

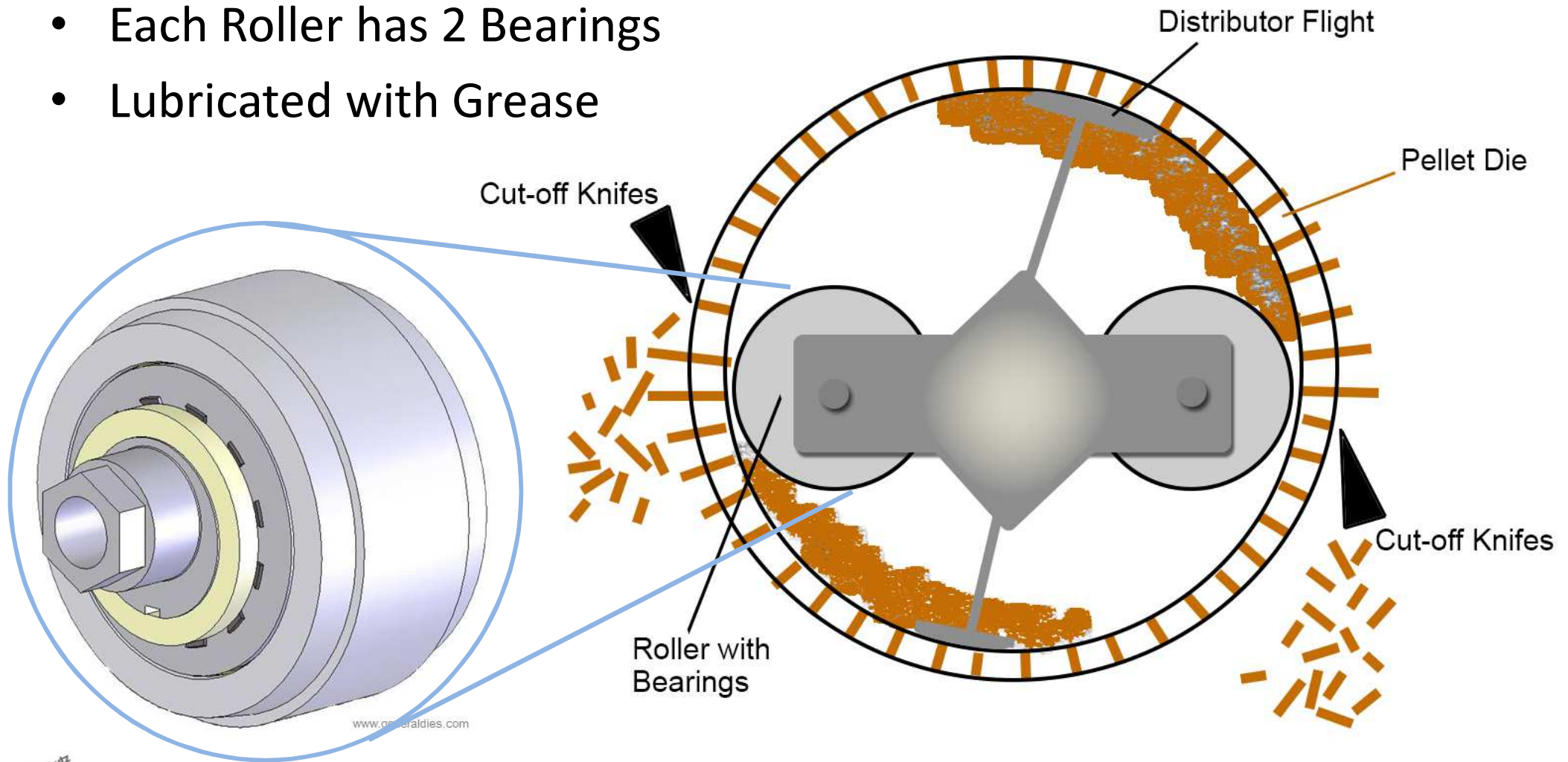


Ceramic Lubricants in Pellet Mills

*Analysis of Using Innovative Greases
in Pellet Mills in Europe and USA*

What Are We Talking About?

