KRUCH
RAILWAY INNOVATIONS

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RAILWAY INNOVATIONS

This is me

- **Jan Röhl**
- 1977
- 3 kids
- 1 wife

- 1 Mission:

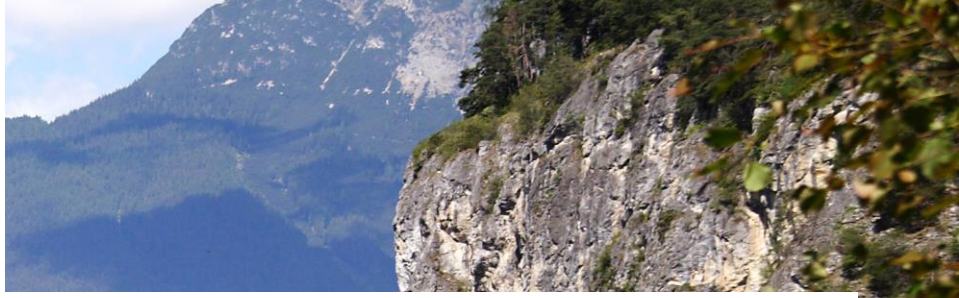
"Empower customers to cut energy consumption of public transport and buildings by at least 20% while raising performance & comfort!"

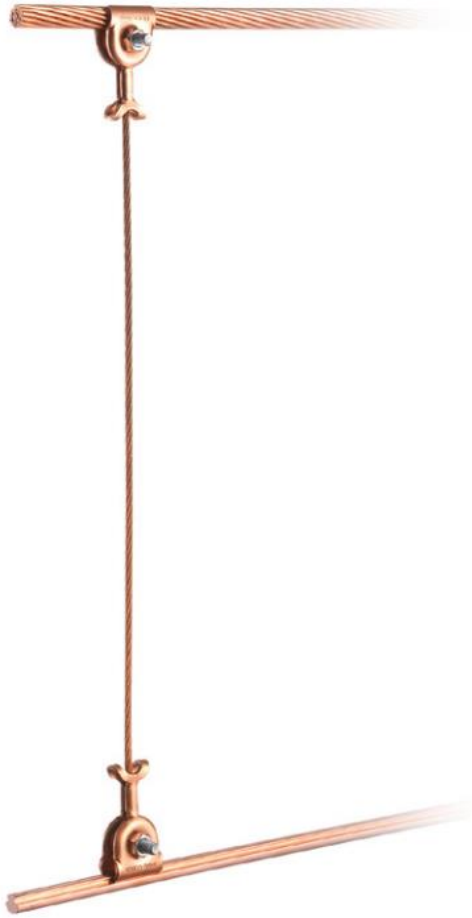
This is KRUCH

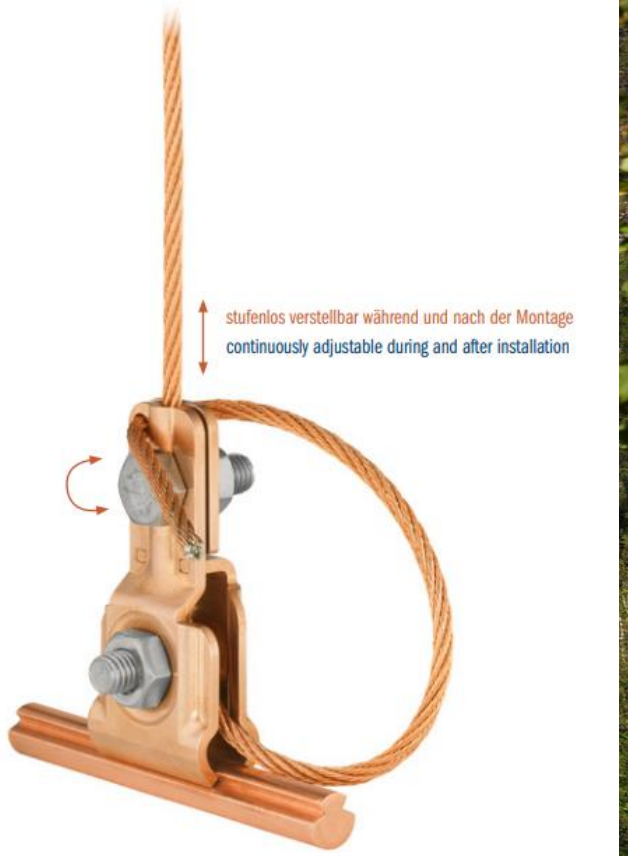
- Since **1869** // >150 years experience
- Family owned: **reliable + passionate + straight**
- 30 employees // turnover: >3 Mio. €
- R&D // Testing // Production // SW-Dev.
- Specialized: **ELECTRIFICATION-COMPONENTS for transport networks** // **DIGITAL SOLUTIONS**
- Based in Vienna & Barcelona // worldwide Export

