1480 SAINTES
BELGIUM

+32 2 332 17 17

info@fib.be

www.fib.be