- Lubrication of Roller Bearings in Pellet Mills
- Each Roller has 2 Bearings
- Lubricated with Grease



Agenda

- Company, Technology & Products
- Overview of Projects
 - Greenwood Energy, Green Bay
 - Pfeifer, Trhanov
 - Binderholz, Kösching
 - Tschopp, Buttisholz
- Efficiency Calculation
- Conclusion

Company

BVG AG in brief:

- Swiss company, established in 2010
- Ceramic technology with 12 years of R&D background
- Solely owns and distributes the ceramic technology
- Co-Office in Germany
- Cooperations in Switzerland, USA, and Asia
- Solution provider for several industries

Pellets – Cement – Wind – Gears – Engines – Shipping

*Our ceramic lubricants outpace technology leaders
in industrial lubrication.*

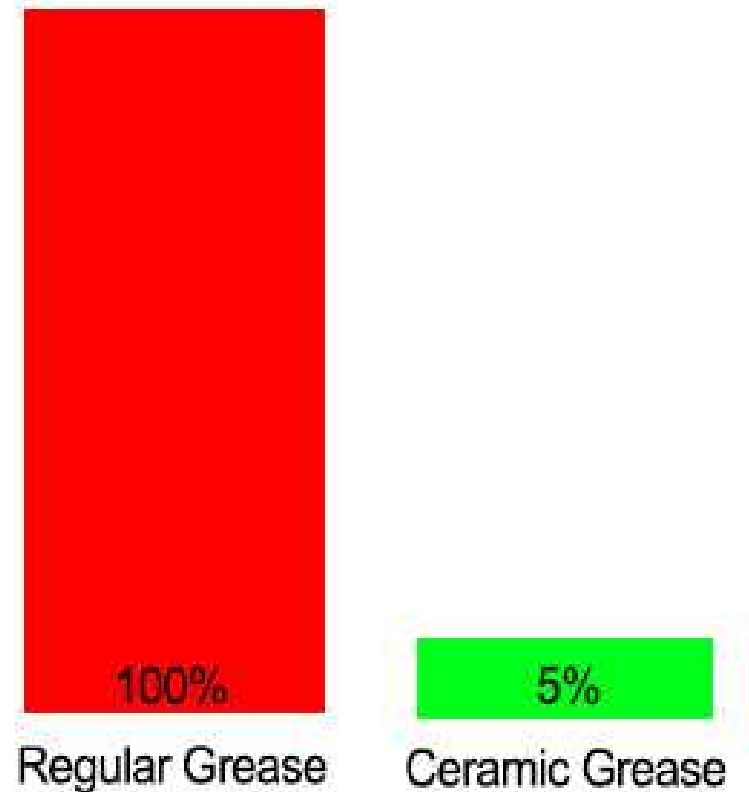
Technology

The Bathan products contain industrial ceramic that has a distinct crystalline structure with low density, high lubricity and excellent thermal conductivity.

Highlights:

- Reducing grease consumption by 95%
- Reducing friction & wear
- Decreasing power consumption
- Increasing efficiency
- Saving maintenance & operating costs