"We create and supply smart Cutting Edge Technology to
- reduce material lifecycle costs
- energy consumption
of electric railways on a global scale"

Kruch OCL Material

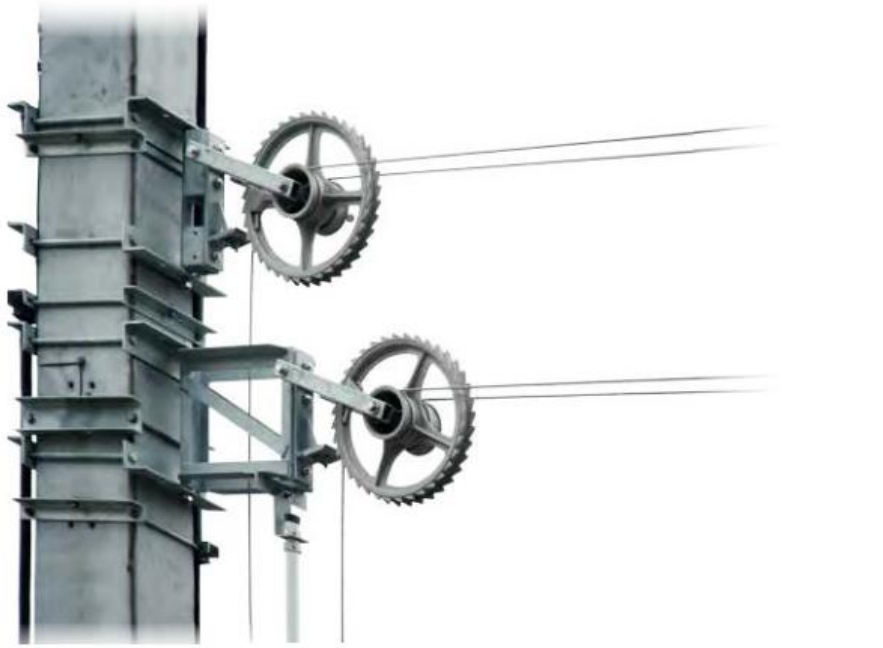


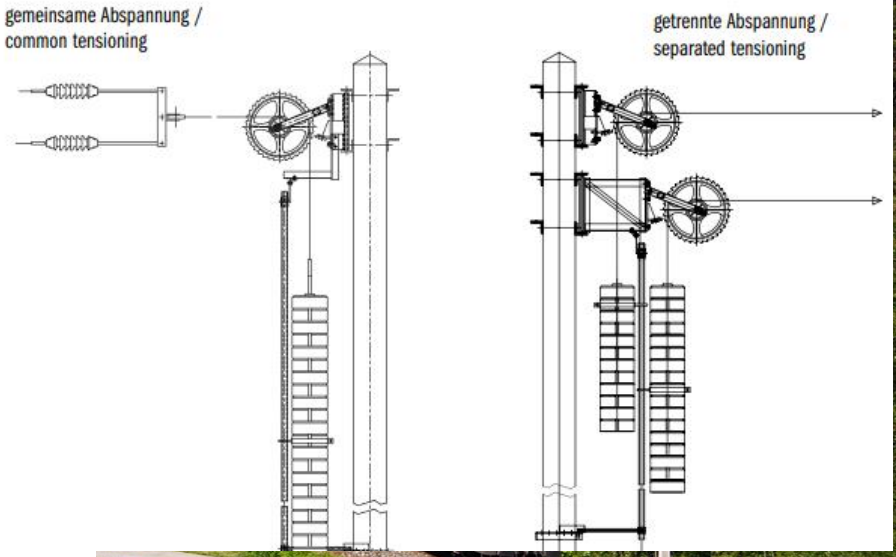




LCC . OPTIMIZED . HIGH-SPEED . LONG-LIFE

Kruch OCL Material





LCC . OPTIMIZED . HIGH-SPEED . LONG-LIFE

the digital KRUCH world

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cocreated with our customers

