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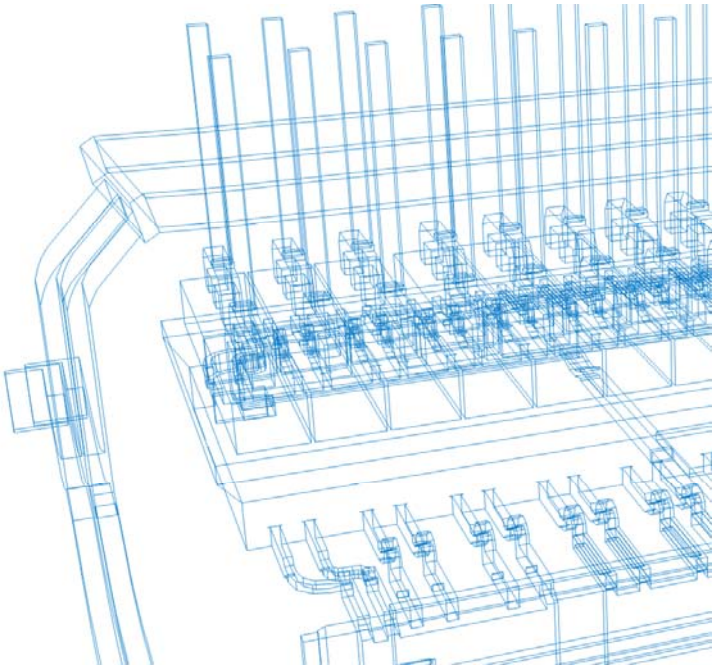
Your technology next step



KAN-NAK S.A. is a company dedicated to the optimization of smelters with a strong intent in current increase projects using the state of the art mathematical modeling tools.

Based in Switzerland, in a region that has long tradition in the aluminum industry, KAN-NAK S.A. is composed of former Alcan/Alusuisse people, with more than 30 years
of experience in the field.

Services

The main services we provide include:
- smelter upgrade (current increase projects)
- detail engineering solutions
- technical assistance
- feasibility study
- measurement campaigns
- cooling techniques
- casting, mold filling and injection
- extrusion

Experience and modeling

To bring a project to successful completion, we'll use both our thorough experience in the aluminum field, proven modeling tools and a long engineering experience.

Our projects are supported by an extensive use of the best modeling tools. Available simulations cover:
- magnetohydrodynamic state and cell stability analysis
- thermal state and energy balance
- mechanical shell and lining behaviour
- potroom ventilation

