

Kompakte und effiziente Hochstromverbindungen in Industrieanlagen

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PIONEERS IN ELECTRIC POWER



Content



The Company



Industry

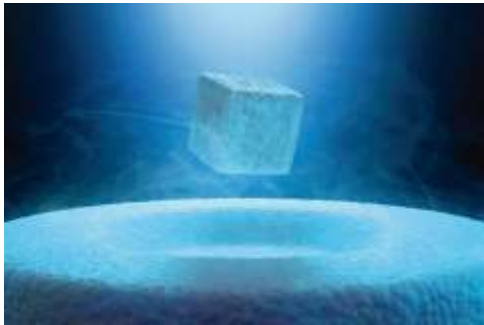


Data Center



Railway

Key markets



About
Superconductors



Power Grids



H2 Electrolysis

COMPANY - PIONEERS IN ELECTRIC POWER



- Starting 2014 by experienced industrial leaders with successful and proven track history
- Technology leader in superconducting high current applications worldwide
- Engineering, Design, Procurement, Assembly, Installation, Project Management: we transfer customer's need into solutions.
- System integrator – combining existing methods and material into a system.

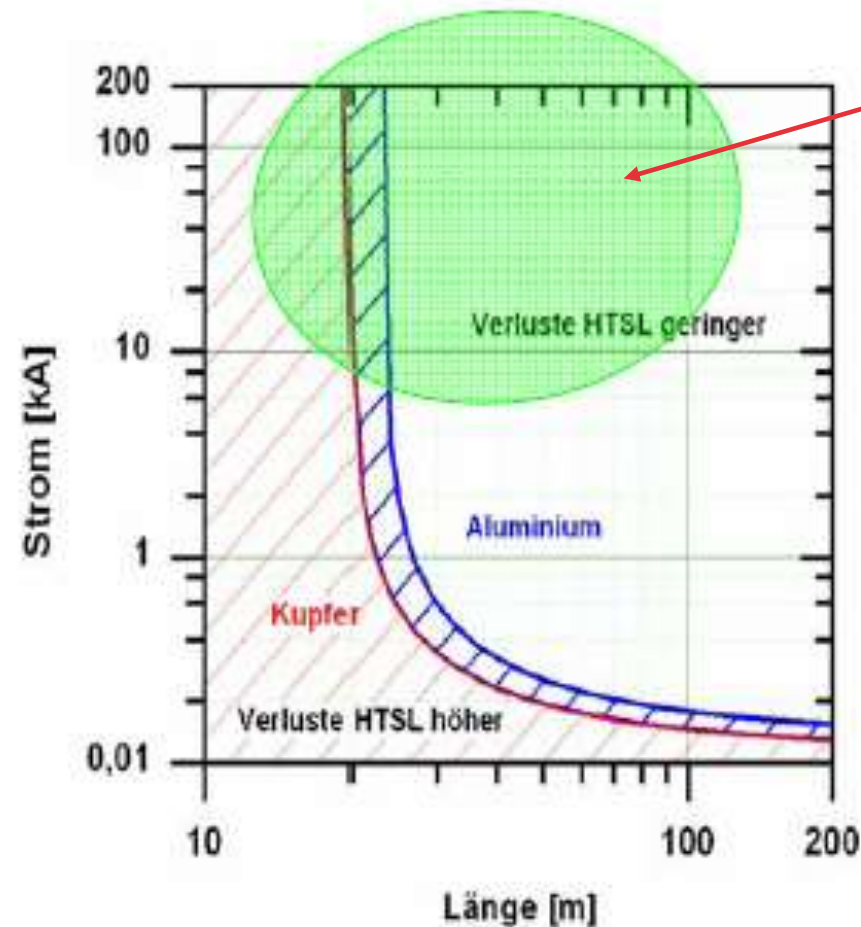
Superconductors – break-even

■ Cu / Al – Conductor

- Ohm Losses
 $P_V = I^2 \times R$; $R = f(T)$
- Contact resistance
 $R_K = f(t)$

■ Super Conductors

- Current Lead
- thermal losses:
 $P_T = f(A)$
- Efficiency of the cooling unit



VESC business area:

- above 10 kA
- above 20 m

Conductor Costs

- Cu: 50 – 60 €/kAm
- Al: 14 – 20 €/kAm
- SC: 80 – 100 €/kAm

Applications for Industry Plants



Zincelektrolysis, 200 kA



Application	Typical Current	Length
Chlorine Plants	approx. 20 kA	30 - 300 m
Data Centers	15 - 40 kA	40 - 500 m
Copper Electrolysis	40 - 80 kA	200 - 400 m
Zinc Electrolysis	120 - 200 kA	100 - 300 m
Aluminium Plants	200 - 350 (500) kA	100 - 1200 m

And all other electrolysis and high current plants like Na, Mg, F, Electro Furnace, Graphite, etc.

