Is there a need for PhD-candidates in the traditional, Norwegian process industry?

Hans Erik Vatne, Head of Technology
NTNU PhD conference, 2017-03-30
This is Hydro
111 years of industrial and sustainable development

Hydro has led the industrialization of Norway for more than a century

Turning science and natural resources into products, contributing to viable societies

A world-leading aluminium company

Fertilizer, aluminium, magnesium, oil & gas, polymers, fish farming, pharmacy, investments...
Does industry need PhD candidates?
Step-change for a mature smelter technology

Karmøy Technology Pilot – proprietary electrolysis technology

Source: International Aluminium Institute, Hydro analysis
Smelter 4.0 – the smelter of the future

- Autonomous cells
- Connected operator & maintenance
- Connected plants
- Automated cranes
- Automated transport
Metallurgical expertise develops new products and markets

High Speed Alloys

Long Life Alloys

Mg-Si prec.

Dispersoids

Fe-rich particles

Microstructure

Bending behaviour

Eutectic morphology

«Aluminium was the ideal choice, providing thinness, lightness and nice finishing options»

Dan Riccio, Senior Vice President of Hardware Engineering, Apple
Aluminium substitutes steel in automotive due to weight, sustainability and good properties.

Combining advanced electron microscopy and modelling capabilities gives competitive edge.

**Audi**

**Daimler**

0% pre-strain  2% pre-strain  5% pre-strain  10% pre-strain
The process industry participates in the world championship every day - and we need to win the technology race.

Our industry challenge
Global competition and over-capacity

Energy efficiency and emissions
Prerequisite for profitability and sustainability

Innovation drives margins and demand
Product development based on competence and innovation power
What does reality look like?
Primary Metal Technology (smelter technology organisation)
Wide span in competence background and many PhD candidates

76% university graduates
(Ph.D., M.Sc. and Engineers)

Wide technical background
(Ph.D., M.Sc. and Engineers)

140 employees - 13 nationalities
Did you know …

Hydro’s CEO is Dr. Ing. from NTNU

Technologists in industry

• Background: PhD inorganic chemistry, post doc
• Career:
  - R&D, operations/management, CEO
  - Chairman BoD NTNU, BoD positions

Hydro in general

• 13,000 employees, close to 100 PhDs
• My PhD colleagues from metallurgy @ NTNU 90-ies:
  - Hydro: R&D og Prof. II @ NTNU
  - Hydro: process engineers, management
  - other material industry
  - SINTEF/NTNU
Competence needs in industry

• High internal technological competence required
  − Optimise production processes (productivity/emissions)
  − Product development

• We need to win the technology race to survive the global competition
  − Productivity growth primarily due to improved technology
  − We will need even more specialists and experts in an increasingly complex and technology-driven world

• PhD positive independent of career path
  − Proof of quality and determination/drive
  − Competence – we need specialists
  − Systematics, structure, ability to think in abstract terms and analyse and understand complex challenges