SAFETY-COUPLINGS

SE Series

(Torque Limiters)

IRD Association, Inc.

Spring Meeting 2019
Ft. Wayne, IN

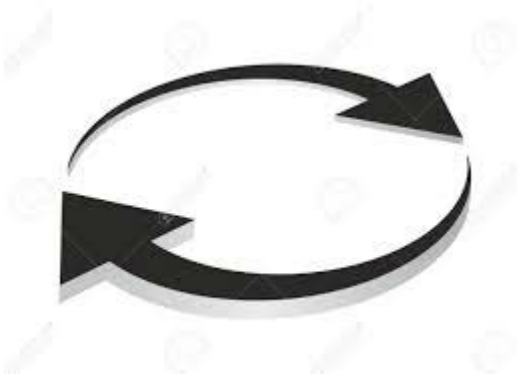
Presented by Cullen Ketcham

Let's Review

In physics, **Torque** is the tendency of a force to turn or twist. ...

Technically……

Torque is a measure of the force that can **cause** an object to rotate about an axis. Just as force is **what causes** an object to accelerate in linear kinematics, **torque** is **what causes** an object to acquire angular acceleration….



Why is this important to us?

We need torque to turn rolls, pinions, gearboxes, etc….!

What influence does Torque have?

Positive:

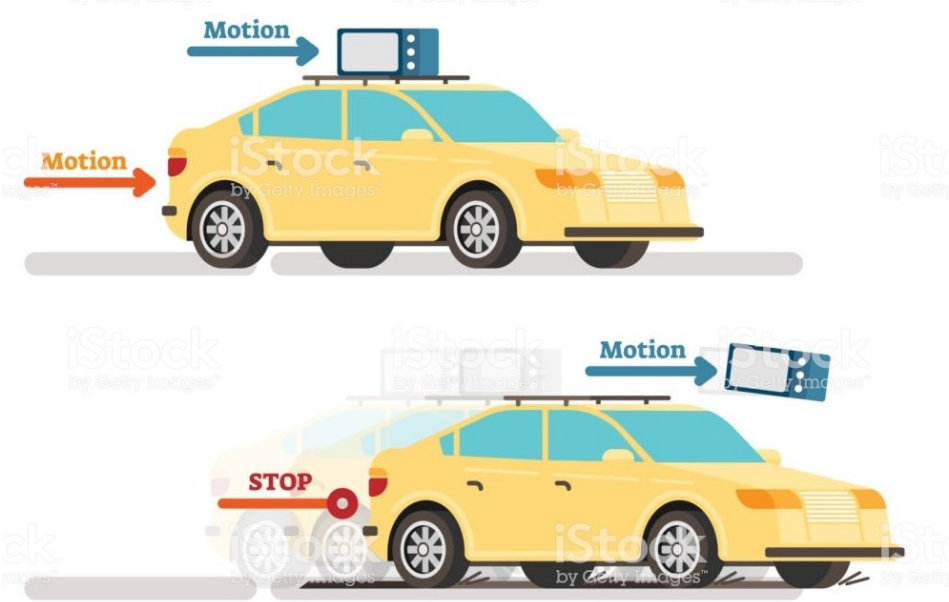
Torque provides the force we need to process materials

Negative:

Too much Torque can damage drivetrain components

Inertia!!

According to Newton's first law of motion, an object with a given velocity maintains that velocity unless acted on by an external force.

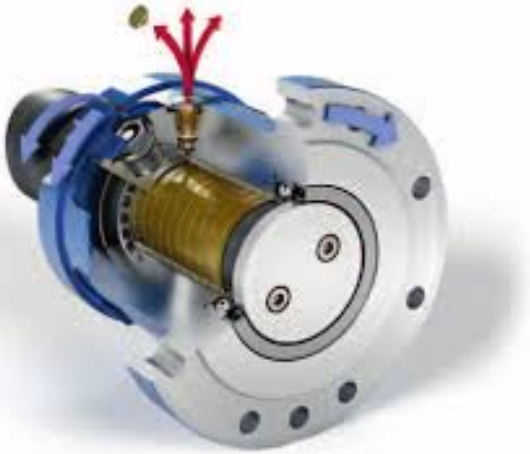


What can go wrong?

