Deployment of OpEx strategy in a mature company
- Lessons learnt

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Presentation content

• Introduction to Glencore Nikkelverk
• What we did
• How we did it
• Some achievements
• Highlights and learning
INTRODUCTION TO NIKKELVERK...
Where are we?

Metals and minerals
- Copper
- Zinc/Lead
- Aluminum
- Ferroalloys
- **Nickel**
- Iron Ore

Energy products
- Coal
- Oil

Agricultural products
- Grains
- Oils/Oilseeds
- Sugar
- Cotton

- 90 commodities
- Revenue $177.4 bn (2016)
- EBIT $ 3.9 bn (2016)
- 155 000 employees (incl. contractors)
- 90 offices and 150 operational plants
- More than 50 countries
Nikkelverk refinery is the final unit in Glencore`s Integrated Nickel Operations

Canadian Glencore Nickel Mine Feeds

Urban mining: Batteries, Catalysts, Scrap Metals, Residues

Sudbury Smelter Canada

Third party Intermediates
- Ni matte
- Residues

Nikkelverk Refinery Norway
General information

• Established 1910
• Kristiansand, Norway
• Western worlds largest Nickel refinery
• ISO 9001, 14001, 50001 and OHSAS 18001
• 550 Employees
• Main products: Nickel, Copper, Cobalt
Who we are-**video**
WHAT WE DID...
Need for change

Too many injuries  Stronger competition  Low nickel prices

World class Refinery  Improved safety culture  Dedicated and competent team
Example – firefighting

- Firefighting and instability
- Low degree of operator involvement
- Lack of systematic improvement work
Opportunities to improve performance, understanding the current situation

Reduce firefighting
Increase involvement
Strengthen prioritisation
Introducing Nikkelverk Business System

Nikkelverk into the future!
## Our NBS journey

<table>
<thead>
<tr>
<th>Time period</th>
<th>Activities</th>
<th>Illustrations</th>
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| 2008-2013   | **Secure our “platform”**  
• Building stronger safety culture  
• In-house competence in lean tools and methods | ![Illustrations](image1.png) |
| 2013        | **Establishing “Need for change”**  
• Management ownership to NBS  
• Union ownership to NBS | ![Illustrations](image2.png) |
| 2014        | **Pilot phase**  
• Starting NBS pilots in the Nickel department  
• NBS leadership training  
• Visual targets - Nikkelverk  
• Tracking and recognition of improvements | ![Illustrations](image3.png) |
| 2016        | **NBS roll-out**  
• Development of NBS School  
• Setting expectations for all departments and transfer of NBS ownership to line organization  
• NBS principles being applied in all departments | ![Illustrations](image4.png) |
NBS vs former BI initiatives

Nikkelverk Business System

Guiding principles
Enabling full participation in process stabilization and continuous improvement
Efficient use of proven tools and methods

Value stream mapping

IGS
ICCM
“LEAN”
A3
5S
Nikkelverk Business System

Challenging and motivating targets

Key principles (*that are mandatory to follow*)

The foundation: safety culture and our values
HOW WE DID IT...
Application of NBS for our critical processes

1. Activity
2. Connections
3. Flow
4. Continuous improvements

Basic design of the system
Developing the System
Standard method & execution

Involve to drive performance

«Living» Standards

Continuous Improvement - Involvement

Customer/Supplier Connections

Process development
Leadership Development – Practicing SOP observation in the Nickel Department
A clear structure and arenas for continuous improvement

- Hands on local process competence and experience. Day to day improvements
- Cross-discipline process competence Development of best practice
- Specialist process Competence
Introduction of Critical Process Teams

Team organization

• **Shop floor participants (always)**

• **Multi-discipline teams**

• **Supported by staff functions as needed**

• **Clear mandate, measureable targets and allocated resources**

• **Focus on improving SOP’s for the «critical processes»**
Focus on the details to get our processes under control

- Housekeeping on cell
- Anode Quality
- Ni-Concentration
- Alignment
- Cathode quality
- Flow
- pH
- Temperature

Process Stability
Improvements made by the Nickel Starting Team

BEFORE: many cathodes aligned by hand after insertion.

AFTER: Now cathodes are automatically aligned during insertion by the crane.

Better alignment is a critical factor for good current distribution and uniform thickness. Uniform thickness is critical to making a good starting plate for cathode production.

1 Million euros saved by improving critical drivers.
Clear Customer/Supplier connections

- Visual
- Clear expectations
- Direct
- Measureable
NBS – Kaizenboard

Improving is part of the job

- BUILD NEW CULTURE
Tell about the improvements

• NBS News (every week)

• Improvement of the month (every month)

• Improvement of the year (Leader- / Union meeting every year)
Step-wise improvement and NBS

Government support in energy saving program
SOME ACHIEVEMENTS
NBS is giving tangible results

NBS and safety go hand in hand

Improved working environment and well-being

Large quality improvement
Improving EHS and quality have a big impact on cost

Efficiency improvements 2008-2017E

- Increased cost
- Reduced cost

Note: Actual saving adjusted for production and price adjustments

Reported improvements
Other results...

Energy saving in Nickel tankhouse: 18 GWh/y

600-1400-2500
2015-2016-2017
Registered improvements
Run-rate value: 10 MUSD

Production record ! 92,7 kton Ni Zero harm in Nikkel tankhouse 2015/2016

Total of 50 MUSD in committed funding

NBS Academy

Agder competence Award

Quality Director Harald Eik
Designated as the year's quality leader 2016

New SOPs

Improvement of the month
Improvement of the year

05.12.2017
NBS – People development!

• Only **people** can identify and **solve problems**
• Continuous improvement and problem solving – great way to develop people
• More problem solvers = more problems solved 😊!
• Learning organization – competent and motivated people
NBS School, foundation for training

5th class now being trained

Participants from all organization levels

5 days (3+2) School sessions
HIGHLIGHTS AND KEY LEARNINGS
Key learnings - Highlights

- Securing **commitment** from union and **management** was time well spent
- **Pilots** for demonstrating NBS extremely useful
- Investing time in **sustaining new structures** was a key success factor for building improvement culture
- **NBS training** was important to build momentum
- People-**involvement, visibility** and **ownership** are key
What would we have done differently?

• Comment from Nickel tankhouse Superintendent:
  – «We should have started earlier!»

• Could have invested more time with *middle management*
  – Leadership training – leader as coach
  – NBS understanding in practice

• More *coaching* in the implementation phase

• Stronger effort earlier on cascaded *targets*
  – Increase understanding for the *need to change*
  – *Management by objective, with a regular «target resetting process»*
NBS = Cultur Change

Culture:
- Continuous Improvement
- Involvement
- Precision
- Discipline

Culture and behaviour

Understanding, motivation, mastering

Competence and involvement

Principles, methods and tools

- Do the Job
- Improve the job
- Communicate the improvements
There will be many challenges on our way to operational excellence. To succeed we must make an effort!
What does it mean to “change a culture”?

It’s like making a new path in the woods:

We have to walk it many times...

...and let the old one grow over!

(Quote from Bjarne Berg Wiik)

Thank you very much for your attention!