- **EFS Dashboard – Kruch Energy Navigator**
- FLEET Dashboard – Kruch Fleet Navigator
- TROLLEY Dashboard – Kruch Trolleybus Navigator
- CAT Dashboard – Kruch Catenary Navigator
- SUB Dashboard – Kruch Substation Navigator
- ECO Dashboard – Kruch Eco-Drive Navigator
- FACILITY Dashboard – Kruch HVAC Navigator

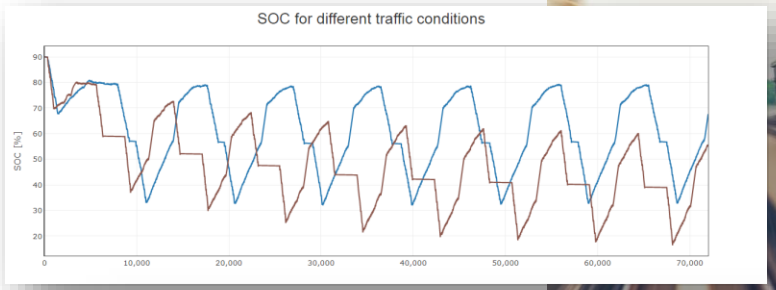
~20% potential in savings (energy, LCC)

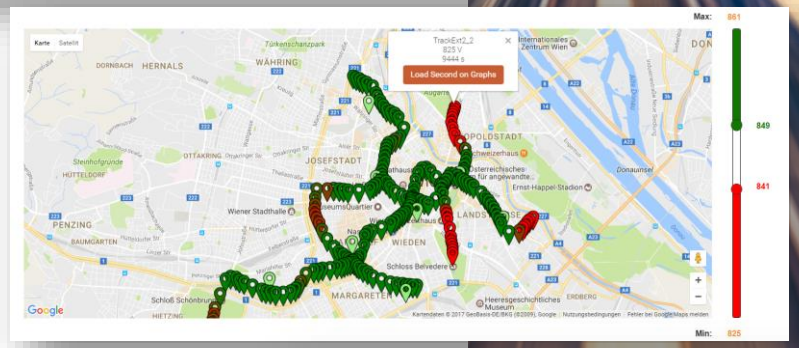
without reducing performance or comfort

by using latest technologies (BIG DATA, AI, real-time-control)

EFS-Dashboard
Kruch Energy Navigator

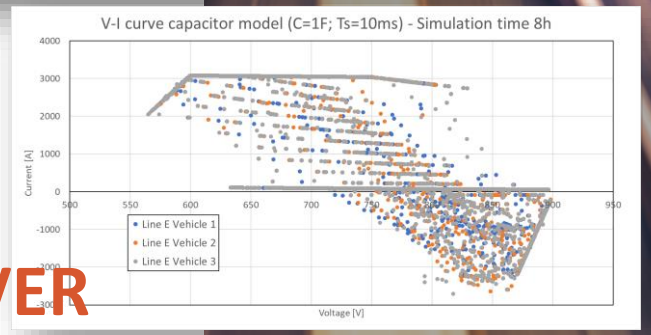
- every current
- on each meter
- in every second





„most complex simulations - playfully easy“

- electrical limits // timetable feasibility // n-1 situation
- SOC // in-motion-charging // extra charging points
- substation overloads // voltage on contact wire // short-circuits
- electromagnetic fields // thermal cable limits // middle voltage network



SIMULATE . YOURSELF . WHATEVER . WHENEVER

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FLEET-Dashboard
Kruch Fleet Navigator

- from each vehicle
- GPS-position, condition (failure codes), activity, temperatures, voltage, …
- in every second

„your fleet on your screen“

- preventive maintenance // immediate action
- analyze accumulation of events
- continuous monitoring of fleet and network
- improvement & optimization of parameters

