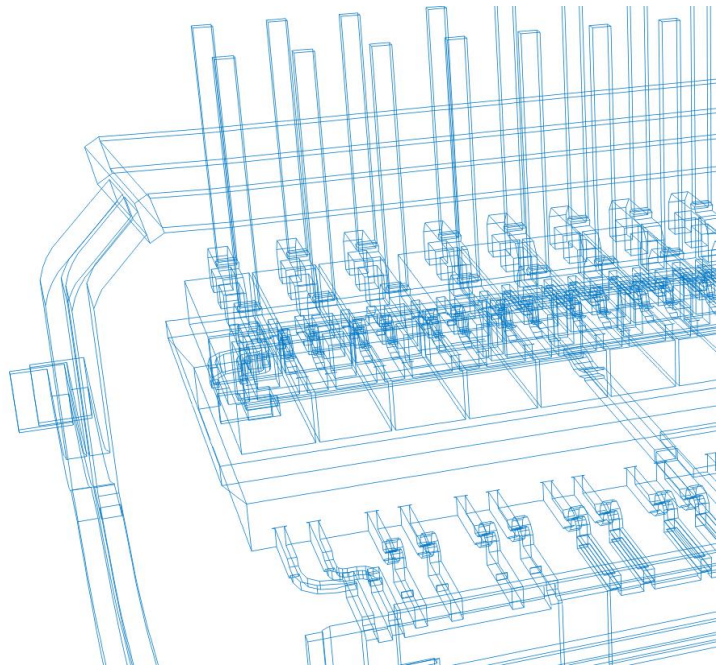


**Your technology  
next step**



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 and proven know-how.

Based in Switzerland, in a region that has long tradition in the aluminum industry, KAN-NAK S.A. was founded in 2003 by former Alcan / Alusuisse managers having more than 30 years of experience in the field.

## ***Services***

KAN-NAK services include:

- smelter upgrade (current increase projects)
- automatic short-circuit systems
- detail engineering
- technical assistance
- audit, feasibility study
- measurement campaigns
- training
- cooling techniques

## ***Experience and modeling***

To bring a project to successful completion, KAN-NAK uses thorough experience in the aluminum field, proven modeling tools and a long engineering experience.

Projects are supported by an extensive use of the best modeling tools. Available simulations cover:

- magneto-hydrodynamic state and cell stability analysis
- thermal state and energy balance
- mechanical shell and lining behavior
- potroom ventilation

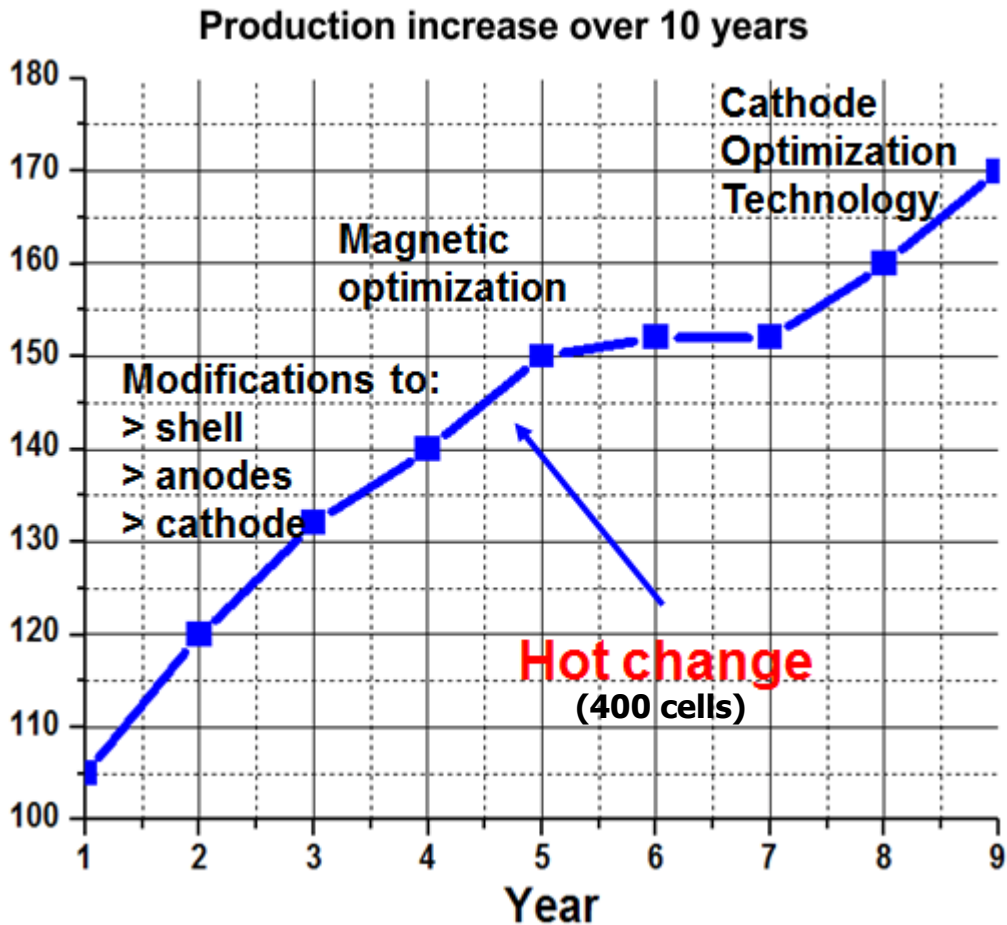
Further topics include signal analysis, gas emissions analysis, cell design improvement, baking furnaces optimization, materials know-how and consulting.