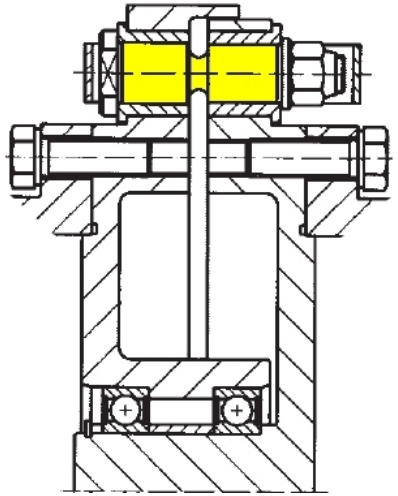
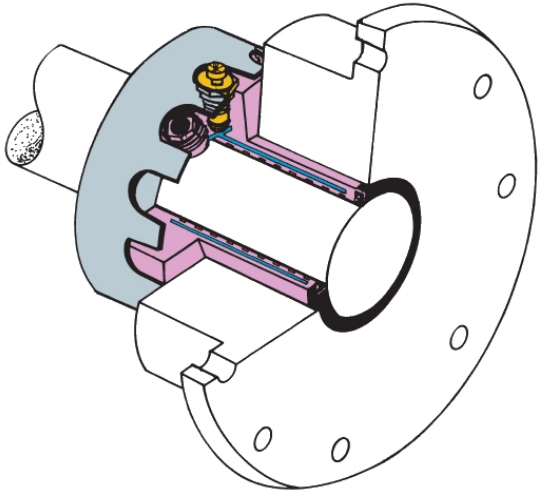
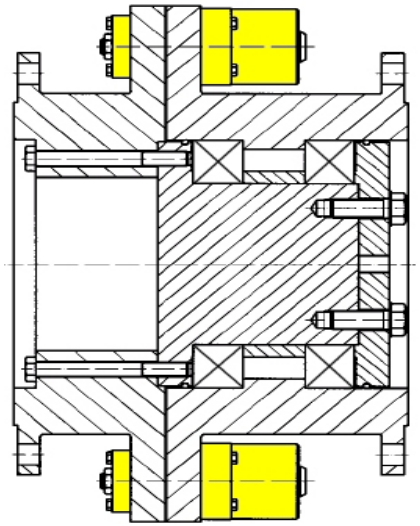
A sudden stop or jam to the drivetrain