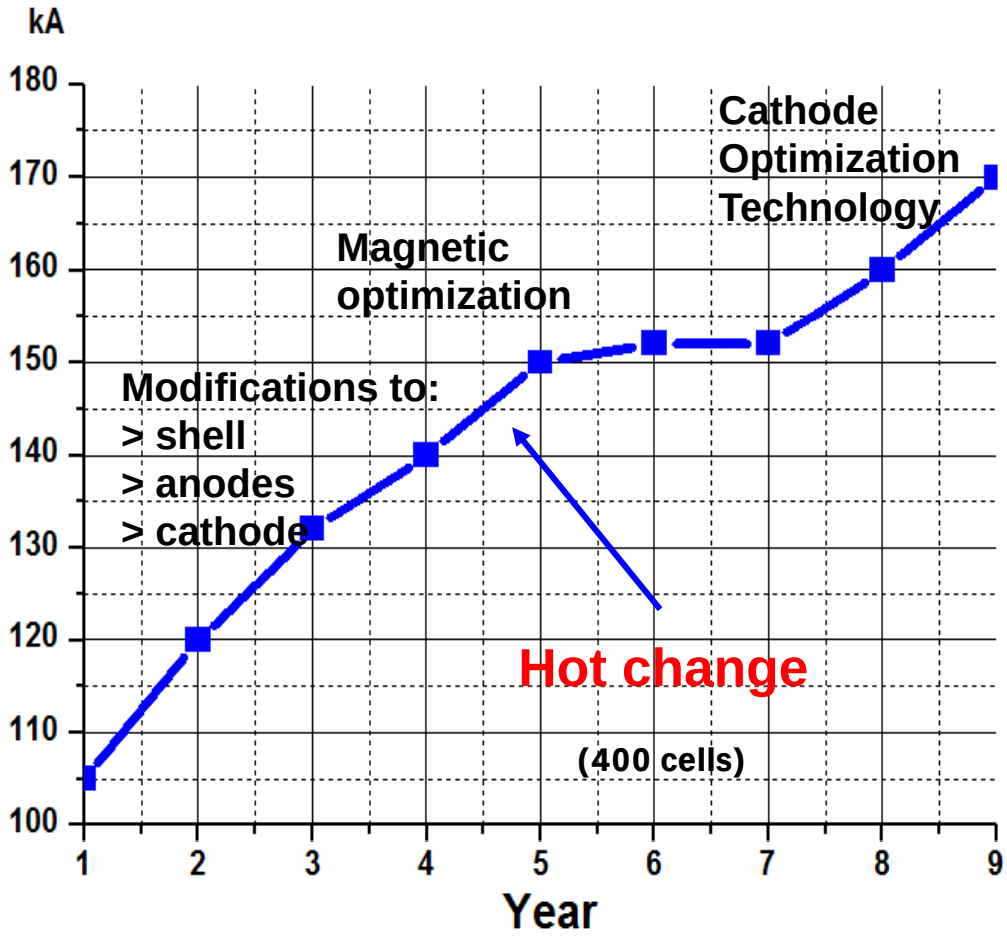
Further topics include signal analysis, gas emissions analysis, cell design improvement, baking furnaces optimization, materials know-how and consulting.

Measurements

With measurement campaigns, we check both the current state of cells and their optimized state. The measurement we are able to perform include current distributions, voltage breakdown, shell temperature, heat fluxes, bath and liquidus temperature, ledge profile, magnetic field in the liquid metal, metal upheaval and cell stability.

Example of amperage increase project

KAN-NAK S.A. has gained experience in maximizing the shareholder value by finding the fastest and most economical way of implementing current increase projects.



Specific know-how:

- Busbars can be modified while all cells are under production.
- Cells can be taken in/out of operation without any change on the line current.
- Group of cells can be restarted with 20%-50% higher current by the use of a booster rectifier and temporary busbars.

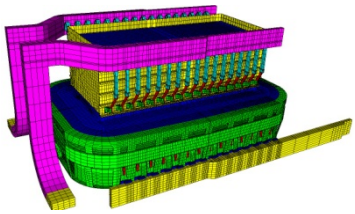
We realized projects all over the world:
Brazil, England, Germany, Iceland, Norway, The Netherlands, Quebec, Russia, Scotland, South-Africa, Switzerland, USA,…

As KAN-NAK takes full advantage of the existing assets, most projects have a payback time of less than 12 months.

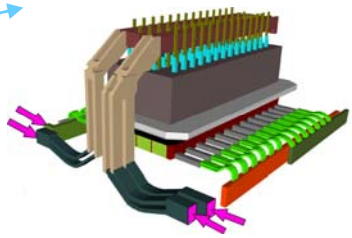
Proven capabilities

KAN-NAK S.A. employees have a long experience in the aluminum industry and achieved many successful amperage increase projects. Many type of technologies have been analyzed ranging from 50 kA to 500 kA being side by side or end to end, pre-baked or Soederberg technology.

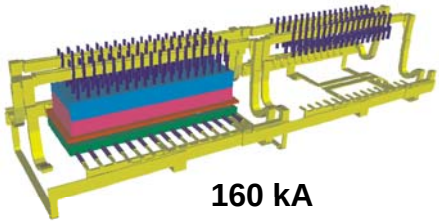
Topologies of analyzed technologies:



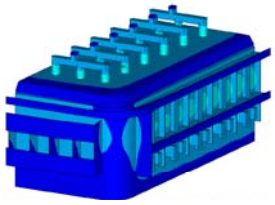
60 kA



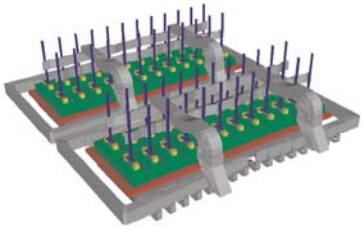
120 kA



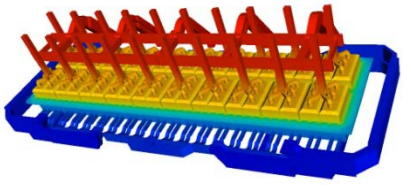
160 kA



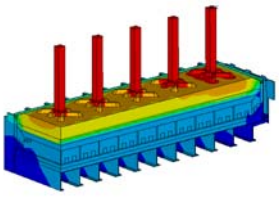
170 kA

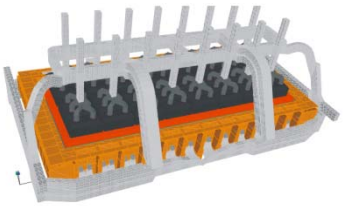


180 kA



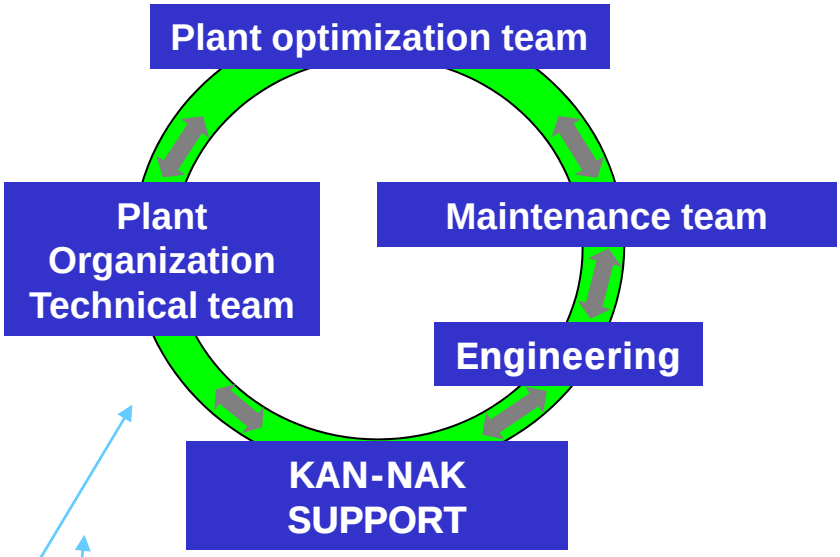
400 kA





200 kA

KAN-NAK will help your organization to do the right steps



- **Standard current increase:**
  1) Increase in cell heat
  2) External current loop
  3) **Higher specific energy**
- **KAN-NAK current increase:**
  1) Constant shell heat production
  2) No external current loop
  3) **Lower specific energy**

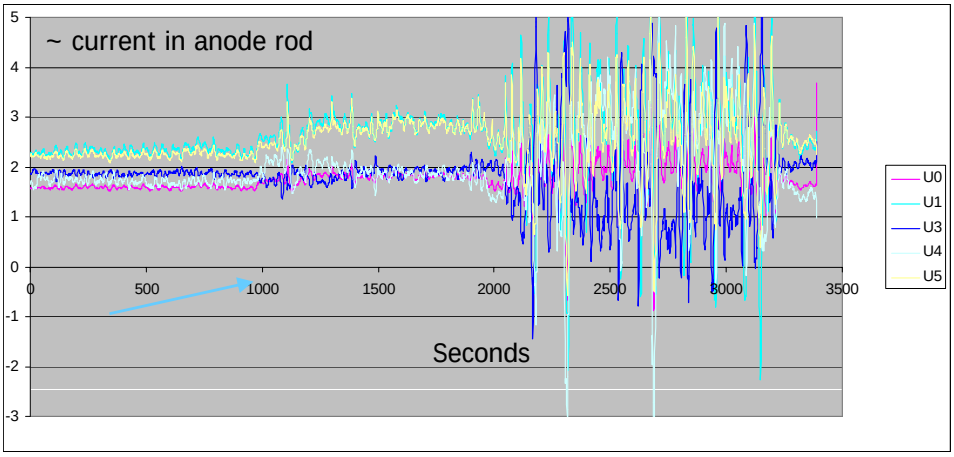
	STANDARD		KAN-NAK	
Cell parameters	**Before**	**After**	**Before**	**After**
Current (kA)	330	396	330	396
Specific energy (kWh/kgAl)	13.0	13.4	13.0	12.7
Efficiency (%)	96	96	96	96
Cell production (kg/day)	2552	3062	2552	3062
Energy (kWh/day)	33171	41030	33171	38966
Cell voltage (V)	4.19	4.32	4.19	4.10
Cell heat loss (kW)	701	892	701	806

