

WE CONVEY QUALITY



PREMAS®

6th Brazilian Cement Conference CBC

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INNOVATIVE AND EFFICIENT PLANT OPTIMIZATION APPROACH

Klaus Gruene
General Manager
AUMUND PREMAS®



PROFILE

The **AUMUNDGROUP** specializes in conveying, storage and bulk handling solutions, particularly for abrasive, hot or sticky bulk materials.

Comprehensive know-how is available in the following industries:

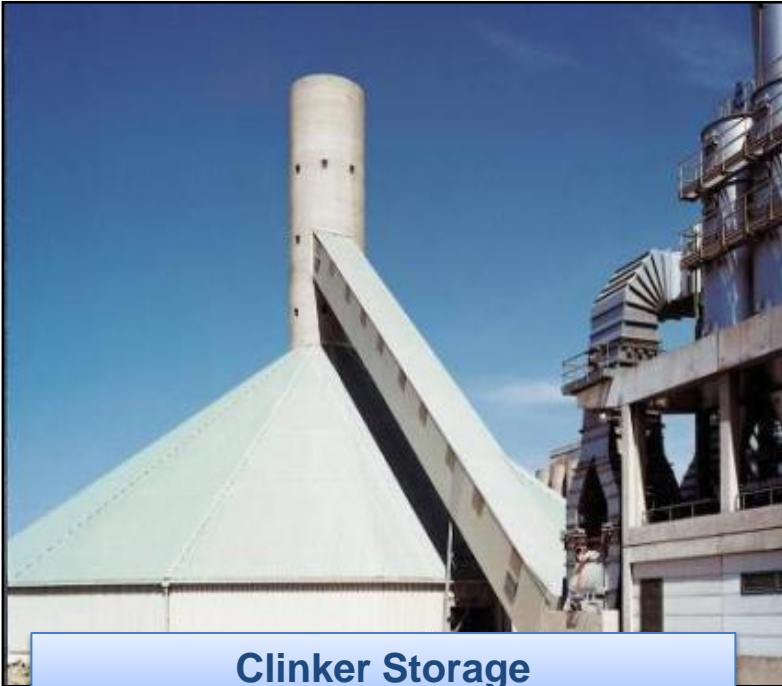
- Cement, Lime, Gypsum
- Mining, Minerals, Fertilizers
- Iron- and Steel plants, esp. alternative routes (DRI)
- Primary Aluminium Production
- Ports and Terminals
- Power Plants
- Recycling Industry / Alternative Energy / Biomass

Equipment in the Cement Industry

From the quarry to dispatch of clinker and cement



Equipment in the Cement Industry



Clinker Storage



Stacker/Reclaimers



Truck Intake




**Bucket
Elevators**



Pan Conveyors

Belt Bucket Elevators for Mission Critical Performance

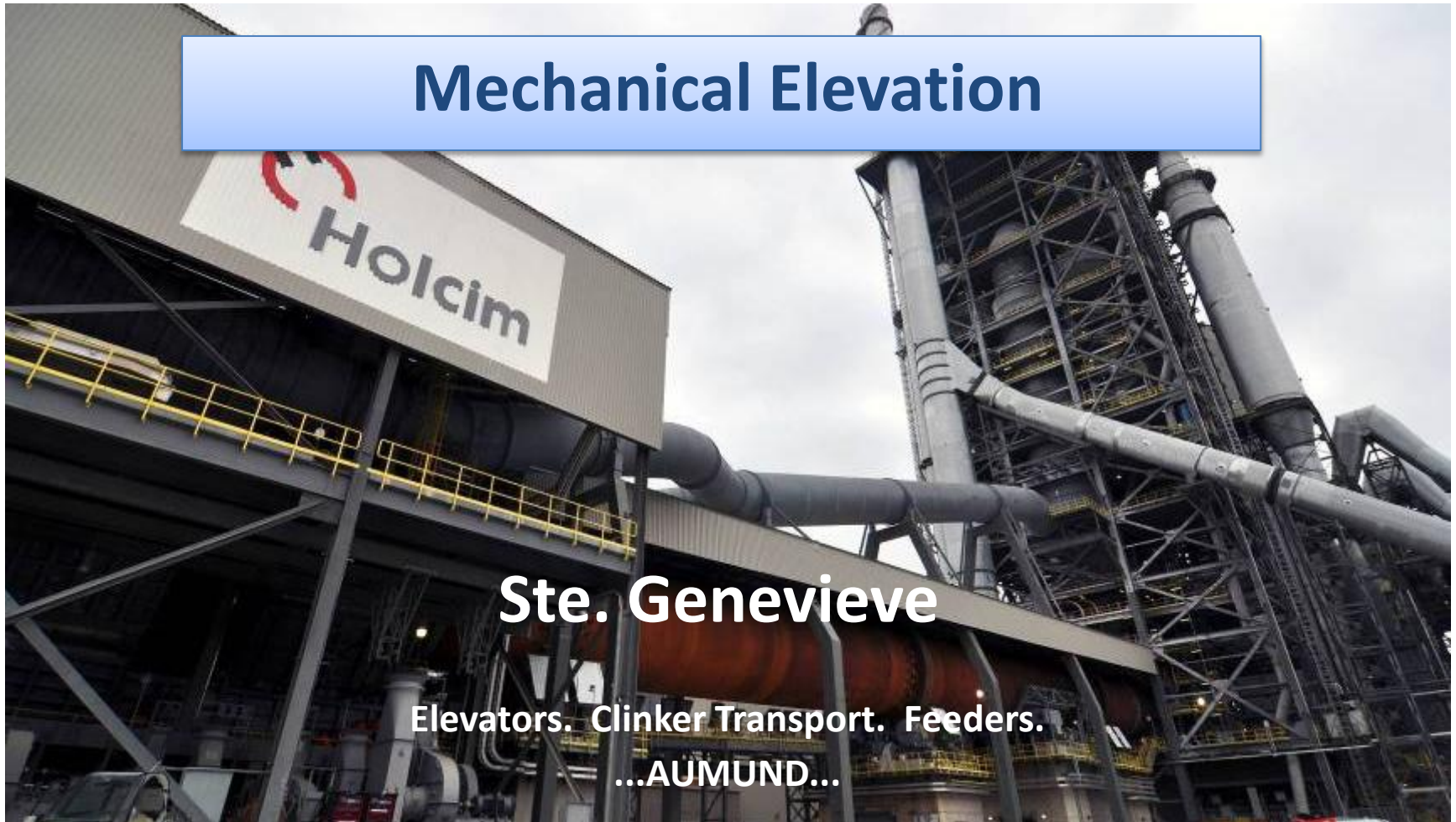
Mechanical Elevation



Cong Thanh Cement in Vietnam at 12,000 t.p.d. the largest line in Asia
...Elevators by AUMUND...