We need a way to limit the torque from spikes

Examples of Safety Couplings / Torque Limiters

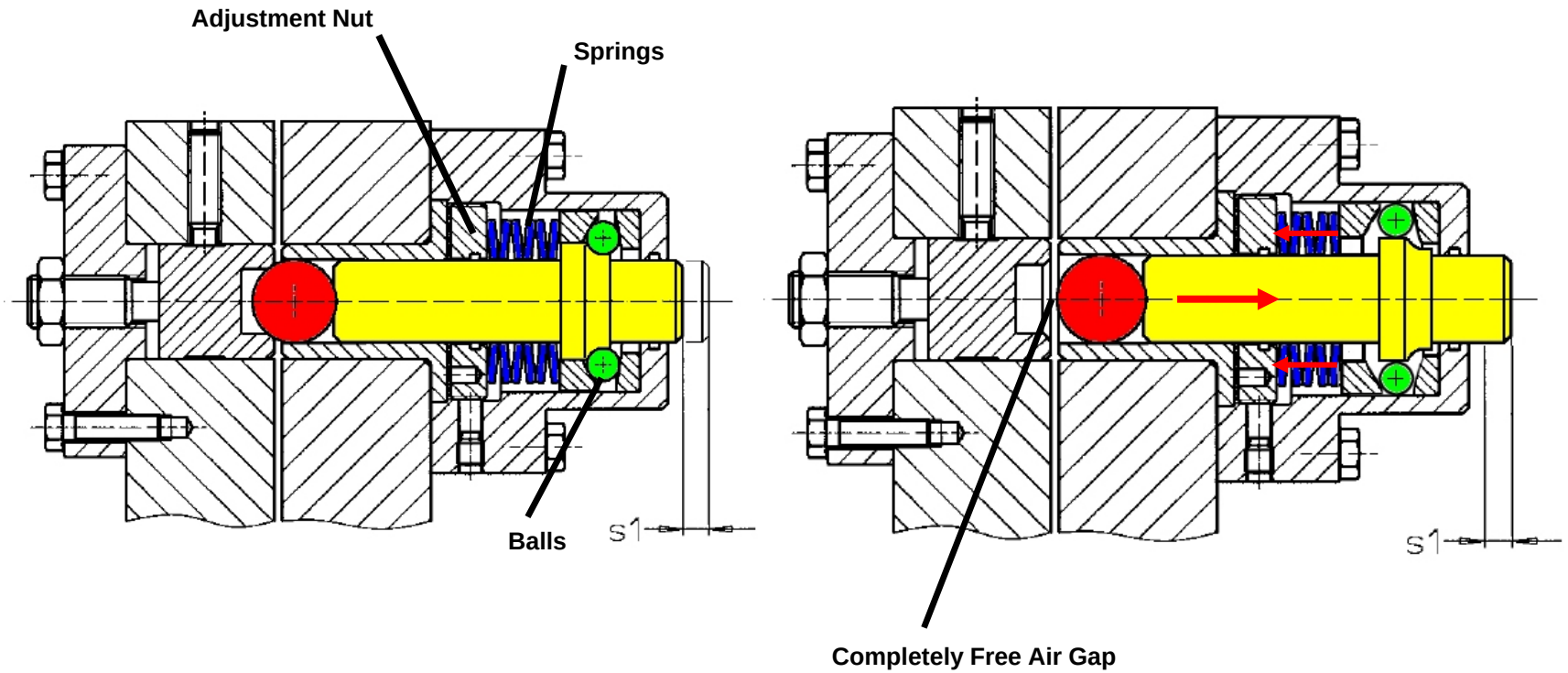


Comparison of common torque limiter coupling technology

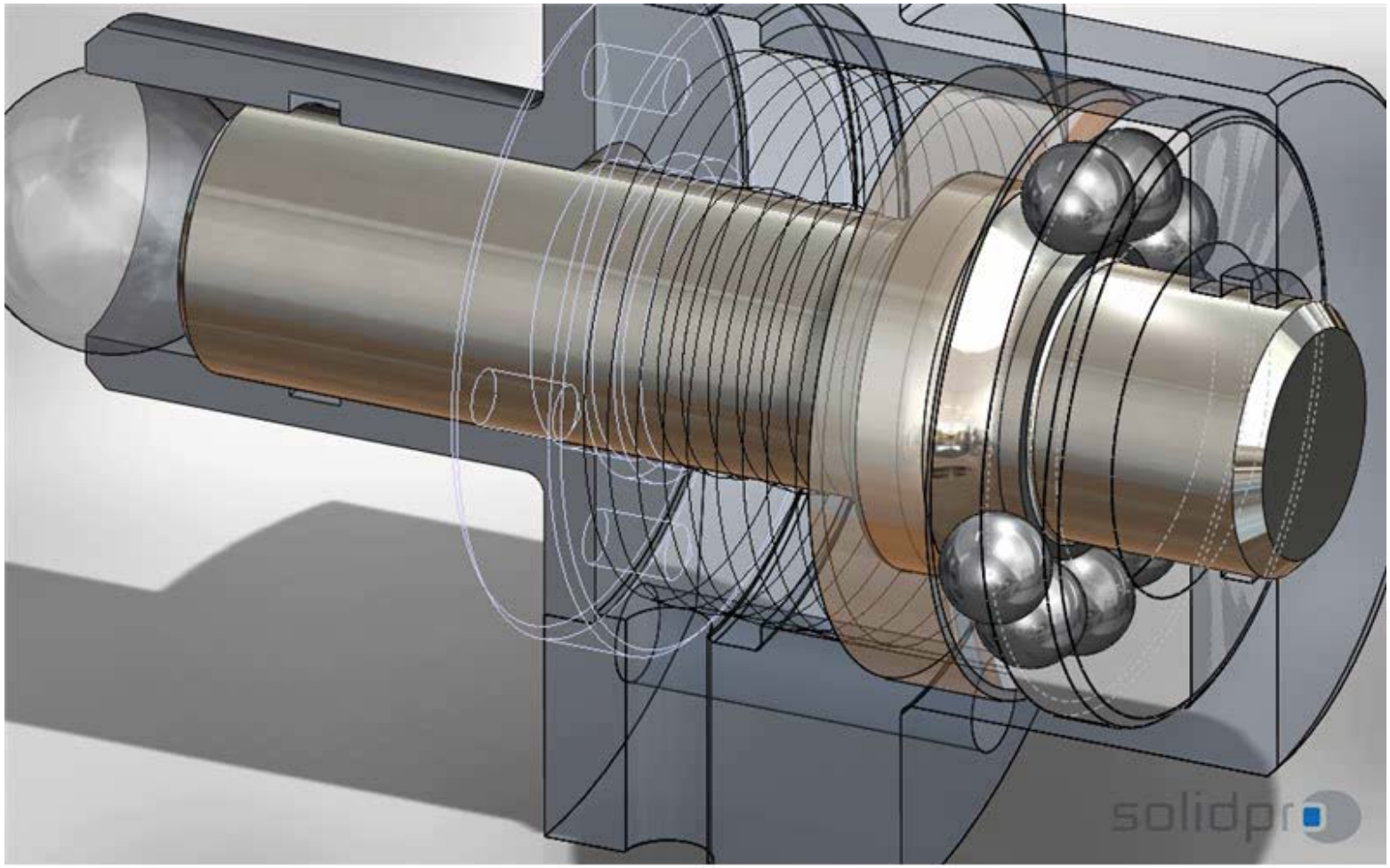
Shear Pin Design	Fluid Design	Safety-Element Design
		
Pro: • Simple and inexpensive design • Maintenance free • No special tools required (others than replacement pins) **Con:** • Uncertain shut-off torque due to material fatigue • Long re-commissioning time due to the required pin replacement	**Pro:** • Very compact design • Low Maintenance **Con:** • Uncertain shut-off torque due to pressure alteration • Oil leak upon shut-off • Special tools required • Difficult re-commissioning (pressure setting)	**Pro:** • Maintenance free • Reproduceable shut-off torque • Ultra fast shut-off and recomissioning • No special tools required • Shut off monitoring by proximity switch (option) **Con:** • Relatively large diameter