## ***Measurements***

With measurement campaigns, KAN-NAK checks both the current state of cells and their optimized state. Measurements performed 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 Ltd. 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
- ECOCONTACT can be used instead of welding busbars

KAN-NAK has realized projects all over the world:

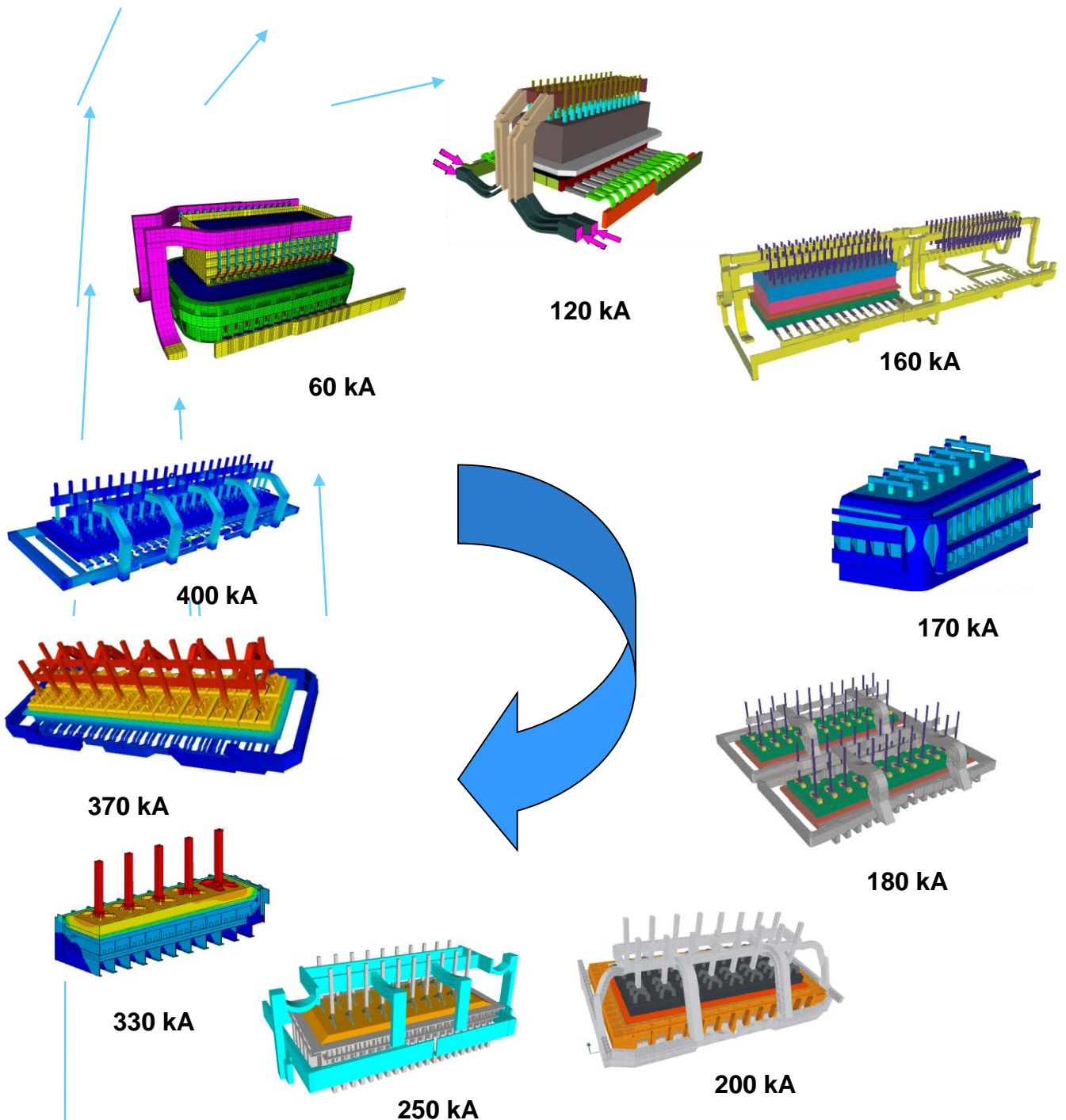
Brazil, England, Germany, Iceland, Indonasia, Norway, The Netherlands, Quebec, Russia, Scotland, South-Africa, Switzerland, USA,...