Mississippi Mega Plant – 13,000 tons per day

Mechanical Elevation



Air Lift compared to Mechanical Elevation



Raises raw meal to the pre-heater
Using simple pneumatic transfer from
the Blending silos

Raises finished cement to
silo storage and dispatch

Positives & Negatives



Benefits of Air-Lift

- Simplicity
- Easy installation
- Low capital cost

Drawbacks of Air-Lift

- High energy input
- High noise levels
- High de-dusting cost
- High ID fan load
- High carbon footprint
- High wear rate[#]
- High operating cost
- Extra machinery space

Waste of Energy & Money



Moving vast volumes of air absorbs heat and energy

Only 23% of the total energy consumed by the air-lift typically are absorbed in conveying the material, either raw meal or cement

Compared to mechanical elevation where over 90% of the installed power are used to raise the material

Secondary Benefits



Air-lifts force into the preheater section vast volumes of unwanted cold air

- Increasing the ID fan loading
- Absorbing heat
- Consuming energy

If other factors permit...
the heat energy and ID fan capacity released after conversion to mechanical elevation may be used to improve the kiln performance.

Air-Lift Silo De-Dusting



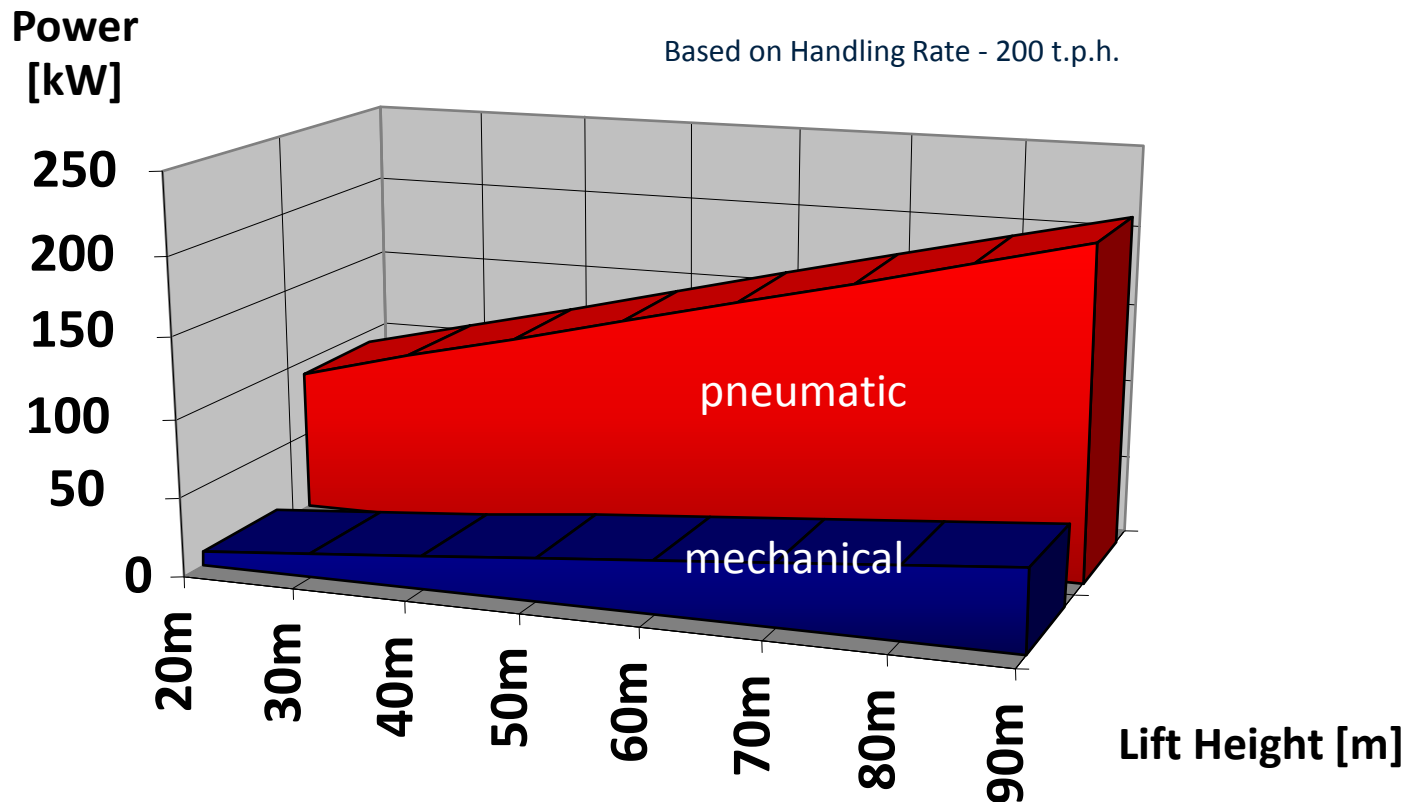
Waste of Energy
to convey the cement

Waste of Energy
to clean the exhausted air

To prevent dust escape, the silo de-dusting system must be at least equal in capacity to the incoming air flow

For silo intake the air-lift may generate 20,000 m³ of air movement into the silo