Chlorine plant, 20 kA

Aluminium Smelter, 200 kA



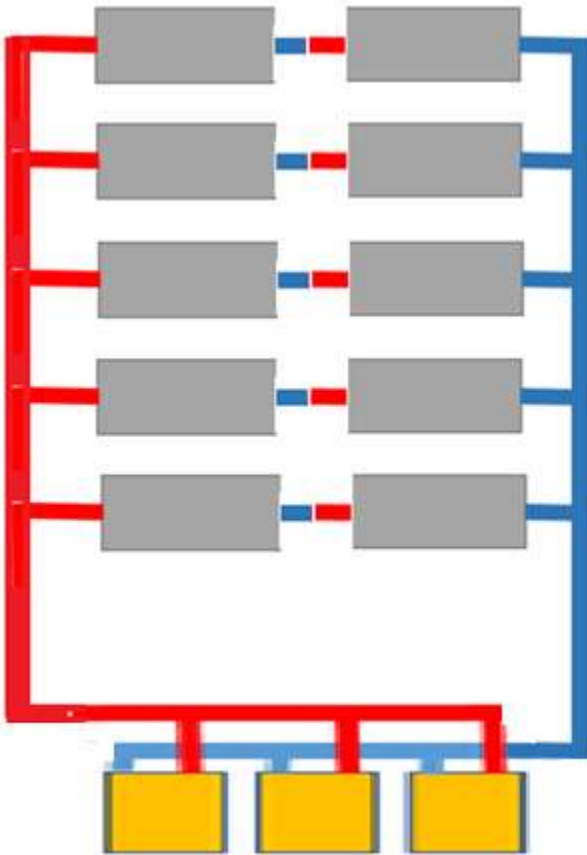
Chlorine plants

- Typical 15- 20 kA @ +/- 200-250 V DC
- Membrane cells producing chlorine, hydrogen and caustic soda
- One unit includes two electrolyzer cells in series
- Two up to 16 units in parallel in one plant