Comparison of Grease Consumption



Products

Bathan Additive

- High performance additive for use in engines and gears

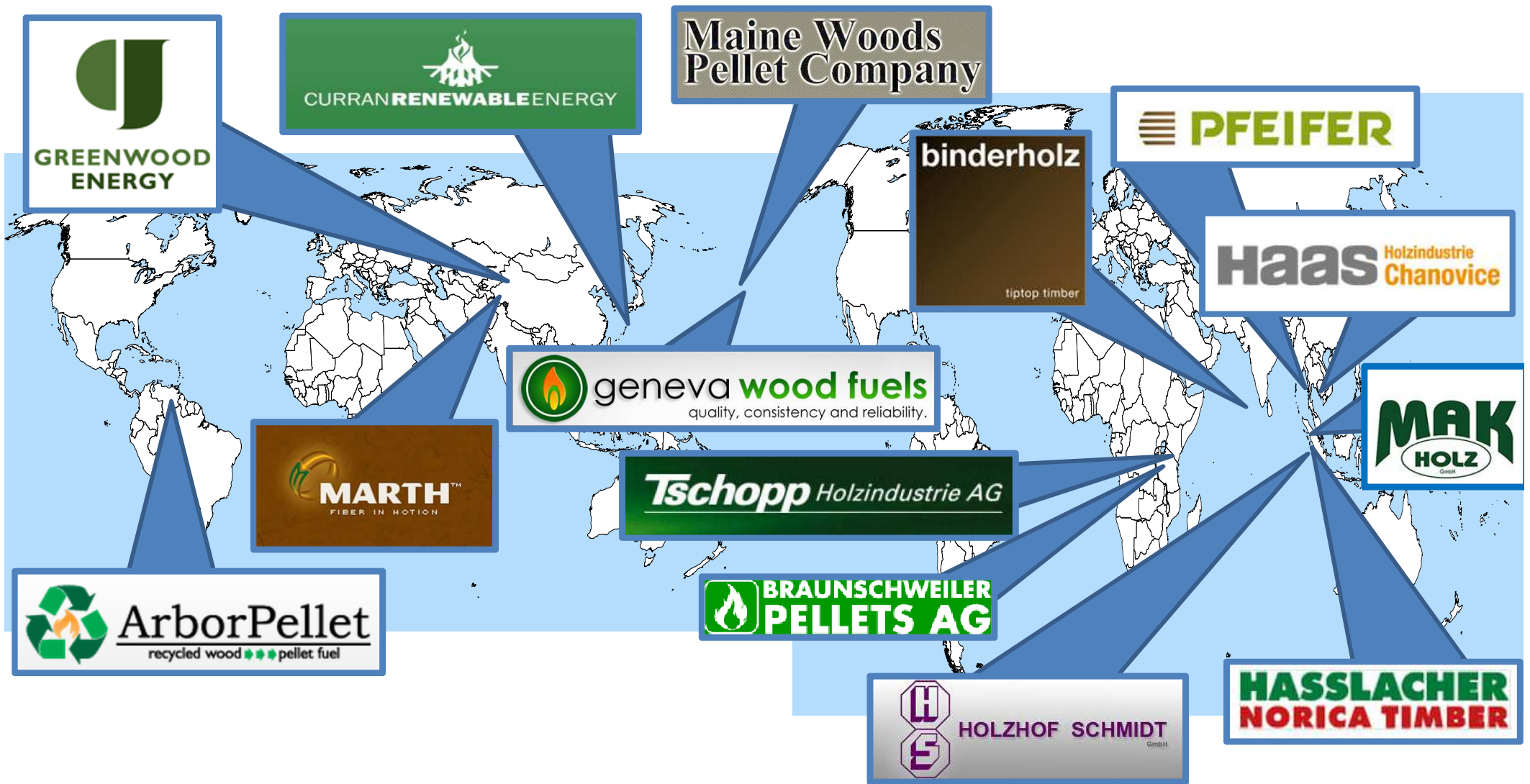
Greases

- Bathan KF 7 / 60 M: high pressure - high temperature grease with industrial ceramics and modified EP-additives
- Bathan KF 1 / 100 M: seawater-proof high pressure - high temperature grease with industrial ceramics and longlife-characteristics
- Bathan KF 9: high pressure – high temperature greasing paste