Result	**STANDARD**	**KAN-NAK**
Increase in production (kg)	510	510
Increase in energy (kWh/day)	7859	5795
Specific energy for additional metal (kWh/kgAl)	15.4	11.4

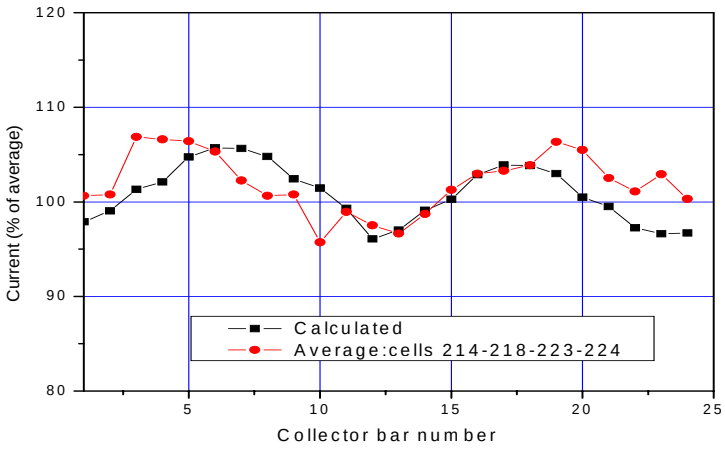
KAN-NAK

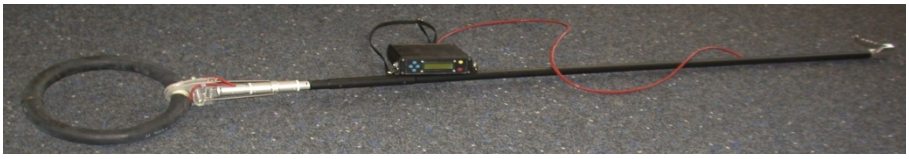
KAN-NAK measurements

Cell stability



Collector bars current distribution





- **Cell stability**
- **Anodes and collector bars current distribution**
- **Voltage drop (cathode and external)**
- **Shell temperature distribution**
- **Bath temperature (± 1 °C)**
- **Bath liquidus temperature (± 1 °C)**
- **Ledge profile**
- **Magnetic field (inside liquid metal)**
- **Metal surface contour**