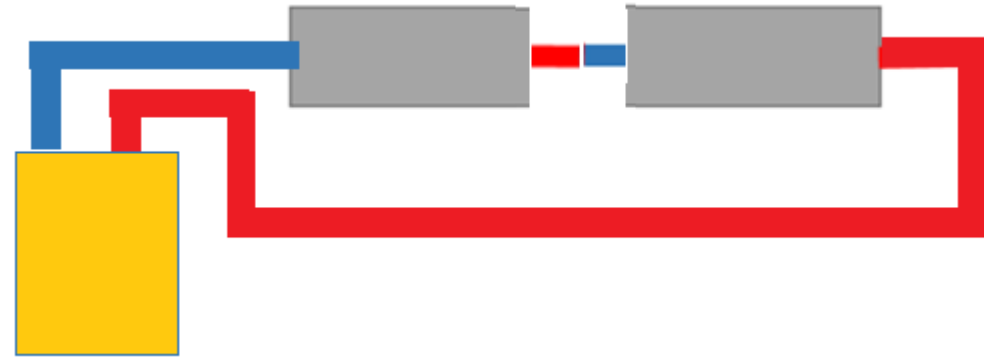


Chlorine Plant – Use Cases

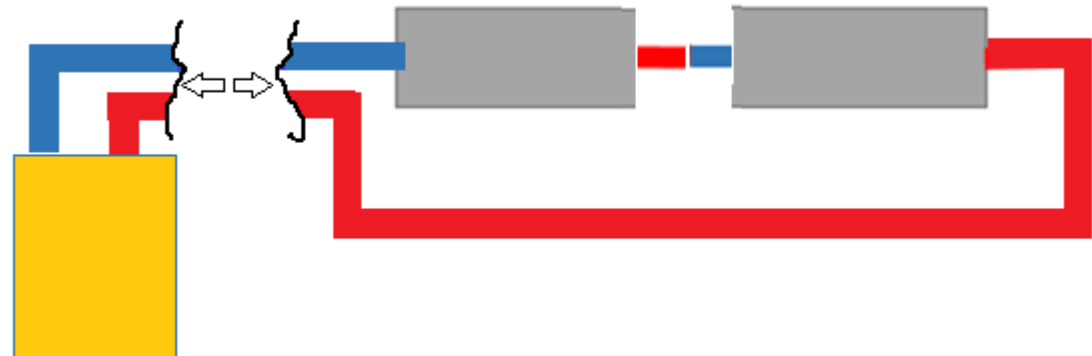
- Case collector bars



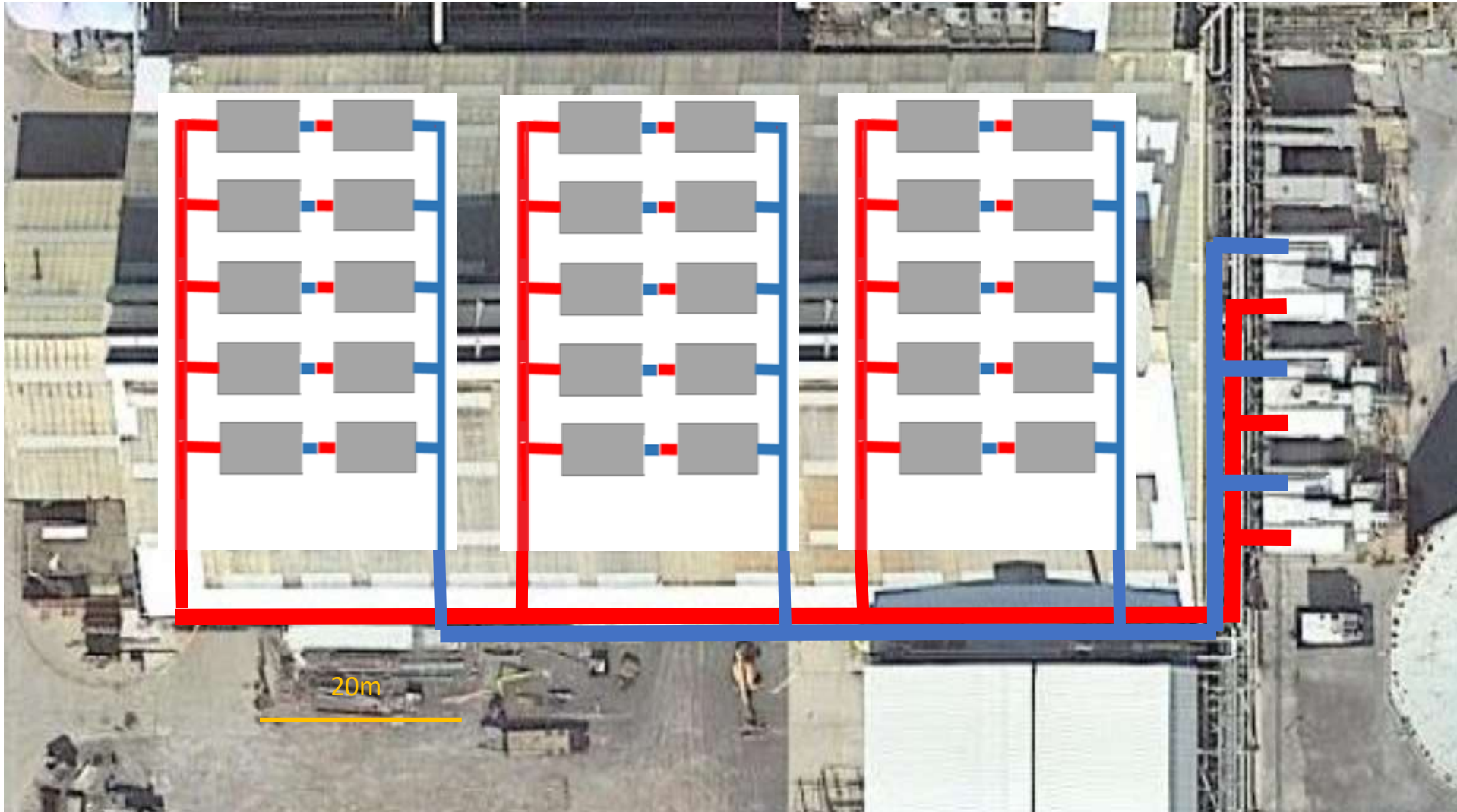
- Case return bars



- Case remote location of rectifiers

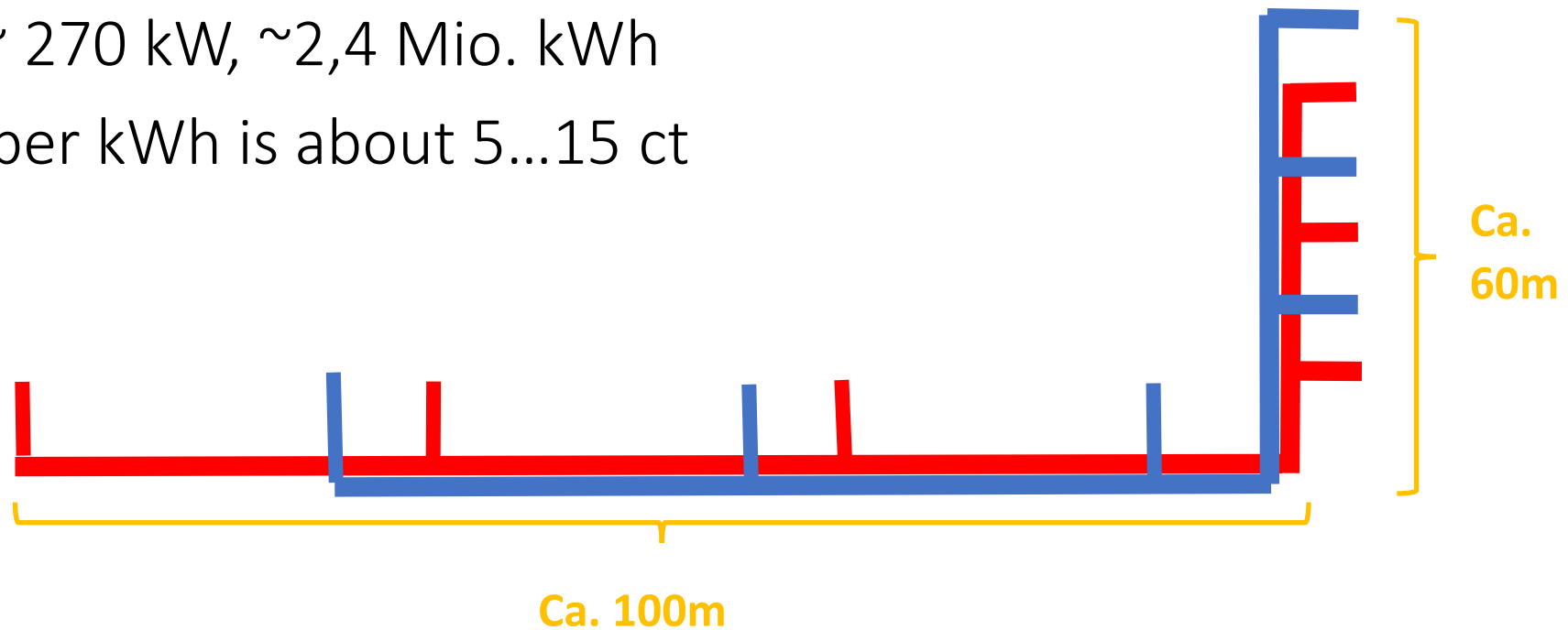