Pneumatic vs. Mechanical Elevation

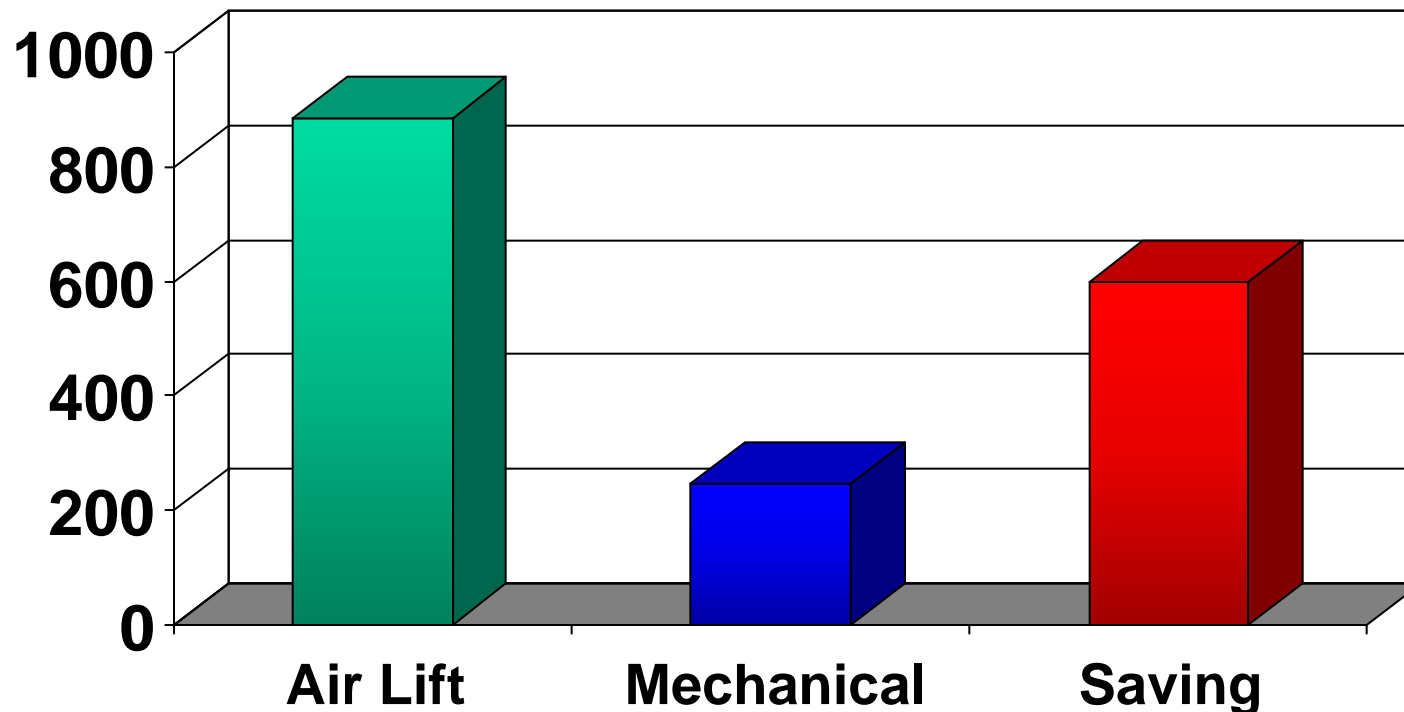


Operational and environmental savings by
huge reduction in energy consumption

Overall Comparison

Converting a typical 3,000 t.p.d. plant with air-lifts at the blending, pre-heater and finished cement silos

Energy
[kW]



Relative Costs and Return on Investment

Greenhouse Gas Generation – Carbon Dioxide

Description	CO2 Equivalent	CO2 Equivalent	Saving
Potential Carbon Credit Saving - \$ 50,000 USD per year			
CO2 Equivalence - 0.000116 tons	2,578 tons		

Potential Savings Replacing Air-Lifts with Bucket Elevators

	Air Lift	Bucket Elevator	Saving
Estimated Power Cost per kWh – \$ 0.08 USD	\$ 541,440	\$ 157,440	\$ 384,000
Estimated Retro-Fit Costs		\$ 500,000	
Estimated Retro-Fit Costs		\$ 500,000	
Estimated Retro-Fit Cost –Cement Silos		\$ 420,000	
Sub Total		\$ 1,3 m.	
Return on investment (ROI)		3.4 years	

Potential ROI – 3.4 years

Elevator Head and Silo De-Dusting



Elevator head with typical de-dusting ducting
using around 6,000 m³ per hour extraction

Easy Planning and Installation Original or Retrofit



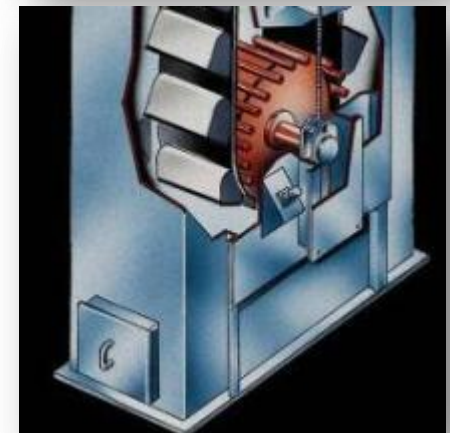
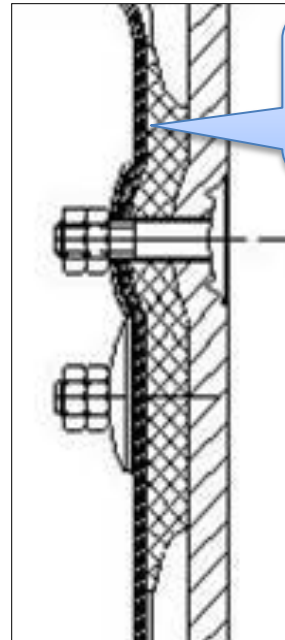
Bucket Design and Fixing

Benefits

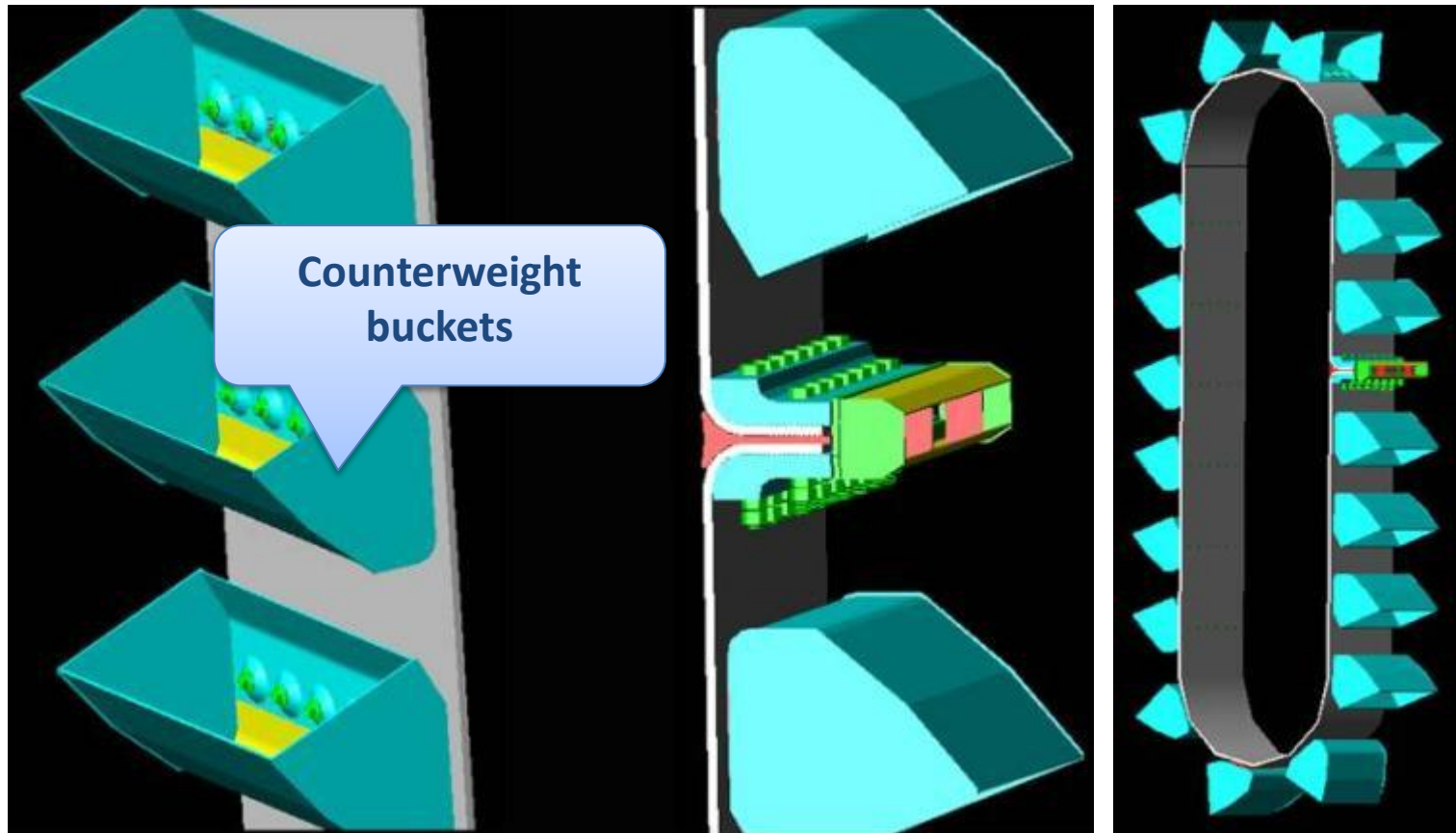
- Smaller buckets with close spacing for better filling efficiency, smooth running, and less fixing stress...
- Rubber plates prevent particles penetrating between buckets and belt...
- Easy assembly...
- Standard belt with normal steel cord pattern...



