

## Hi-tech bearing solutions & condition monitoring

**Optimize your production**  
**Reduce energy costs**  
**Improve your competitiveness**



## About CeramicSpeed

- CeramicSpeed at a glance
- Products
  - Ball bearings with ceramic balls
  - Roller bearings with ceramic coated rollers
    - Bearings with a longer lifetime
    - Bearings that use less energy
- Guarantee
- Increased competitiveness
- Energy projects
- Cases
- Lifetime calculator



## CeramicSpeed at a glance

CeramicSpeed

CeramicSpeed  
Sport

- Road
- Tri
- Off-road

Part of the Victory

CeramicSpeed  
Bearings

- Industries:
- Food
  - Timber
  - Chemical
  - Pharmaceutical
  - Electro mechanical
    - Motors
    - Pumps
    - Ventilation

Bearings that last!

CeramicSpeed  
xxx

CeramicSpeed  
Sport Americas

- Road
- Tri
- Off-road

## The Idea

Technology brought into orbit - Early 90'ties



## Bearing solutions for industrial use

### Hi-tech components

- 4-8 times longer lifetime
- 50-70 % lower energy consumption
- Increased competitiveness

## CeramicSpeed LongLife Series

Hybrid bearings  
with ceramic  
balls



Linearsystems  
with ceramic  
balls



Rullelejer  
m/coatede  
ruller



Silicon nitrid  
balls



Condition  
monitoring



Optimization



Sealing-  
systems



Coated  
parts



Consultancy

## Why CeramicSpeed bearings?

### Bearings that last

4-8 times longer lifetime

50-70 % lower energy consumption



### Reduce operating costs

Reduce service frequency

Reduce material usage



### And increase competitiveness

Lower costs

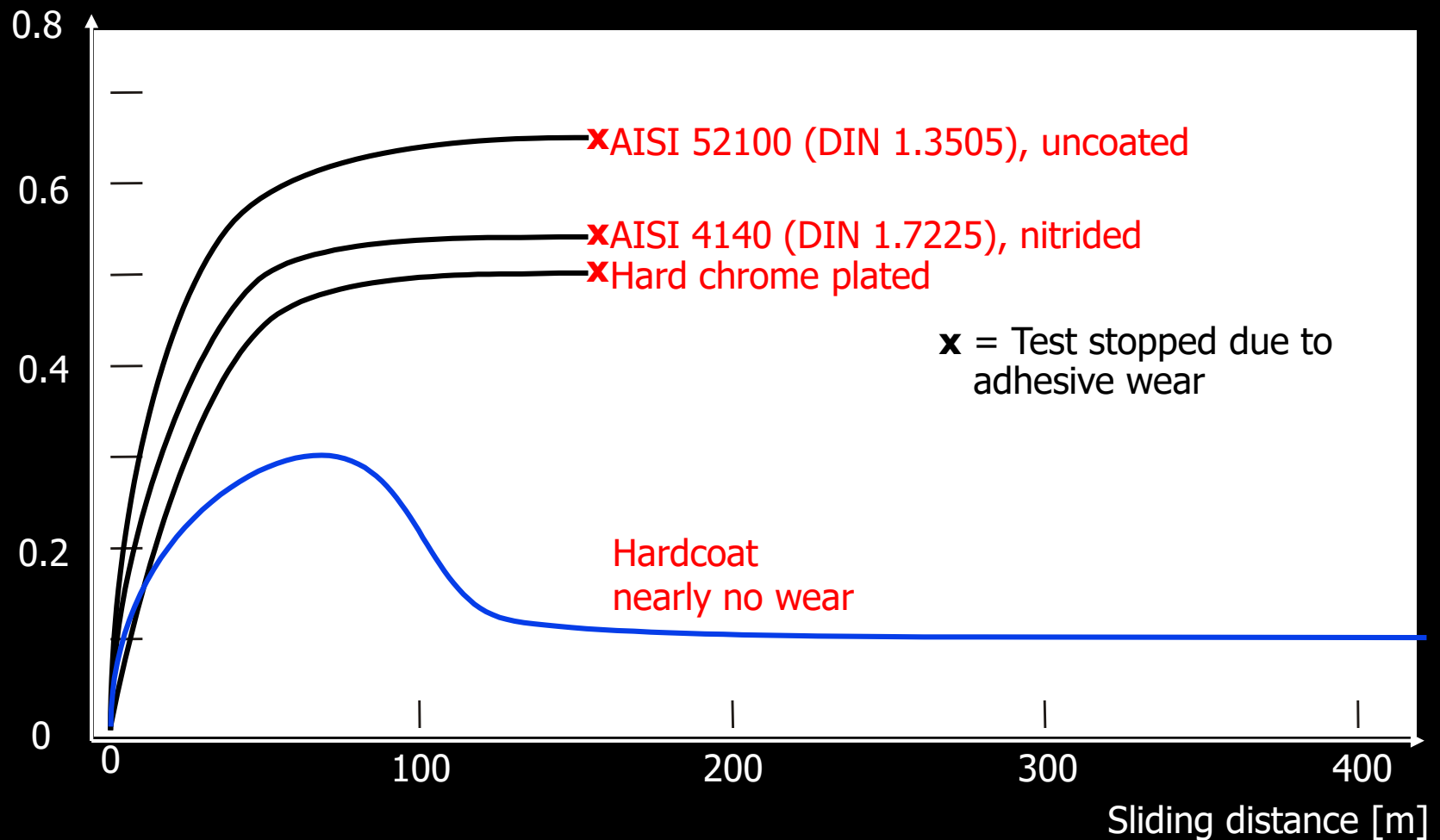
Increased productivity

## CeramicSpeed balls and ceramic coatings

	<b>Hardened Steel</b>	<b>CorroCoat</b>	<b>WearCoat</b>	<b>Silicon Nitride</b>
Process		"Dipping"	Nanotech applied PVD coating	Sintering
Process temperature °C		<80	170	
Colour		Platinum grey	Dark grey	Anthracite
Hardness, HRC	58-64	75-78		
Hardness, HV	700	1200-1300	2800	1600
Max operating temperature °C	150	800	500	1000