KNOW . EVERYTHING . ACT . PREVENTIVE

Trolley-Dashboard

Kruch Trolley Checkpoint

- for every bus
- 3D-laser scan
- contact force check

“automatic DAILY CHECK of current collectors”

- Minimum use of carbon current collectors
  - replacement in just the right moment
- tremendous reduction in labor
- less wear on contact line // indirect monitoring

BAD . AWAY . GOOD . STAY

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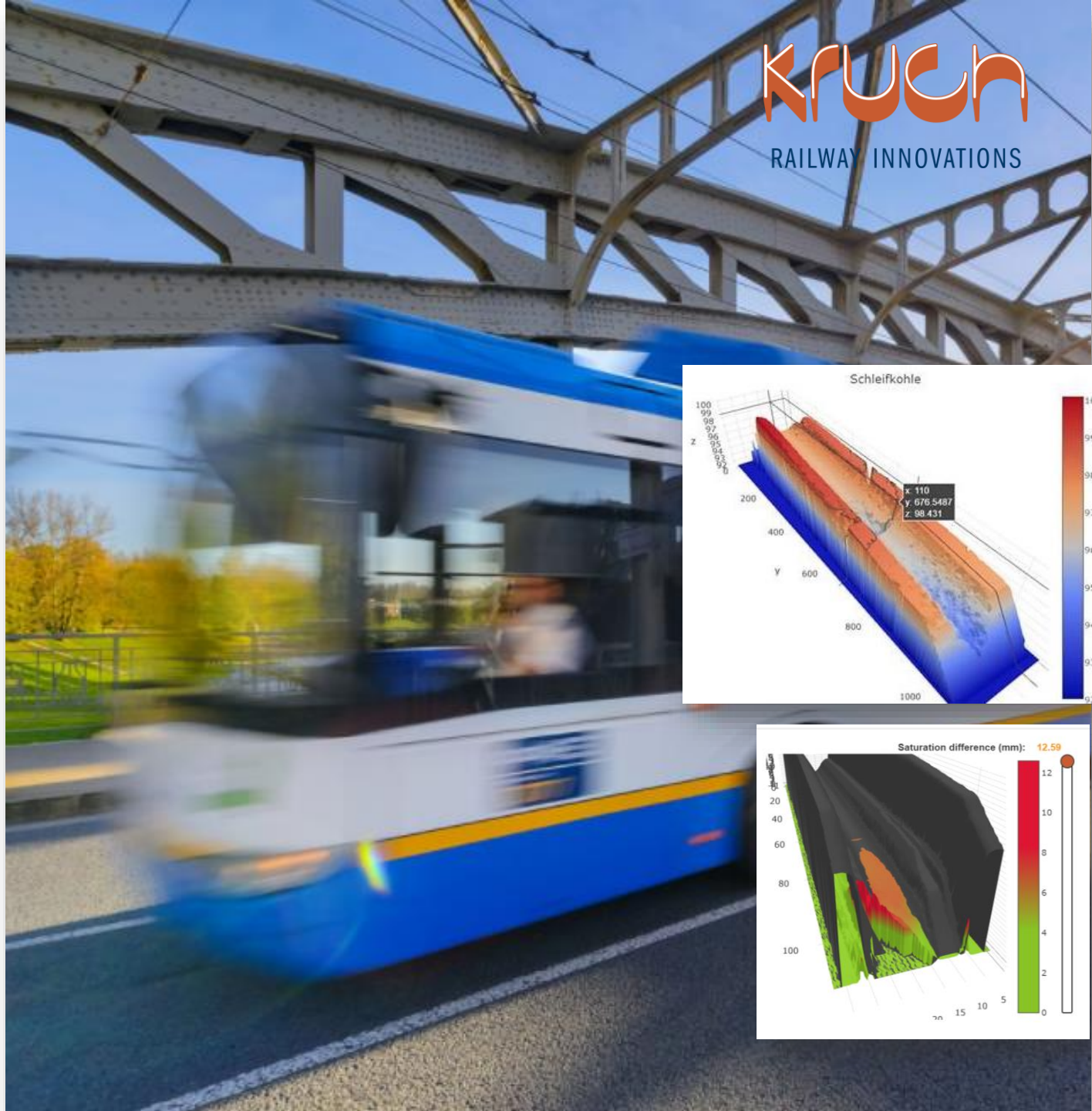
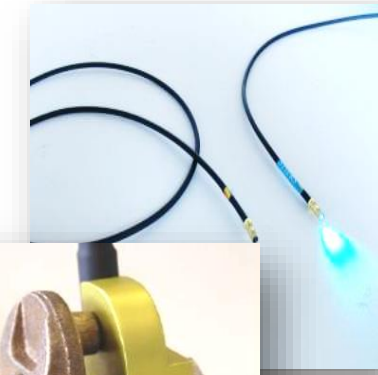
RAILWAY INNOVATIONS