**Rubber
Plates**

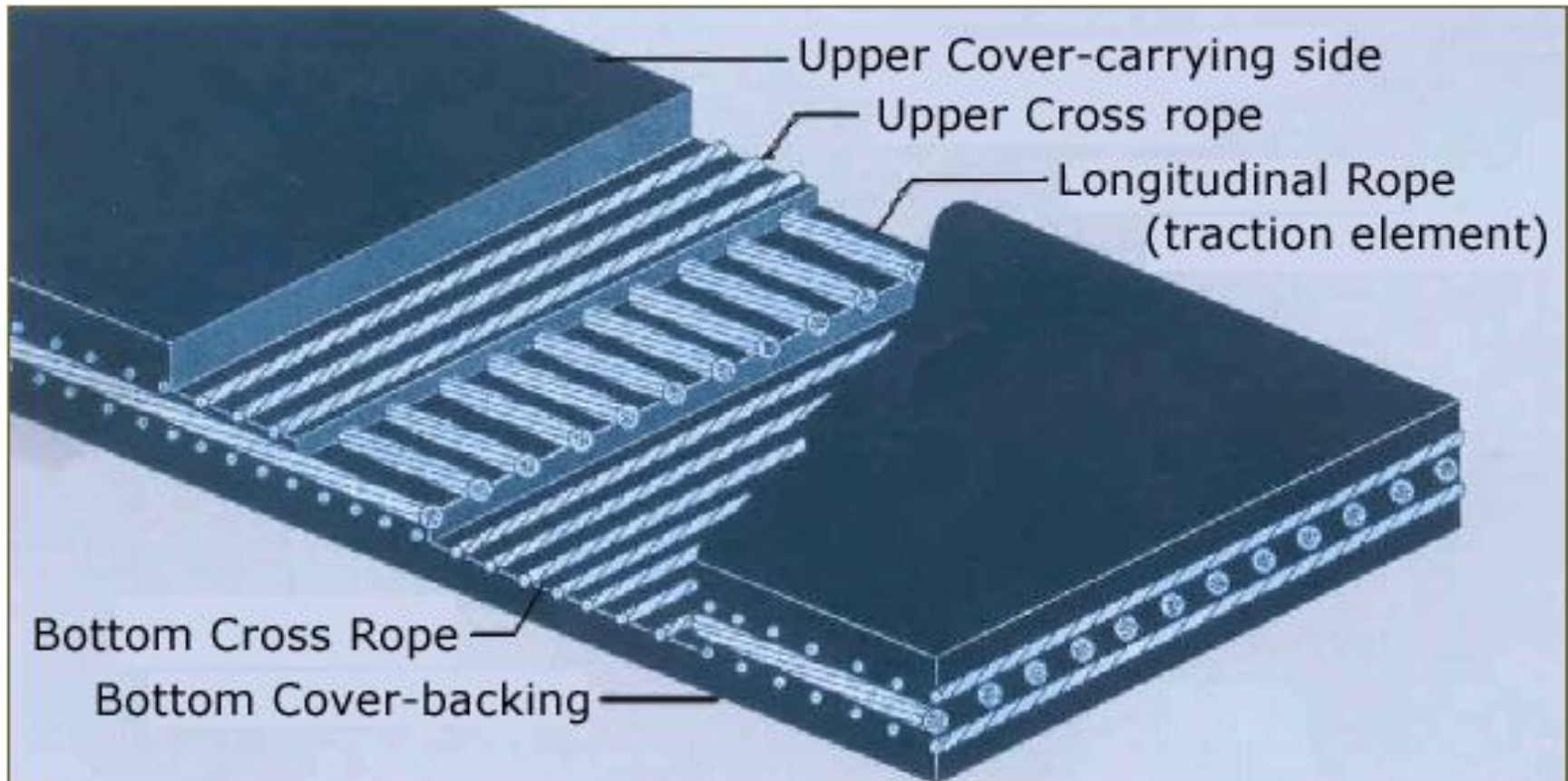


Balanced by Design



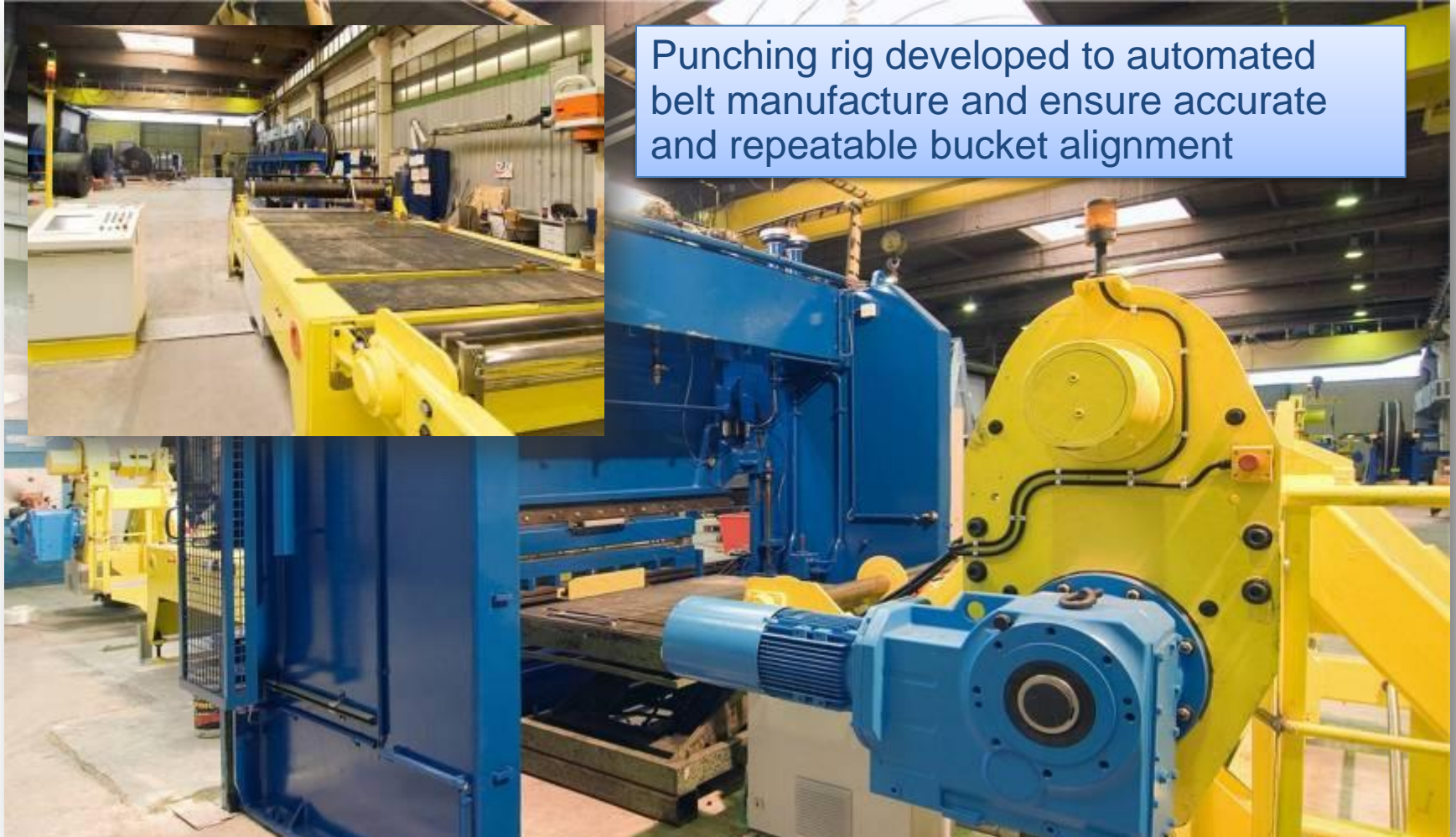
Weight compensation for smooth operation

Cross Stabilised Steel Cord Belts