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

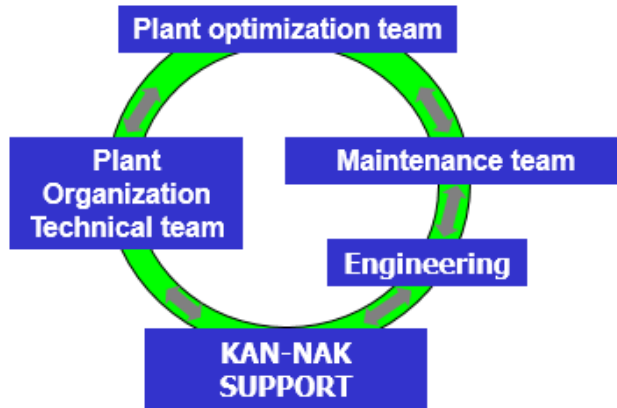
## ***Proven capabilities***

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

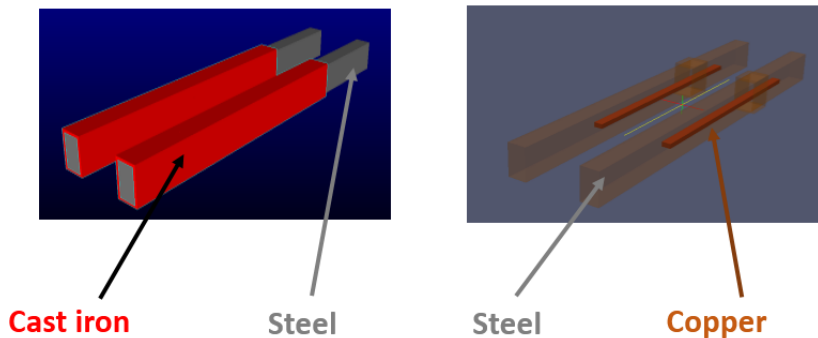
Examples of analyzed technologies:



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



The use of copper inserts in the collector bars when dimensioned correctly and combined with an improved thermal insulation of the cell has proven to allow energy consumption reduction of more than 1 kWh/kg. At the same time the current efficiency and current can be improved.



Busbars optimization can be implemented fast as the lining is not affected and can also lead to substantial benefits.