Thickness, µm	Solid	3-12 µm	3 µm	Solid material
Friction, Ra - against steel	0,8	0,25	0,05-0,1	0,2

## Coefficient of friction for different materials

Dry running properties





## CeramicSpeed balls

- 58 % lighter
- 63 % stiffer
- 70 % higher thermal stability
- 128 % harder
- 400 % smoother

**4-8 times longer lifetime**

*- An analysis of 1000 bearings demonstrated that this applies to 99.4 % of bearings*

## 50-70 % reduction in energy consumption

- Documented over a 3 year period in an public "ELFORSK" sponsored project
  - Winner of the "ELFORSK" Award 2013
  - Participation of Pronor and Grundfos as well as other large manufacturing companies
- 
- *Saving on electricity costs*
  - *Subsidies via CO<sub>2</sub> quota*
  - *And...*
    - *14-47 degree lower operating temperature*
    - *Guaranteed against damage from stray currents*
    - *Complete program in the LongLife series*
    - *And of course a 4-8 times longer lifetime*



IMPROVED COMPETITIVENESS

Conditions which reduce the lifetime of standard bearings  
- and where hybrid bearings offer a significant potential improvement

**Damage resulting from:**

- Stray currents
- Contamination in the bearing from liquids or particles
- Slow rotation
- Frequent start/stop
- Problematic lubrication
- Corrosion
- Vibration
- Uneven/high loads
- High temperatures

**Examples of machines:**

- Electric motors
- Conveyor belts
- Rolling machines
- Decanters and centrifuges
- Ventilators and blowers
- Forklifts and other vehicles
- Conveyors
- Robot stations
- Linear motion systems

## Condition Monitoring & Optimization

Condition monitoring



Off-line

On-line

- Sensors
- Software
- Hardware



Optimization



- Shaft alignment / laser alignment / shims for alignment
- Balancing
- Lubrication
- Maintenance products
  - Assembly & disassembly
  - Induction heater



Consultancy

Bearing analysis/root cause analysis - Education/theme days – Bearing-/application calculations