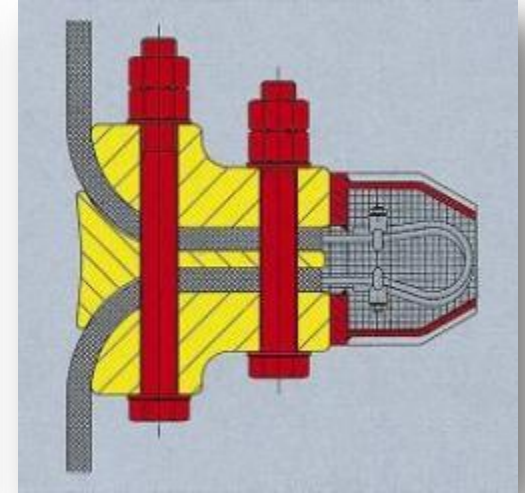
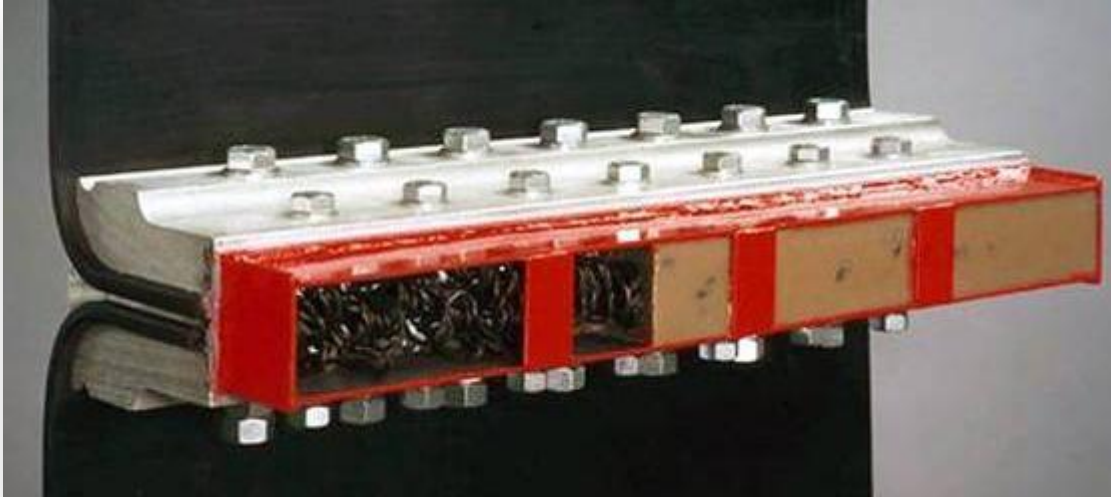


Longitudinal cords for driving traction with cross cords to stabilize the belt laterally for safe bucket fixing