Case collector bars (1st example from the past)



Case collector bars (1st example from the past)

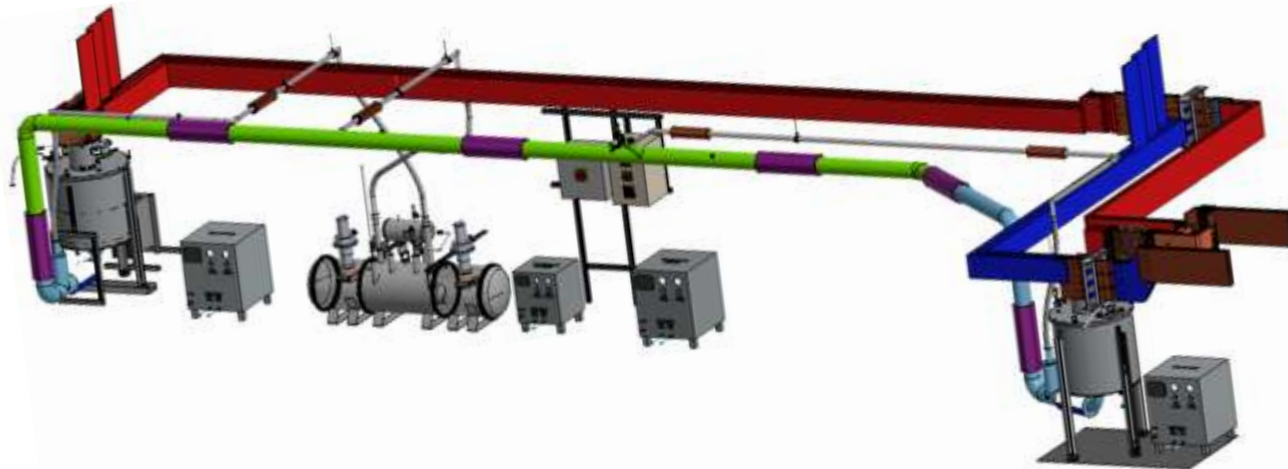
- Chlorine plant outside Europe
- 275,000 tons of annual chlorine production capacity
- 3 x 75 kA @ +/-250 V
- Loss ~ 270 kW, ~2,4 Mio. kWh
- Prize per kWh is about 5...15 ct