Engine Oil

- MTU approved; matching several OEM specifications

Project Overview

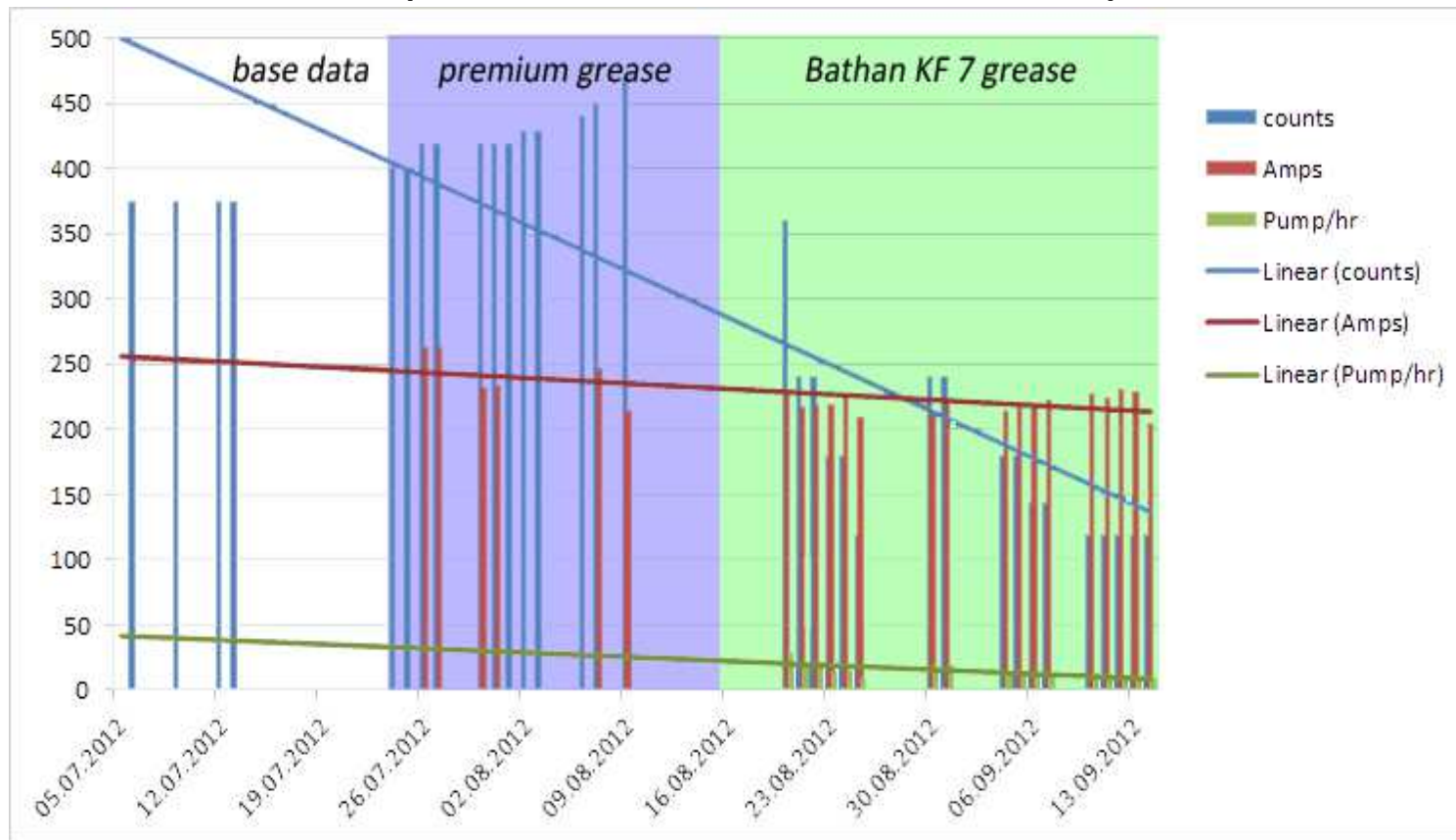


Greenwood Energy - USA

Andritz Mills – 150.000 tons Capacity – Plastic Pellets

Project Start: August 2012

Grease Timer before / after: 360 secs / 6.800 secs (-94.7%)



Pfeifer - Trhanov

CPM Mills – 25.000 tons Capacity

Project Start:

September 2013

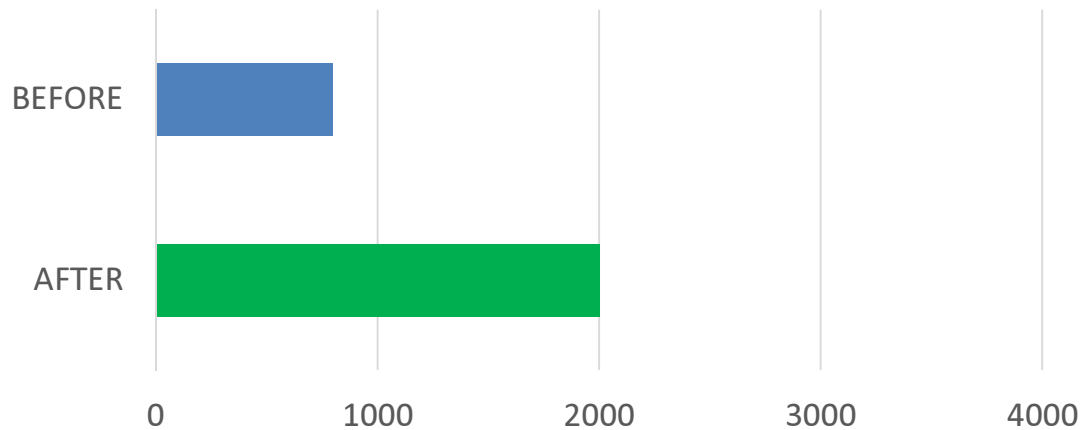
Grease Consumption before / after: 200g/hr / 10.8g/hr (-94.6%)

Temperatures:

lower than before

Bearing lifetime before / after:

800-1.000 hrs / >2.000 hrs



Pfeifer

Binderholz - Kösching

CPM Mills – 180.000 tons Capacity

Project Start:

January 2014

Grease Timer before / after:

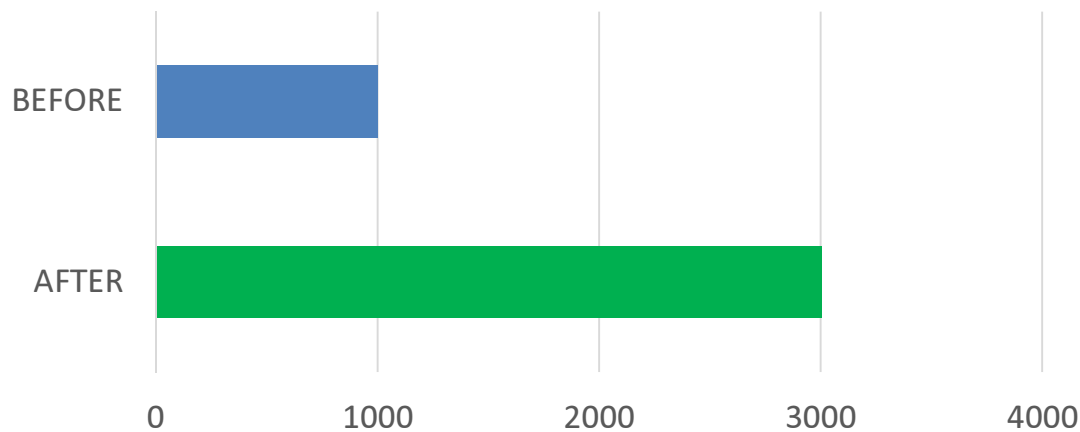
500 secs / 9.000 secs - 94.4%

Temperatures:

lower than before

Bearing lifetime before / after:

1.000 hrs / 2.000-3.000 hrs



Tschopp - Buttisholz

CPM Mills – 90.000 tons Capacity

Project Start:

May 2014

Grease Timer before / after:

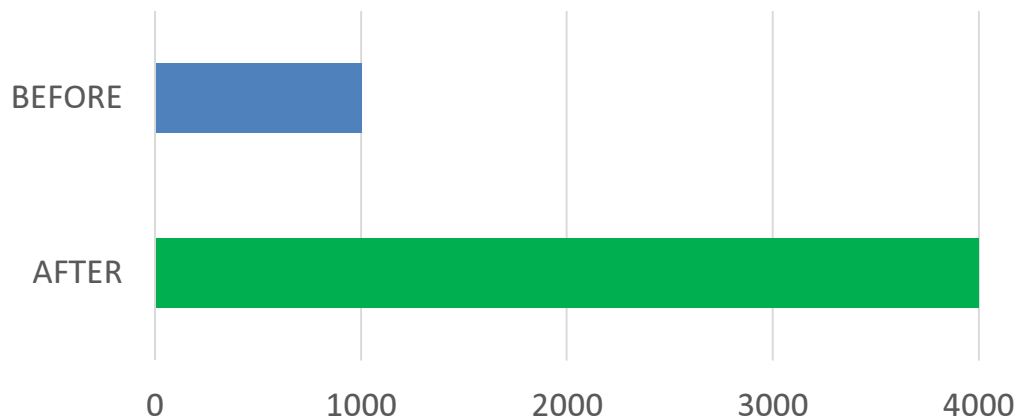
335 secs / 6720 secs (-95%)

Temperatures before / after:

110-120 °C / 85-95 °C

Bearing lifetime before / after:

1.000 hrs / 4.000 hrs



Bearing & Die Types

We have experiences with the following bearing & die manufacturers:

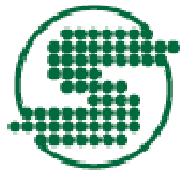


CPM EUROPE
Your Partner in Productivity

TIMKEN

SKF

Hubert Graf
Technische Großhandlung GmbH
Textilmaschinen - Ersatzteile & Zubehör seit 1930



SALMATEC

ANDRITZ

FAG
SCHAEFFLER



Efficiency Calculation

Regular Grease:

Cost of grease p.a.	\$ 10'400	4'600 lbs á 2.25 \$/lb
<u>Cost of roller p.a.</u>	<u>\$ 17'600</u>	<u>1'000 hrs lifetime (16 roller p.a.)</u>
Total costs p.a.	\$ 28'000	

Bathan Grease*:

Cost of Bathan grease	\$ 11'500	230 lbs á 50 \$/lb
<u>Cost of roller p.a.</u>	<u>\$ 8'800</u>	<u>2'000 hrs lifetime (8 roller p.a.)</u>
Total costs p.a.	\$ 20'300	

Net savings p.a. \$ 7'700 for one Mill

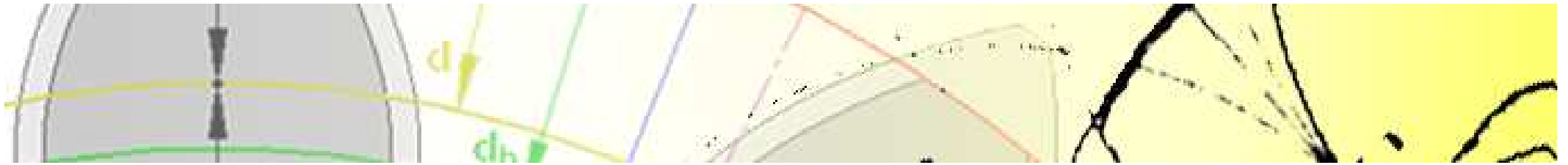
*) \$ 1'100 per roller (shell + 2 bearings); 2 roller per mill; savings of working hours, and lower power consumption not included

Conclusion

- Investments in environmental friendly tech is always preferable
- Temperature reductions indicate less wear
- Increasing lifetime of components improves efficiency

- High quality greases improve the performance
- Investing in high quality greases saves money

- Innovation in lubricants is not dead



LESS IS MORE