Automated Belt Manufacture



Effective and Reliable Belt Jointing

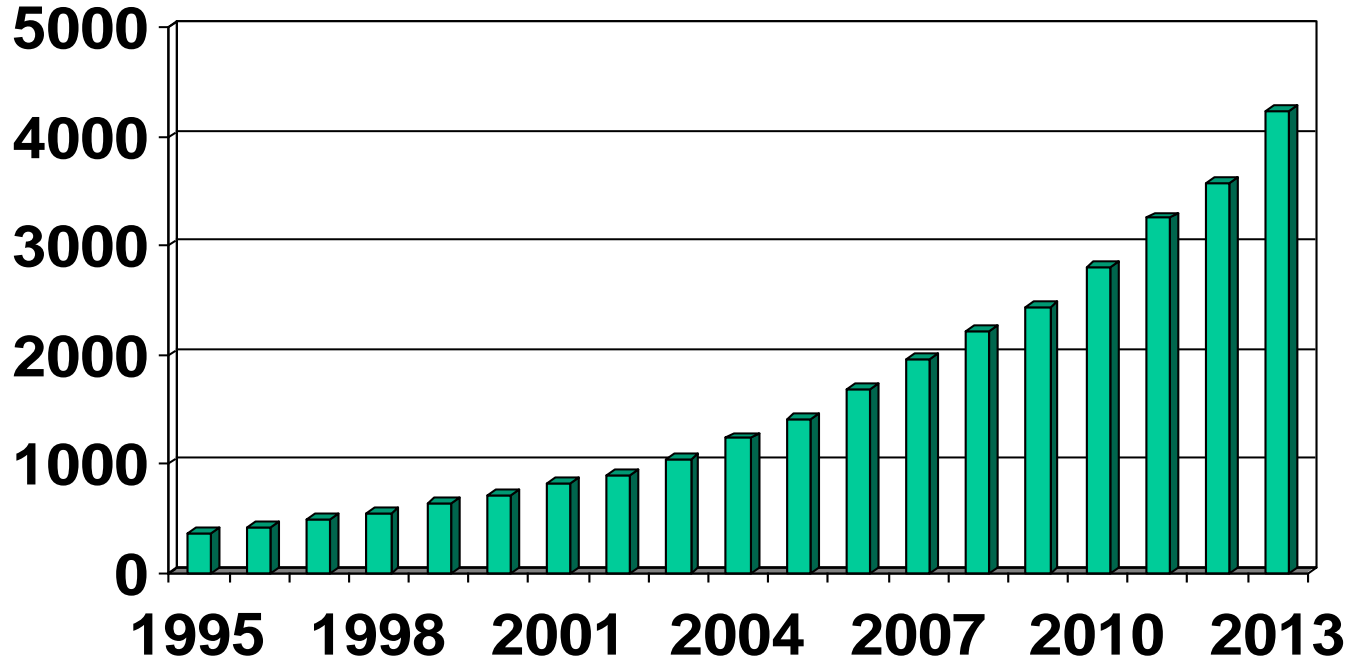


Clamping connection with resin bonded encapsulated connection of the steel cords

AUMUND...

Expert in Conveying Equipment...

■ Aumund Belt Elevator Population from 1995



AUMUND BWG Performance



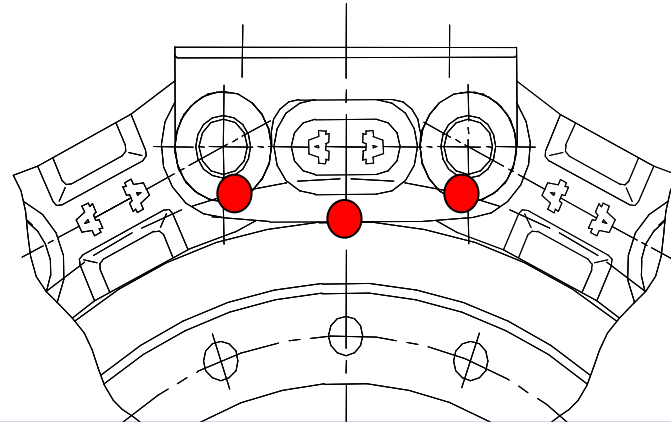
- Shaft center of up to 175 m
- Capacity up to 1,650 mt/h
- Permanent temp. up to 130 °C
- Short term peaks up to 150 °C
- Bucket width up to 1,600 mm
- Belt strength up to 3,500 N/mm

Sophisticated Forged and Sealed Elevator Chains



Forged chains with reduced bearing pressure and pre-lubrication to ensure high surface finish for reduced pin/bush wear and extended chain life

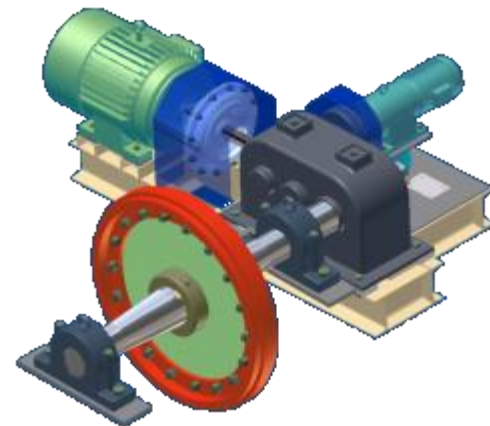
AUMUND Central Chain Solution



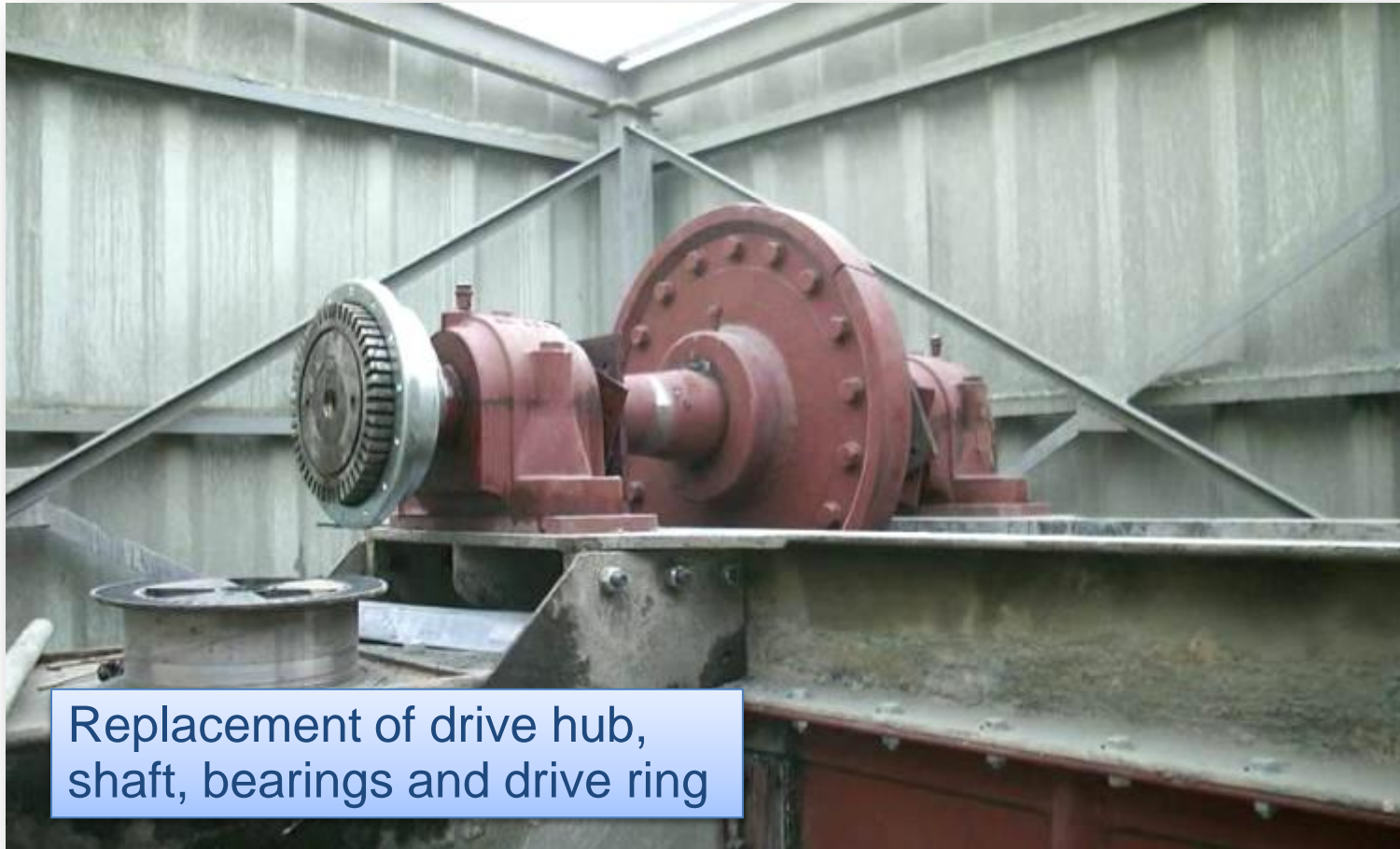
Three Point Contact Friction Drive



Segmented tyre rim
replaceable with
minimum dismantling
and downtime



AUMUND Central Chain Solution



Case Study – Elevator Upgrade

Original Elevator...