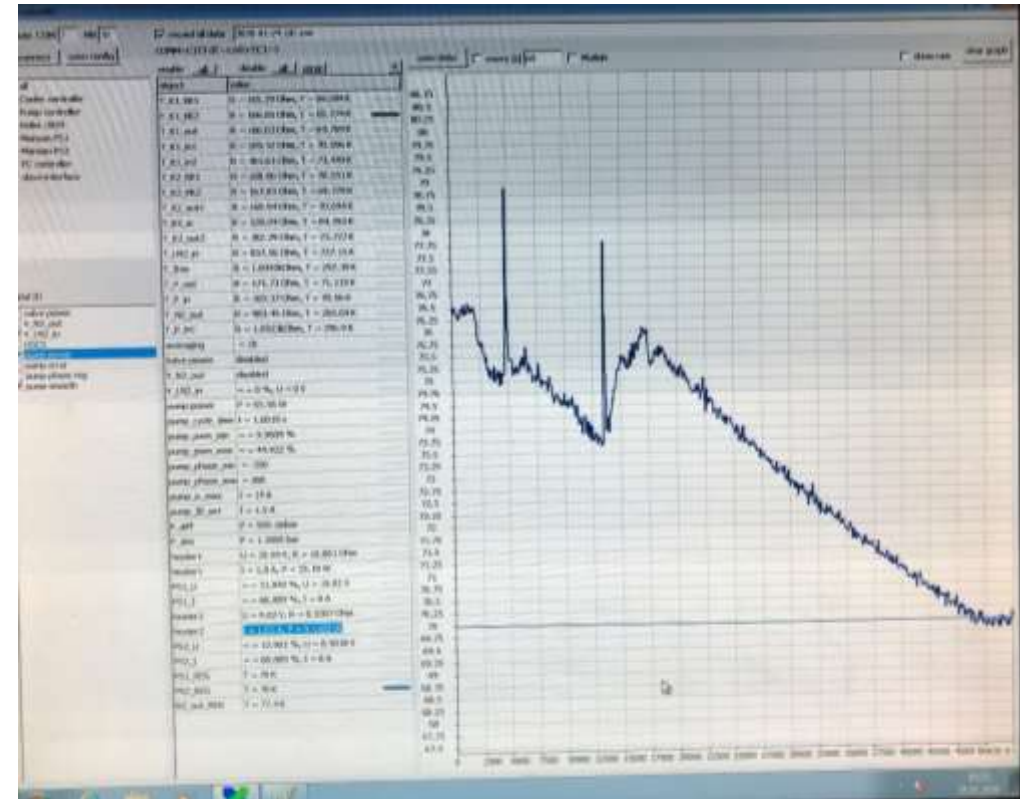
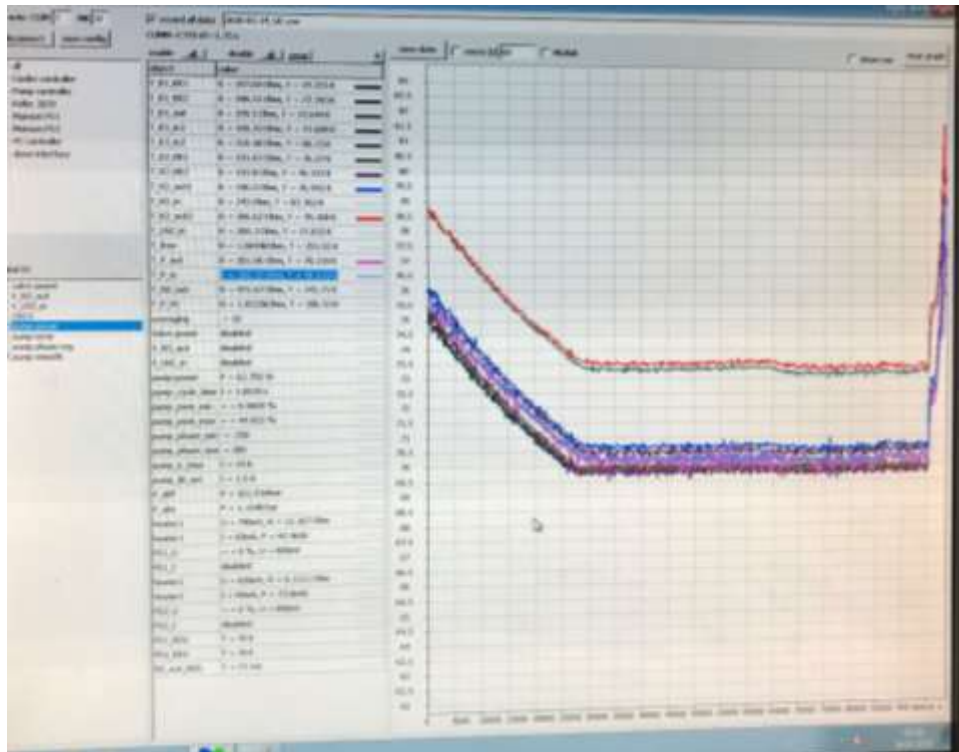
Case return bars (example form the presence)

- 3S- Project as demonstrator for SC-DC bus bars in chlorine plant
- Partners: BASF – KIT- VESC – ILK- PTJ – BMWI
- SC-length ~ 20 m, nominal current 20 kA
- LN2 circulation, 4 GM-coolers
- 1 pump for liquid nitrogen @ 70 K