Principle design layout of MALMEDIE Safety Element

Engaged	Released



Motion Path of the MALMEDIE Safety Element

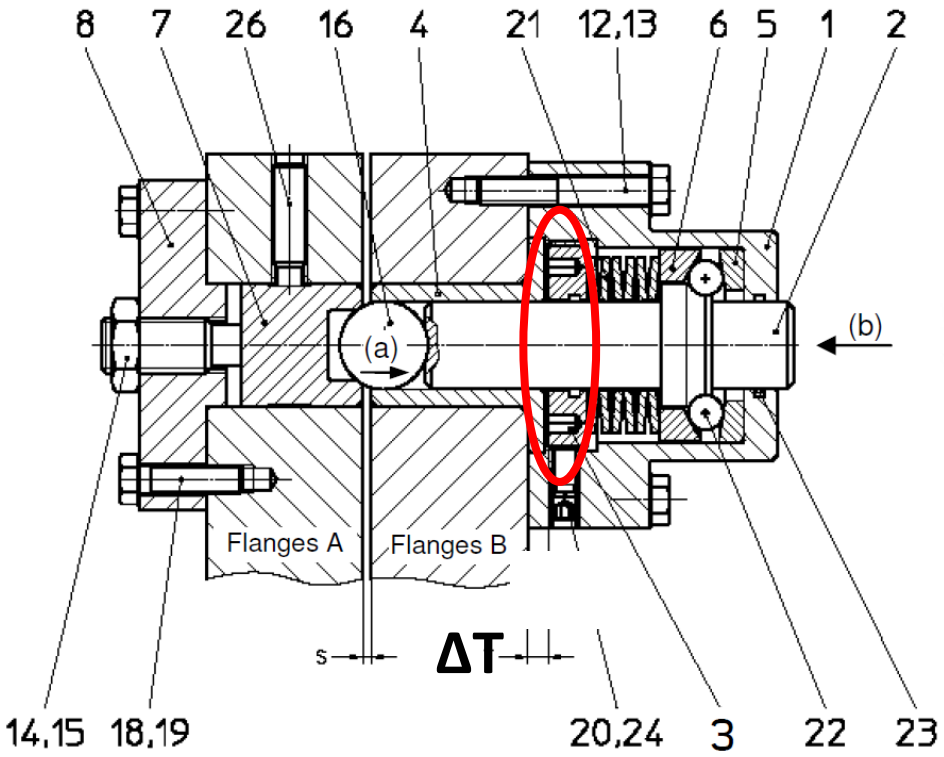


Safety Elements: Adjustable and Rebuildable

ΔT values as delivered (mm)

1	12,80
2	12,76
3	12,93
4	12,92
5	12,96
6	12,94
7	13,12
8	12,74

Tab [Nm]	ΔT [mm]	Ma [Nm]
334000	-3,54	25,44
376190	-3,16	28,53
418380	-2,75	31,61
460570	-2,34	34,70
502760	-1,90	37,79
544950	-1,45	40,88
587140	-0,98	43,96
671520	+0,01	50,14
713710	+0,53	53,22
755900	+1,06	56,31



1 Housing
2 Bolt
3 Nut
4 Sleeve
5 Outer ring (fixed)
6 Inner ring (loose)
7 Centring bushing
8 Centring flange
12 Hex. bolt
13 Spring washer
14 Hex. nut
15 Set screw
16 Ball
18 Hex. bolt
19 Spring washer
21 Belleville washer
22 Ball
23 O-ring
24 Plug
26 Grub screw