- Type – Twin Chain
- Feed Design – Dredge Boot
- Vertical Lift – 21.6 m
- Handling Rate – 50 t.p.h.

Upgrade to AUMUND Design...

- Type – Central Forged Chain
- Feed Design – Direct Feed Boot
- Vertical Lift – 22.1 m
- Handling Rate – 90 t.p.h.



Structure and casing retained along with existing hood, not pretty but functional...

Comparison Cost to Direct Replacement...

Cost Saving – 30 %

Upgrading of a Steep Inclined Bucket Conveyor



Converting an existing deep bucket conveyor to the standard AUMUND BZB specification retaining the existing supporting steelwork and galleries

New Head Shaft and Sprockets



New Conveyor Buckets and Chains by AUMUND



New bucket strands
pre-assembled in manageable
sections before installation
and jointing on the new rails
and guides



Robust rollers with large ball bearings and labyrinth grease seals for long life



Laser cut precision conveyor chains for maximum reliability



Press tool for chain pin assembly with interference fit to chain side plates

Case Study – Bucket Conveyor Upgrade

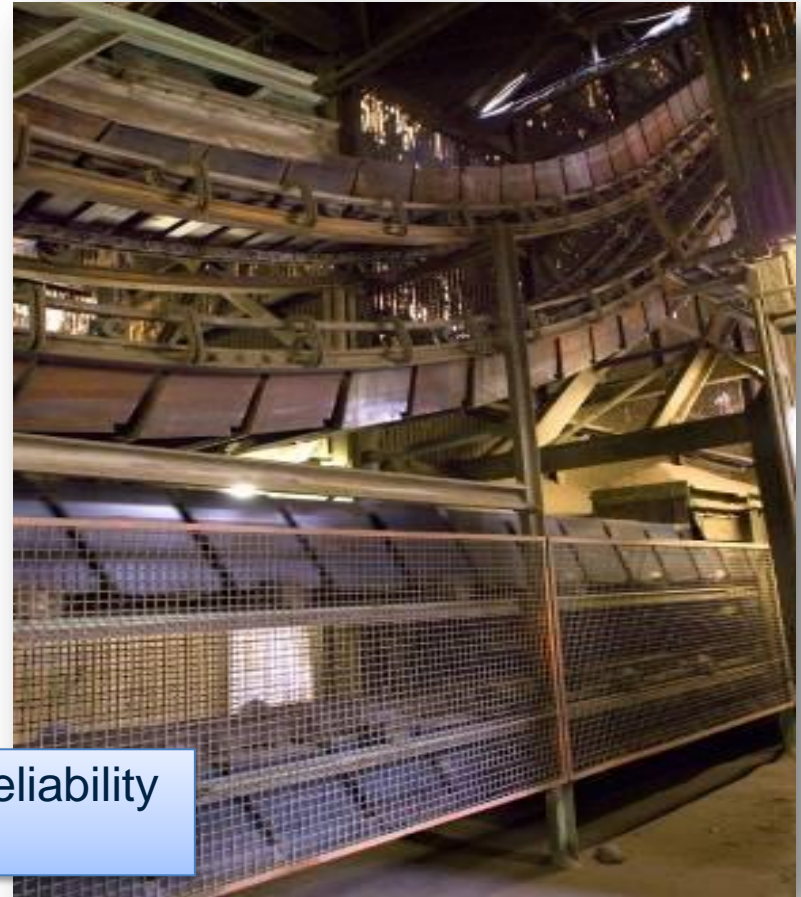
Original Conveyor...

- Type – Deep Bucket Conveyor
- Centres Length – 89.14 m
- Handling Rate – 220 t.p.h.

Upgrade to AUMUND Design...

- Type – BZB 250 – 1200/350/5
- Handling Rate – 272 t.p.h.

Improved performance and reliability
by **AUMUND**



**Cost Saving – 20
%**

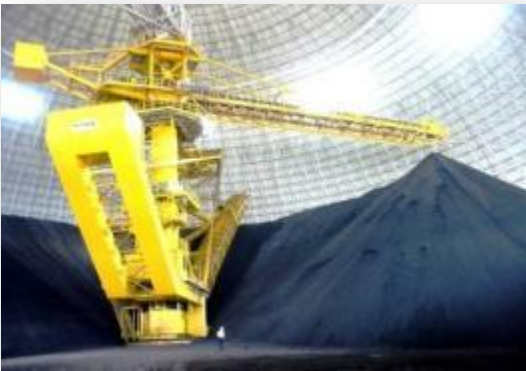
Professional Solutions for Bulk Materials Handling



The AUMUND Group

SCHADE

AUMUNDGROUP



The AUMUND Group

SAMSON

AUMUNDGROUP



PREMAS[®]

PRE_{ventive} MA_{intenance} S_{ervices}



Inspection



Training



Consulting

by **AUMUND**

Why Preventive Maintenance?

What do you think
happend here ???



Only one bucket
was assembled wrongly !!!



waited too long



Maintenance Strategies

Reactive. Preventive. Condition Based.

Advantage

"Use until failure" – this concept means a low-cost effort for the servicing work ... until a machine failure occurs

Disadvantage

Higher cost due to unforeseeable downtimes

Higher manpower cost

Higher cost due to production losses

Maintenance Strategies

Reactive. Preventive. Condition Based.

Advantage

- Fixed maintenance intervals reduce machine downtimes
- In contrast to reactive maintenance, a high cost saving can be reached
- Maintenance can be planned and carried out in times of low sales
- Reduction of production losses

Disadvantage

- Higher cost for spare parts, as components featuring a residual service time possibly have to be replaced

Maintenance Strategies

Reactive. Preventive. Condition Based.