*Aufbau und Funktion der
3S-Schiene als Muster im
Vorraum zu besichtigen*



- Cool down Jan. 2020
- After 20 h „cold head stall“
- Warm up



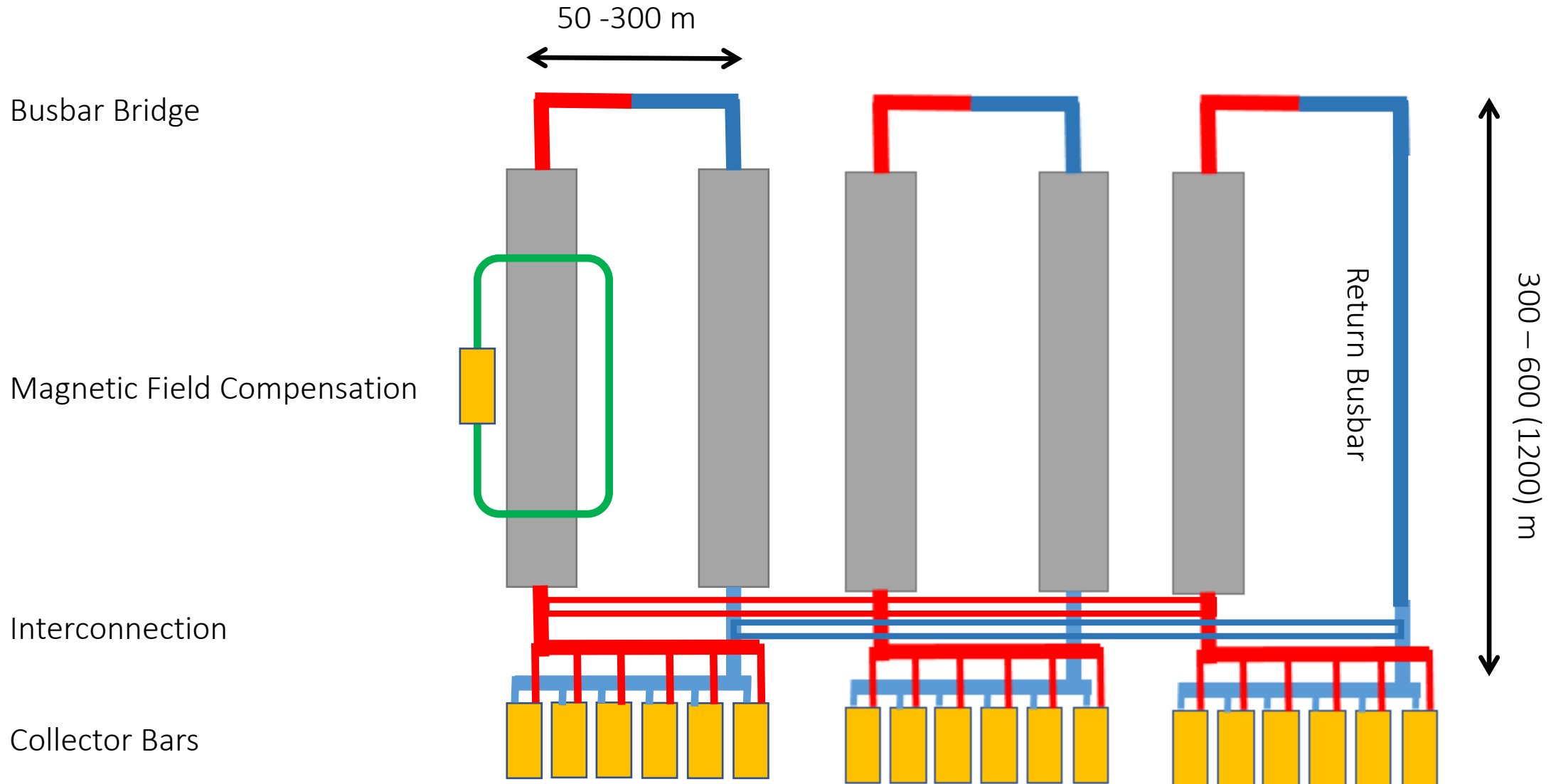
Mo., 02. March 2020 cold head is repaired and reinstalled

Aluminium plants

- Typical 200 - 400 kA @ 800-1500 V DC
- Reduction pots with molten cryolite at a temperature of 960-970° C
- Potlines with 50 - 200 pots in one row
- Typical two rows in parallel as a pair
- Typical several pairs in parallel
- Production 60000 – 100000 to of aluminium per potline per year