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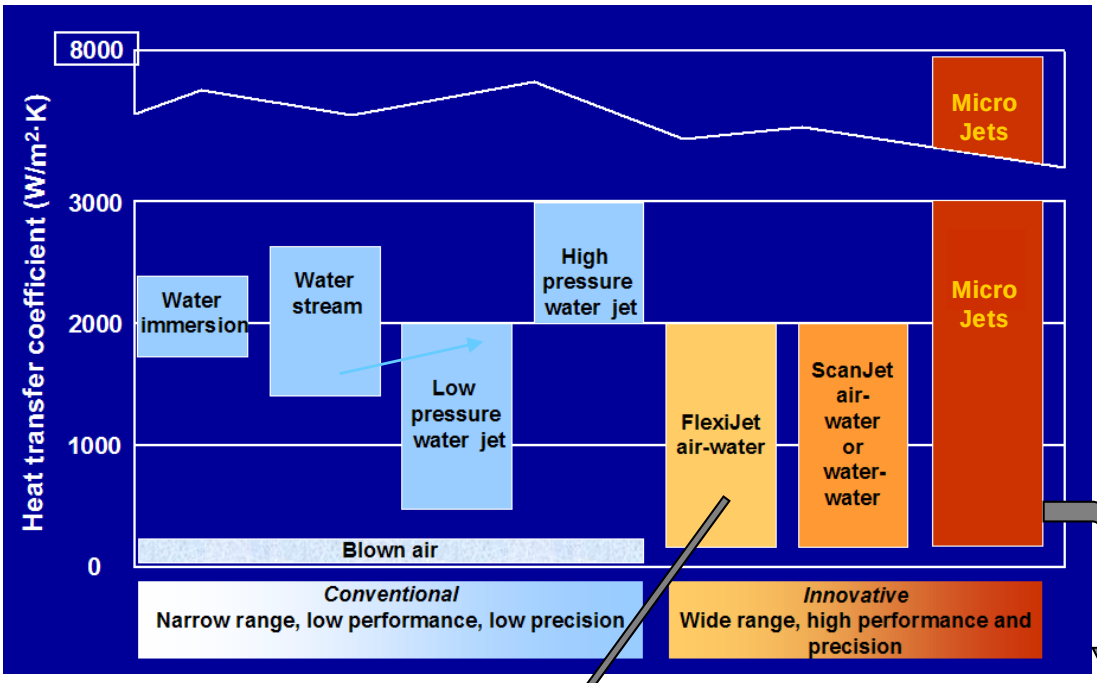
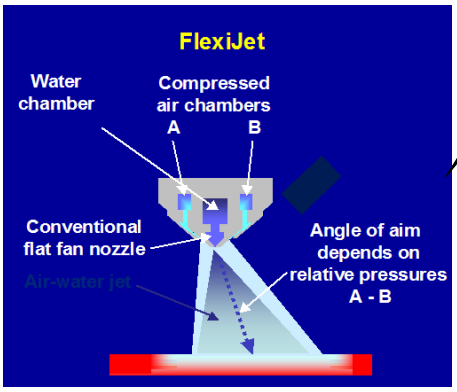
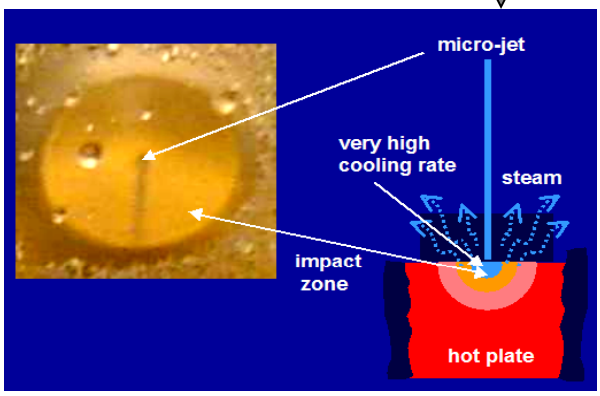
Cooling technology

Many different cooling systems were developed to satisfy a wide range of heat extraction ...