Resetting of the MALMEDIE Safety-Coupling

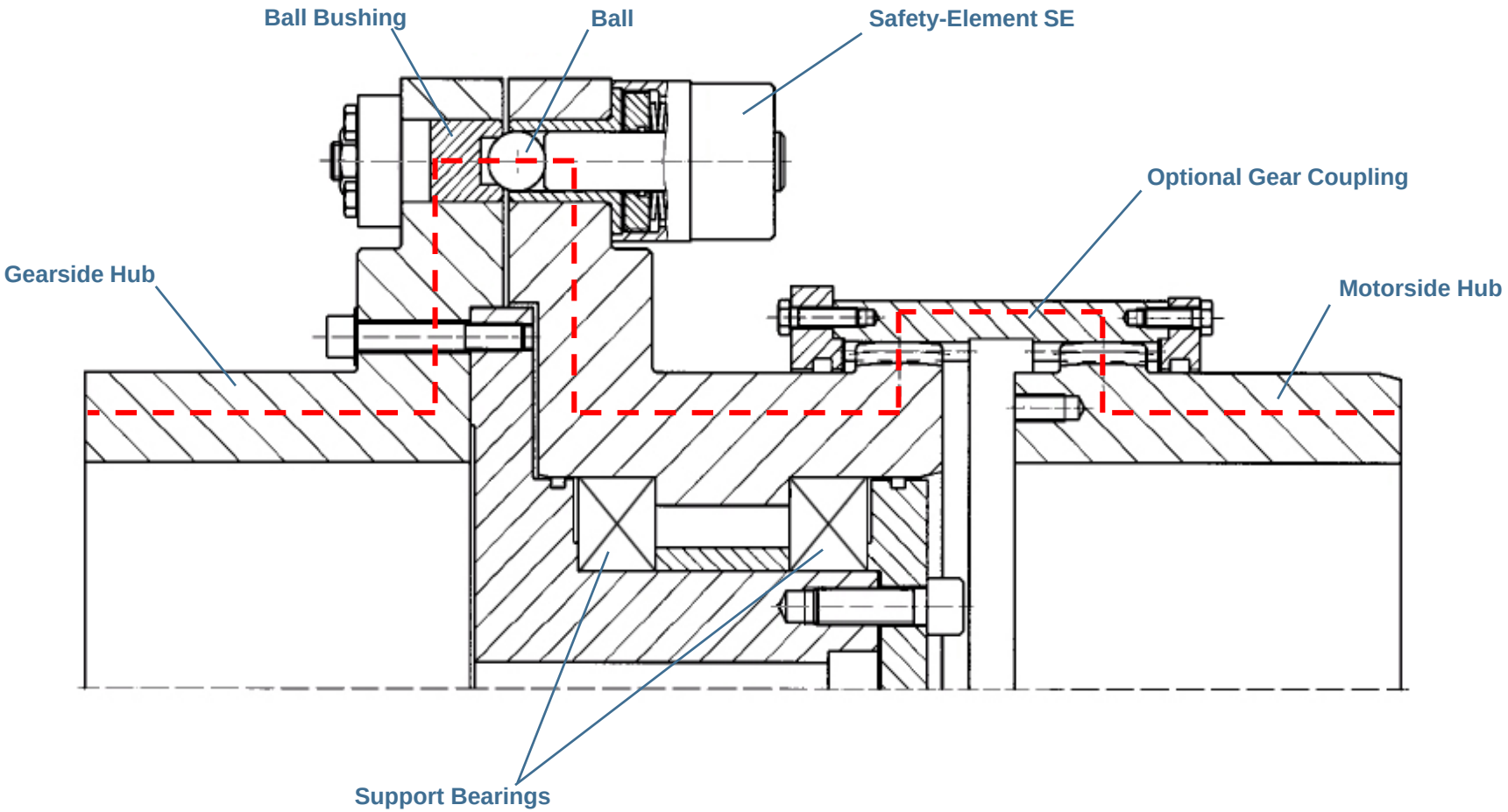
Simple and Fast

- Realign coupling halves
- Hit SE pins with Soft Hammer

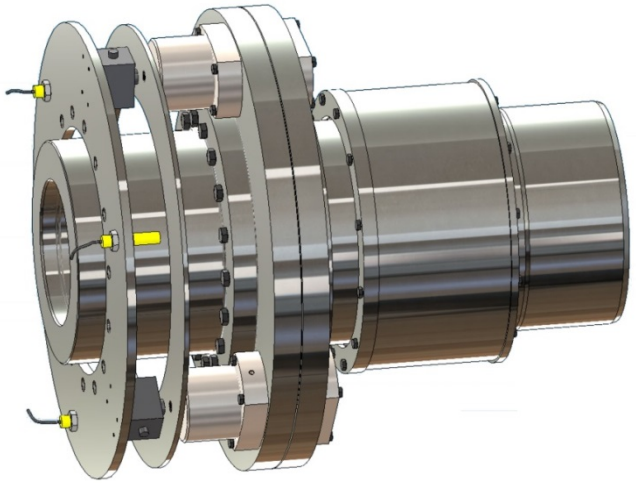
That’s it, ready to run

- Significant reduction of downtimes due to short reset times

Torque transmission path of MALMEDIE Safety Coupling