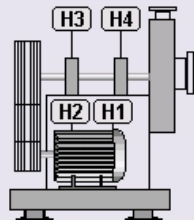
# Arla Foods Hoco – print from Delta V

M880202 Sugeventilator T1  
Motor

	Drift OK	Leje	Ubalance	Drift OK
H1	24.0 mg	0.4 mm/s		
H2	13.1 mg	0.5 mm/s		

Ventilator

	Drift OK	Leje	Ubalance	Drift OK
H3	97.7 mg	0.7 mm/s		
H4	79.7 mg	0.7 mm/s		

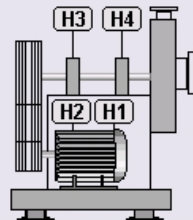


M824501 Sugeventilator T2  
Motor

	Drift OK	Leje	Ubalance	Drift OK
H1	53.4 mg	0.7 mm/s		
H2	111.7 mg	1.1 mm/s		

Ventilator

	Drift OK	Leje	Ubalance	Drift OK
H3	9.7 mg	1.3 mm/s		
H4	12.9 mg	0.3 mm/s		

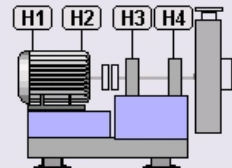


M890200 Sugeventilator T3  
Motor

	Drift OK	Leje	Ubalance	Drift OK
H1	116.2 mg	0.7 mm/s		
H2	70.5 mg	0.6 mm/s		

Ventilator

	Drift OK	Leje	Ubalance	Drift OK
H3	42.0 mg	0.2 mm/s		
H4	296.4 mg	0.4 mm/s		

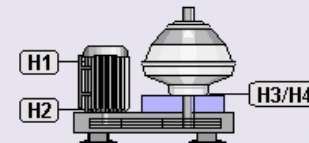


M078230 Dyssecentrifuge  
Motor

	Drift OK	Leje	Ubalance	Drift OK
H1	1.9 mg	0.8 mm/s		
H2	0.4 mg	0.3 mm/s		

Centrifuge

	Drift OK	Leje	Ubalance	Drift OK
H3	0.0 mg	0.5 mm/s		
H4	7.4 mg			



M880202 Sugeventilator T1

Motor	Leje	Ubalance
Ventila	Leje	Ubalance

M824501 Sugeventilator T2

Motor	Leje	Ubalance
Ventila	Leje	Ubalance

M822001 Trykventilator T2

Motor	Leje	Ubalance
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M890200 Sugeventilator T3

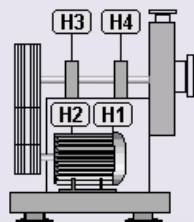
Motor	Leje	Ubalance
Ventila	Leje	Ubalance

M880201 Trykventilator T1  
Motor

	Drift OK	Leje	Ubalance	Drift OK
H1	6.7 mg	0.5 mm/s		
H2	67.1 mg	0.8 mm/s		

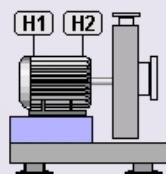
Ventilator

	Drift OK	Leje	Ubalance	Drift OK
H3	32.2 mg	0.9 mm/s		
H4	17.0 mg	0.4 mm/s		



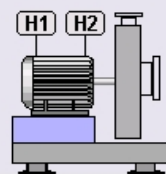
M822001 Trykventilator T2  
Motor

	Drift OK	Leje	Ubalance	Drift OK
H1	22.1 mg	1.5 mm/s		
H2	106.2 mg	1.1 mm/s		



M890104 Trykventilator T3  
Motor

	Drift OK	Leje	Ubalance	Drift OK
H1	181.0 mg	1.9 mm/s		
H2	346.0 mg	0.5 mm/s		

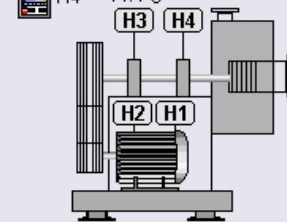


M832231 Mølle Capolac  
Motor

	Drift OK	Leje	Ubalance	Drift OK
H1	7.4 mg	0.4 mm/s		
H2	249.4 mg	0.3 mm/s		

Ventilator

	Drift OK	Leje	Ubalance	Drift OK
H3	8.6 mg	1.0 mm/s		
H4	5.2 mg	0.3 mm/s		
H4	44.4 C			



M890104 Trykventilator T3

Motor	Leje	Ubalance
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M078230 Dyssecentrifuge