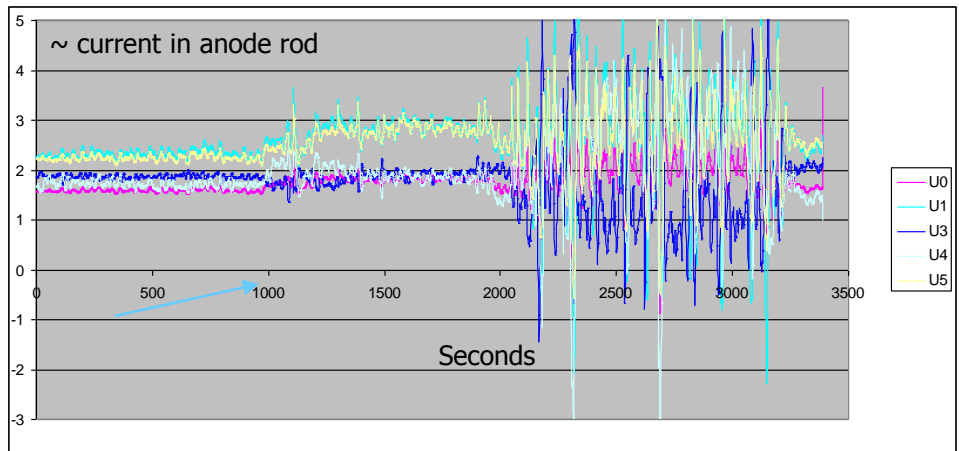
Cell parameters	STANDARD		KAN-NAK	
	Before	After	Before	After
Current (kA)	330	396	330	396
Specific energy (kWh/kgAl)	13.0	13.4	13.0	12.7
Efficiency (%)	96	96	96	96
Cell production (kg/day)	2552	3062	2552	3062
Energy (kWh/day)	33171	41030	33171	38966
Cell voltage (V)	4.19	4.32	4.19	4.10
Cell heat loss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

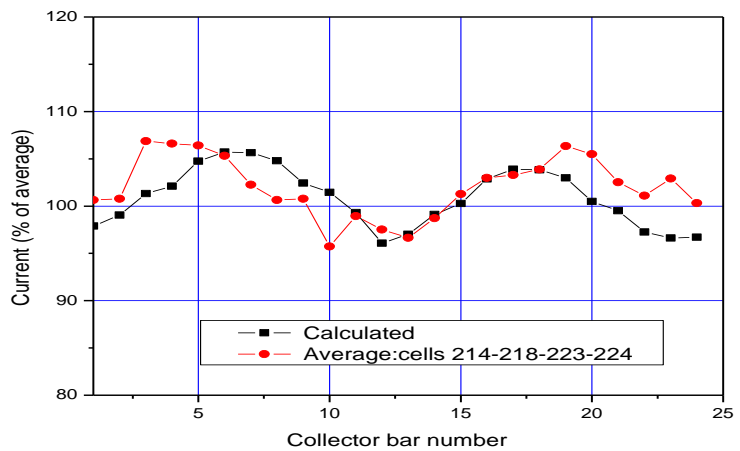
# KAN-NAK

## 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 ( $\pm 1$  °C)
- ▶ Bath liquidus temperature ( $\pm 1$  °C)
- ▶ Ledge profile
- ▶ Magnetic field (inside liquid metal)
- ▶ Metal surface contour

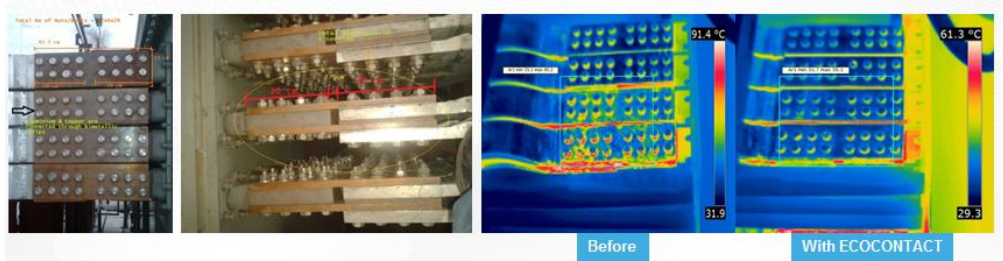
***KAN-NAK is the world representative for ECOCONTACT in smelters  
Your solution to suppress contact over-voltages***



Online implementation of ECOCONTACT.  
Less than 30 minutes operation.  
Used for implementing additional busbars for operating cells.  
No need for welding.



ECOCONTACT on rectifier AC side.  
2-3 MWh/year per busbar saved.  
No critical temperature left.



## **Disconnecter jumper switch**

Aluminium electrolysis circuit process  
Maximum current - 600 kA/min  
- 900 kA/min  
Closing duration < 100 ms  
Pneumatic drive  
AMC-ETEC Patented

# KAN-NAK



**KAN-NAK S.A.**  
**Route de Sion 35**  
**CH-1960 Sierre**  
**Switzerland**  
Tel. +41 27 322 79 41  
info@kannak.ch  
www.kannak.ch