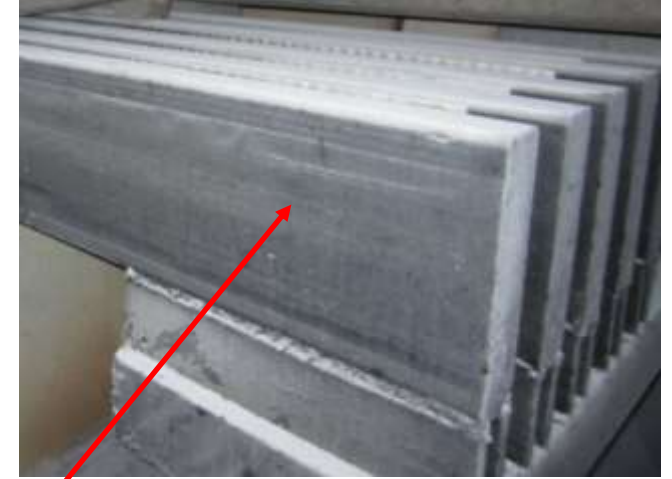
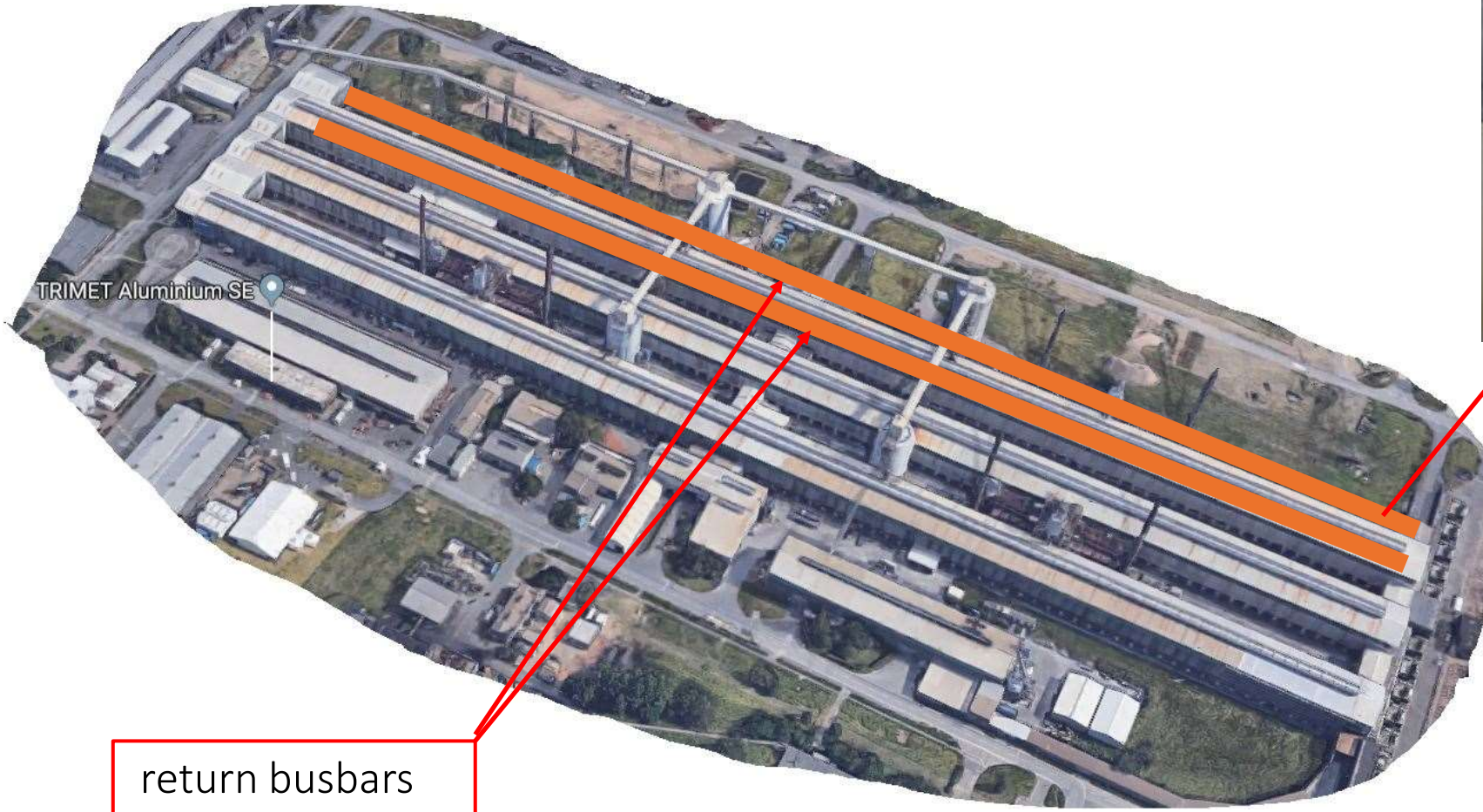


Aluminium Plant – Use Cases



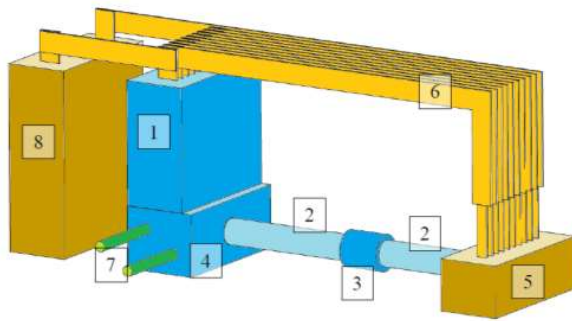
Aluminium Plant – Return Busbar

Aluminium plant in Hamburg (130.000 tons/year) – Operating Cost Reduction



DEMO 200

- Demonstrator for 200 kA DC
- Preparation for TRIMET aluminium plant
- Lighthouse project
- Worldwide highest current with ReBCO
- Installation in industrial plant



Gefördert durch:



aufgrund eines Beschlusses
des Deutschen Bundestages



Projektantrag / Vorhabenbeschreibung
Stand 5.6.2019

Neuartiges Supraleitendes Hochstromsystem für 200 kA DC

Akronym: DEMO200

An das Bundesministerium für Wirtschaft und Energie (BMWi)