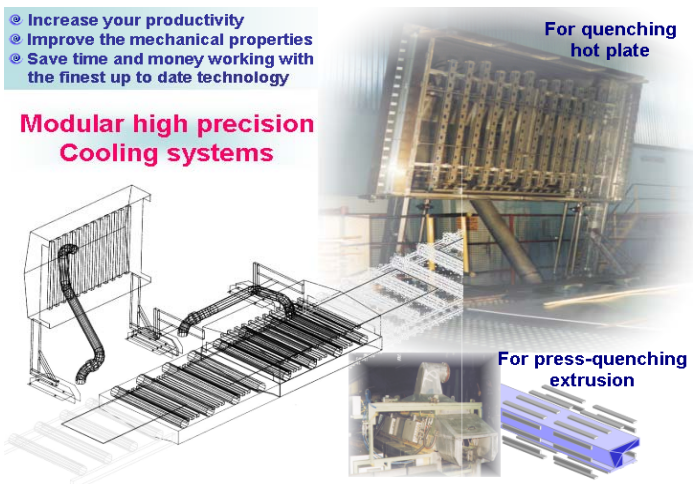






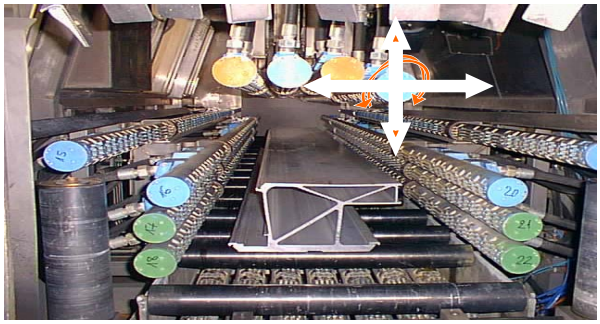
- Increase your productivity
- Improve the mechanical properties
- Save time and money working with the finest up to date technology

Modular high precision Cooling systems

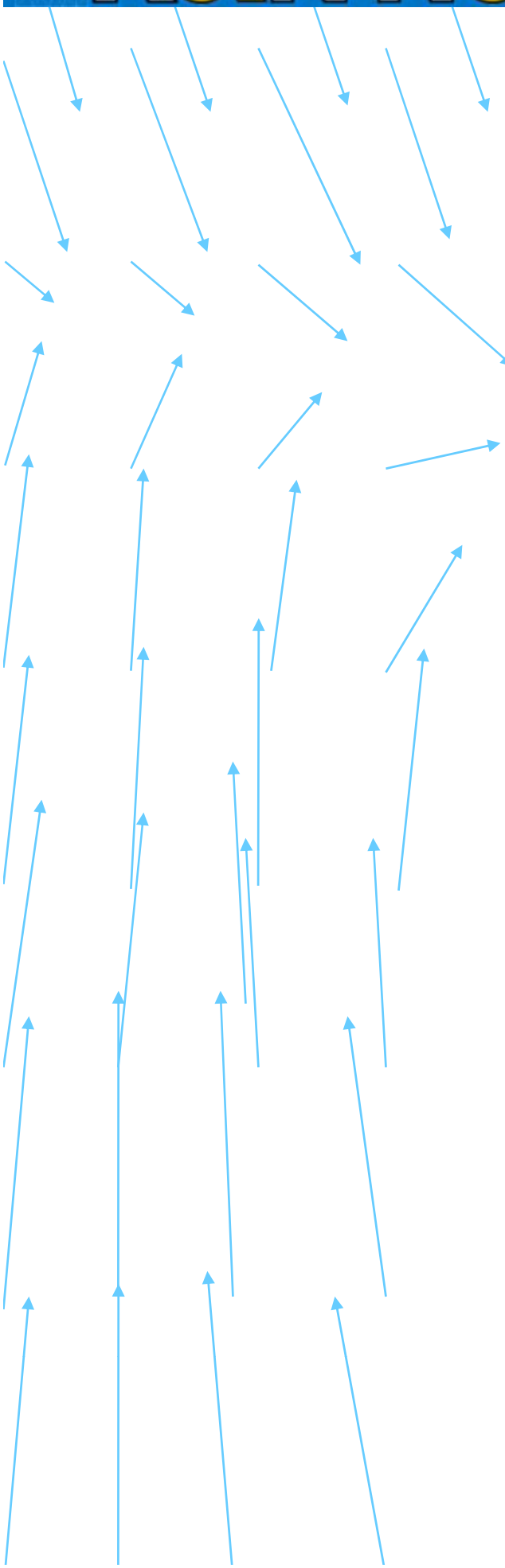


including a new patented “Micro-Jet” system :

- very high heat transfer rate
- high efficiency
- much smaller volume per unit power
- low installed cost for any given power
- tighter control of heat exchange conditions
- improved safety
- new approach to process plant design
- extremely small design is feasible



In close collaboration with NOVALTEC Sarl / www.novaltec.ch



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