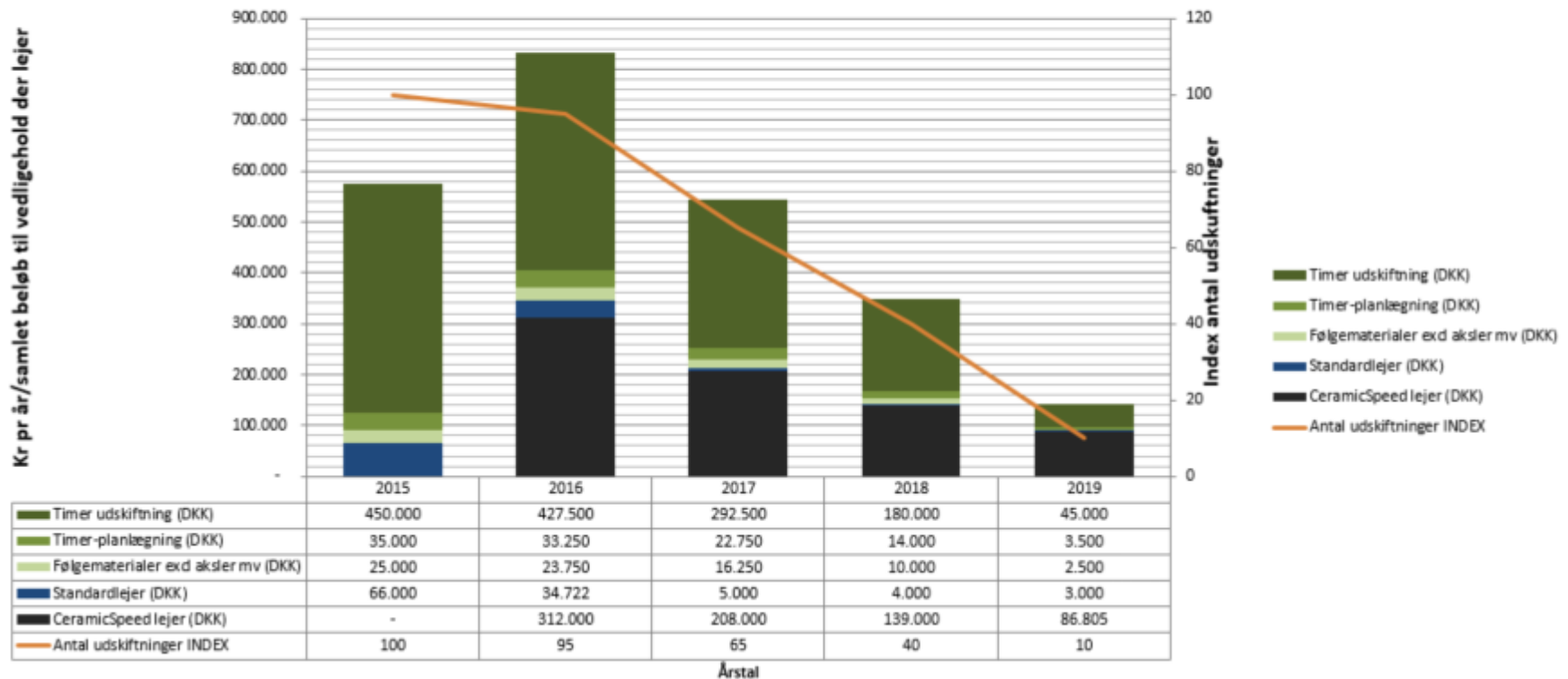
Motor	Leje	Ubalance
Cent	Leje	Ubalance

M832231 Mølle Capolac

Motor	Leje	Ubalance
Ventila	Leje	Ubalance

Case: ALL-IN – Arla Foods, Kruså Dairy

**Arla Kruså Mejeri - Simulering**  
Opgørelser over samlet time og materialeforbrug til vedligehold, lejer



## Summary

- Untapped potential – CeramicSpeed bearings present new opportunities
- Multiple tools – prioritisation and selection
- Product testing is complete – >350 companies have seen the results
- A natural process
  - The first machine
    - Technical clarification
- Condition Monitoring for critical machinery
  - Off-line
  - On-line
- Day to day operations
  - Economy / investment
  - Ensure payback
  - Establish an implementation plan