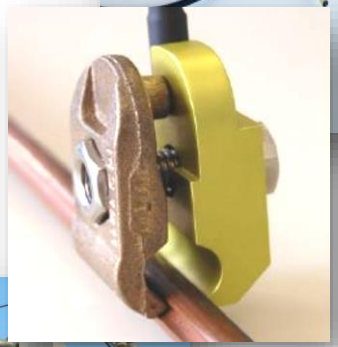


RAILWAY INNOVATIONS

CAT-Dashboard
Kruch Catenary Navigator

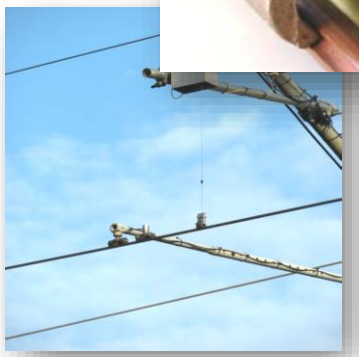
- cw-uplift-sensor
- cw-temperatur sensor
- …more in development…





“your sensors on the contact line”

- detect failures in contact line in real time
- detect failures of pantographs
- detect ice, fallen trees, …
- emergency team NOW



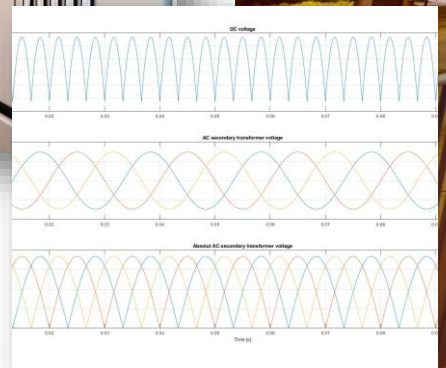
DETECT . REAL TIME . ACT . IMMEDIATELY

SUB-Dashboard
Kruch Substation Navigator

- U / I
- each transfomer // feeding line
- in every second

“all substations at a glance”

- remote condition monitoring
- immediate / preventive action
- Voltage monitoring of contact line



LESS . DOWN . MORE . ON

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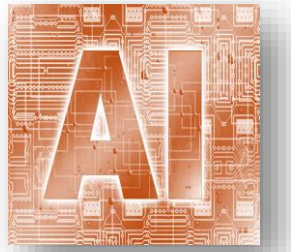
Eco Surfer

(in development)

- vehicle data & position
- contact line voltage
- recovered energy

vehicle sensors



artificial intelligence

dynamic driven information

“surfing on energy waves”

- use braking energy for traction
- no energy burnt on braking resistors
- => big energy savings

SAFE . ENERGY . CO2 . WORLD

FACILITY-Dashboard
Kruch HVAC Navigator

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„reduction of HVAC energy consumption 15-35%"

SAVE . ENERGY . RAISE . COMFORT

enerbrain®

Digital solutions – with effect

• simulate your network anytime	=> Kruch EFS Energy Navigator
• detect and analyse fleet behaviour	=> Kruch Fleet Navigator
• optimal change of current collector	=> Kruch Trolleybus Navigator
• repair catenary immediately & preventive	=> Kruch Catenary Navigator
• improve uptime + line voltage	=> Kruch Substation Navigator
• intelligent use of braking energy	=> Kruch ECO SURFER
• raise comfort in your buildings + safe energy	=> Kruch HVAC Navigator

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KRUCH's digital solutions
without . YOU . effect . ZERO

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with . YOU . things . HAPPEN

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thank you