Im Rahmen des
7. Energieforschungsprogramms der Bundesregierung

Förderschwerpunkt	Energieeffizienz in Industrie und Gewerbe, Handel und Dienstleistungen
Verbundprojekt	Ja
Antragsteller	Vision Electric Super Conductors GmbH Morlauerer Str. 21 67657 Kaiserslautern
Koordination	Dr. Wolfgang Reiser reiser@vesc-superbar.de 0631 / 627 983-0
Laufzeit	1.7.2019 bis 31.12.2021
Datum des Antrags	15.11.2018

Projektpartner:

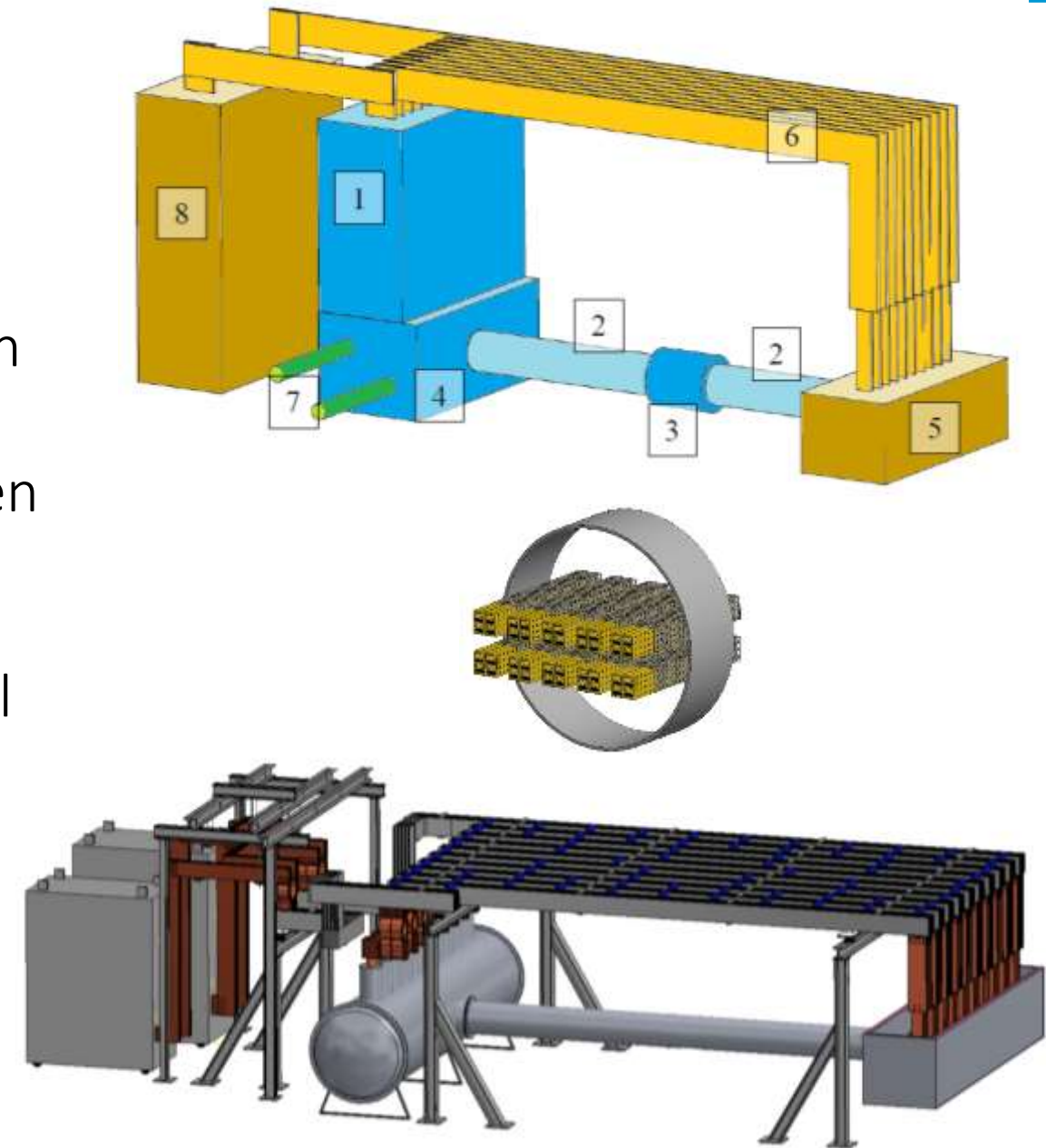


Assoziiert, ohne Förderanteil:



DEMO 200 challenges

- 200 kA current leads (1)
- Interface (4) between current lead (1) and bus bar (2) with pressure tight feed through
- Short piece of bus bar (2) and coupling (3) with soldered face to face multilink between SC stacks
- Innovative cooling system (7) without any moving part in cold areas of LN2 with equal temperature distribution to SC
- Stratification of LN2 from 70 K to 77 K





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Linkedin: www.linkedin.com/company/12619472

Youtube: www.youtube.com/channel/UCBrpgCU6wa_-1J8d1C-Qj5A/videos

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