Advantage

- The permanent monitoring detects damage of components already at an early stage
- Maintenance work is carried out as required only and can be planned in due time
- Versus preventive maintenance an additional cost saving is possible. This cuts down the costs for machine and process outages
- The costs for manpower and spare parts are reduced further

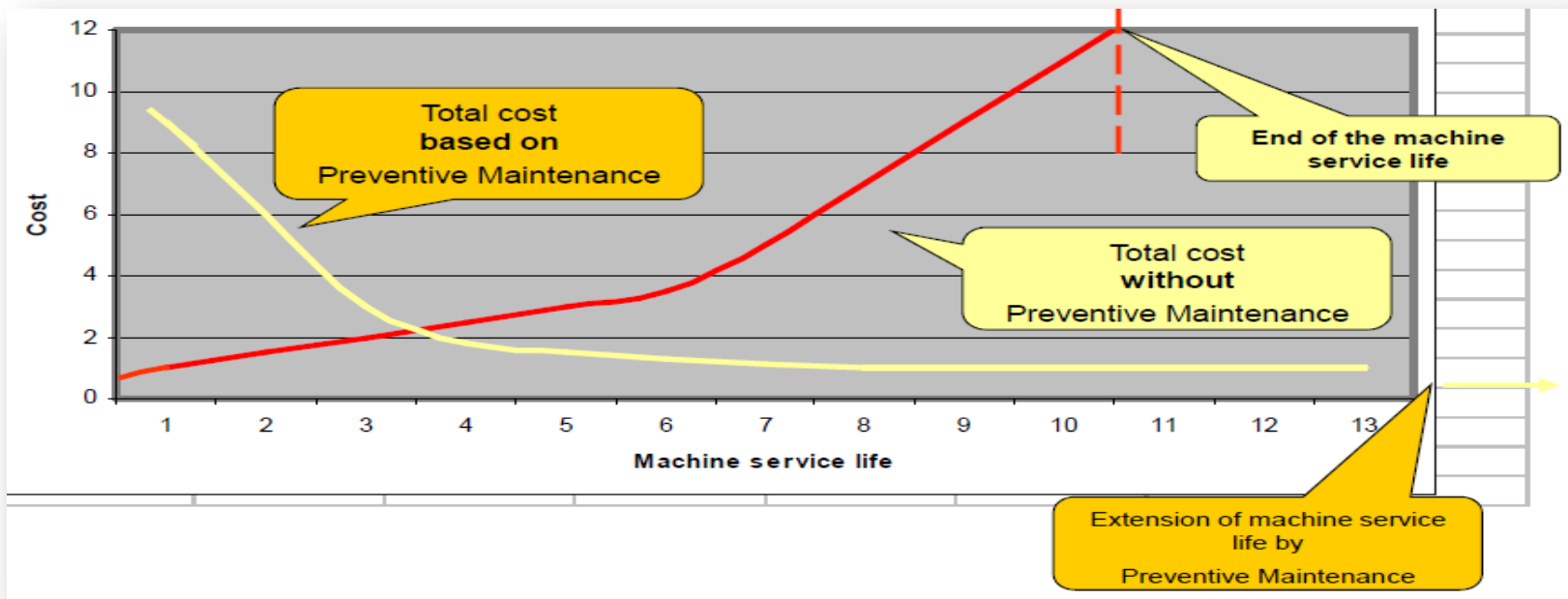
Disadvantage

- The investment expenditure for conventional monitoring systems such as thermography and vibration analysis can be very high

Maintenance Strategies - Conclusion

Considering the costs – value ratio

The best strategy for conveying equipment is a combination of **Preventive Maintenance** and **Condition Based Maintenance** performing regular professional inspections of the equipment to identify the actual status of wear parts

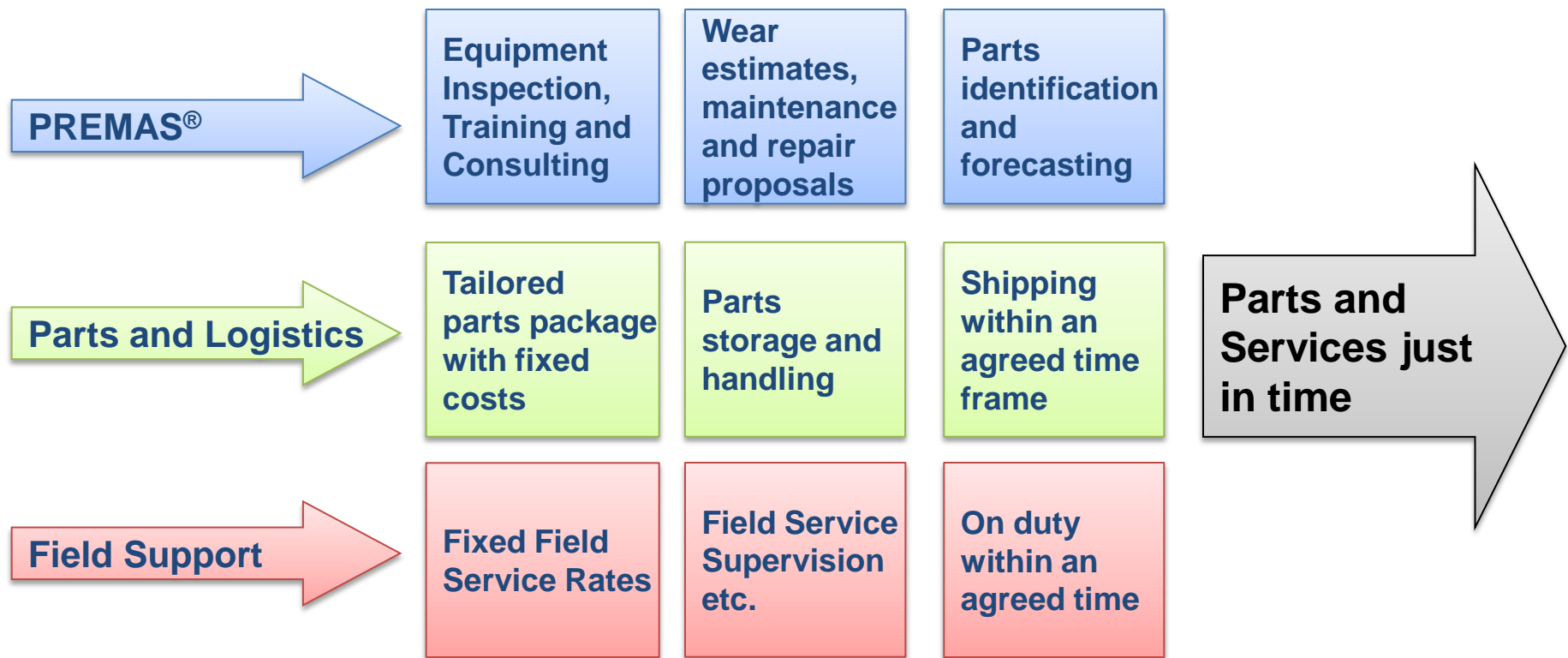


Added Value of PREMAS® Inspection. Training. Consulting.

- Professional assessment of the machine condition
- Failure and wear analysis based on:
Function tests. Visual checks. Wear measures.
- Time scheduling depending on machine downtime
- Qualified and certified PREMAS® Inspectors
- Well structured, reliable and detailed reports
- Avoiding unforeseen stops of production
- Avoiding mechanical damage out of crashes in the conveying lines
- Higher operational availability and efficiency
- Minimized spare part stock-keeping



AUMUND Lifetime Service Package



AUMUND Worldwide



AUMUND PREMAS® THE TEAM YOU CAN COUNT ON



WE CONVEY QUALITY



PREMAS®

THANK YOU FOR YOUR ATTENTION

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