Hoist Performance - unlock the value

How to improve hoist Safety, Availability and Productivity

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Introduction
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- Mechanical engineer, Technical University of Rijeka, Croatia
- Post Graduate – Business School, Auckland University, New Zealand
- With the company since 2000
  - HPFP Global product Manager
  - UGM Hoisting system Application Engineer
  - Maintenance Manager Pulp & Paper mill
  - Reliability Engineer
Introduction
Peter Ylivainio <peter.ylivainio@lkab.com>

- Electrical engineer, Mälardalen university, Västerås, Sweden
- With the company since 1989
  - Maintenance engineer for hoisting in Kiruna
  - Development engineer, company wide
  - Technician, automated quality control machines
  - Electrician and hoist operator
Introduction LKAB
Peter Ylivainio <peter.ylivainio@lkab.com>

EUROPE
LKAB is the EU’s largest iron ore producer and mines around 76 percent of all iron ore in the EU

84% of LKAB’s revenue comes from pellet sales

2
LKAB is the world’s 2nd largest producer of iron ore pellets

16.3
Net sales of SEK 16.3 billion in 2016

4,200
employees approximately in total

100%
LKAB is a 100% state-owned company

1890
LKAB is one of Sweden’s oldest industrial companies and has customer relationships dating back more than a century
Introduction LKAB
Peter Ylivainio <peter.ylivainio@lkab.com>
Introduction ABB
Slobodan Vidmar <slobodan.vidmar@au.abb.com>

What (Offering)
- Power & Automation
  - Power ~ 40% of revenue
  - Automation ~ 60% of revenue

For whom (Customers)
- Utilities
  - ~35% of revenue
- Industry
  - ~45% of revenue
- Transport & Infrastructure
  - ~20% of revenue

Where (Geographies)
- Globally
  - AMEA¹ 37%
  - Americas 30%
  - Europe 33%

~ $36 bn revenue  ~100 countries  ~135,000 employees  Single “A” credit rating  HQ Zurich

¹ AMEA: Asia, Middle East, Africa
### Introduction ABB - UGM

Slobodan Vidmar <slobodan.vidmar@au.abb.com>

#### What (Offering)

- **Complete Mine Hoists**
  - Friction Hoists
    - Both Electrical and mechanical equipment, including all shaft equipment
  - Single / Double Drum Hoists

#### Where (Geographies)

- **Globally**
  - More than 30 Countries with ABB hoist IB

#### Installed Base

- **More than 600 hoisting systems**
Outline of presentation

- Business intelligence predictions for 2017 - what to expect!
- Introduction of a typical Hoisting system
- How old is the typical Hoisting system?
- Hoisting System Improvements – where to start from?
- Hoist Improvements target fields
  - Safety,
  - Equipment,
  - Process / Production,
  - Reliability,
- Summary / Discussion / Questions
Technological evolution journey
Business Intelligence predictions for 2017
Technological evolution journey
What is the main goal for all involved?

Unlocking The Value
Typical Hoisting System
Today’s high performance machines

Typical Friction Hoisting System

- Use of hoisting system
  - Material transportation
  - People transportation
  - Shaft inspections
Typical Hoisting System
How old is a typical hosting system?

- Typical design life 20-25 years
Hoisting System Improvements
Target fields - take it as a system

Safety
- Improve safety of people
- Improve safety of equipment

Equipment
- Identifies condition of the equipment
- Identifies correctness of operation
- Improves equipment performance
- Checks brake system performance

Process
- Operate closer to design constraints
- Reduce production costs and energy consumption
- Improve operational effectiveness

Reliability
- Improve production efficiency
- Increase productivity
- Identify cost reduction opportunities

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Hoisting System Improvements
Where to start from?

Technological evolution journey - "Unlocking Value"

Assess Current state of the equipment

Step 1

Step 2

Step 3

Step ...

Vision

Safety

Business needs

Available Technical solutions & relevant experience

Time line of development
Hoist System Improvements
Safety

Underground environment hazards

- Statistics on fires in UGM Sweden
- LKAB experience – analytical approach to analyze all aspects of resolution
  - Pony Drive & Gravity winding

Chart – courtesy of Mr Rickard Hanses, PhD studies
Hoist System Improvements
Safety

Safety is not negotiable!

- Knowledge of the current state of your equipment is not enough.
- Review all possible hazards which can affect safety of people & machines
- Use new technologies which can increase the safety
- Work in progress – continuous improvement!

Assessing of the current condition of your assets will help to correctly define and allocate the maintenance budget requirements
Hoist System Improvements

Equipment

Strategic planning for the future

- Long term plan to change / replace components in time to come
- Develop good CMMS which supports maintenance efforts
  - Bill of Materials
  - Procedures

Regular Hoist System assessment & testing

- Local resources
- OEM / 3rd party

Continuous improvement – owned by Customer – daily work
Hoist System Improvement

Maintenance Strategies

Maintenance strategies must change over time!

- Safety
- Reliability
- Efficiency
- Availability
- Productivity

Keep your maintenance strategies aligned with the current state of your operations!
Hoist System Improvements
Process / Production

Typical example of Energy consumption

- Reduce production costs & energy consumption
- Improve operational effectiveness
- Operate closer to the design constraints

When a system runs at optimum level then the cost of running is minimal!

AVG total consumption of 10 mines = 90.4 kWh / ton ore hoisted, Ref: 2005, Natural Resources Canada, Benchmarking the Energy Consumption of Canadian Underground Bulk Mines
Hoist System Improvements
Reliability

- Use of adequate high tech equipment makes the maintenance crews more effective & efficient
- Improve production efficiency
- The development makes high tech more affordable!
- Need for a new skills to be developed
  - Interpretation of data
  - Analysis of data
- Reliability tools will come easier to use and more accurate

Use the new technology to boost up your maintenance efficiency, therefore to keep your equipment to run at its’ optimum level!
Hoist System Improvements
Summary / Discussion / Questions

- Develop your vision regarding the technology to reflect your business needs!
- Make decisions on Retaining & Developing required skills mix!
- Treat the hoist as a system rather than individual equipment components!
- Maintenance strategies must change over time!
- Keep your maintenance strategies aligned with the current state of your operations!
- Assessing of the current condition of your assets helps to correctly define and allocate the maintenance budget requirements!
- Use the new technology to boost up your maintenance efficiency, therefore to keep your equipment running at its’ optimum level!
- When the equipment runs at the optimum level, the average production costs & energy consumption reduce!