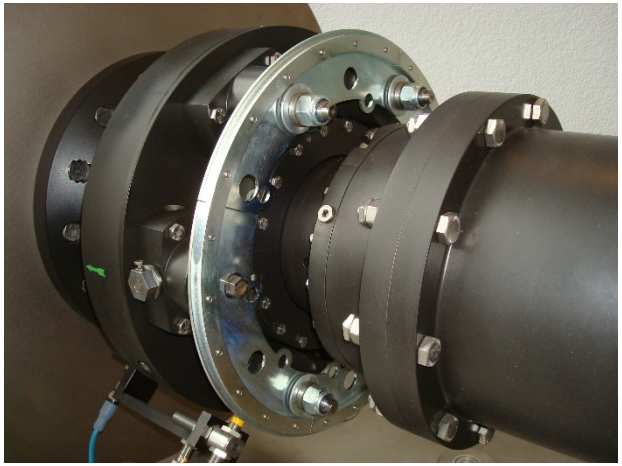


Option - Automatic RESET for Safety-Couplings

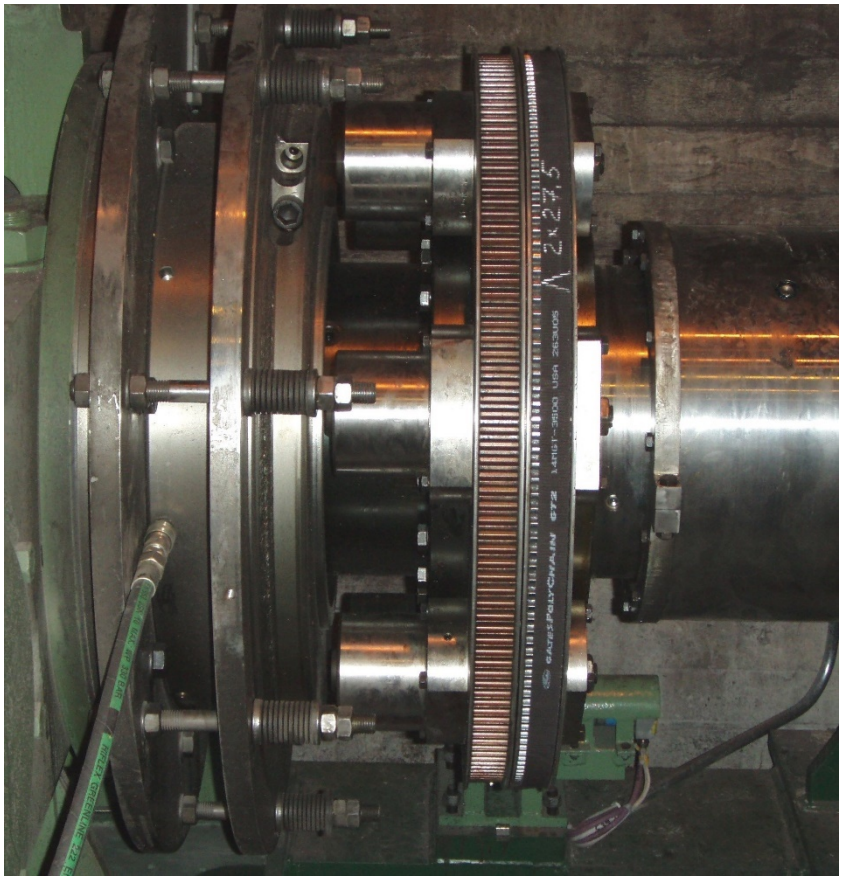


Benefits

- Suits perfectly for hard to access and/ or remote applications
- Significant reduction of downtimes due to short reset times
- Overload event data can be mapped and used for evaluations or findings

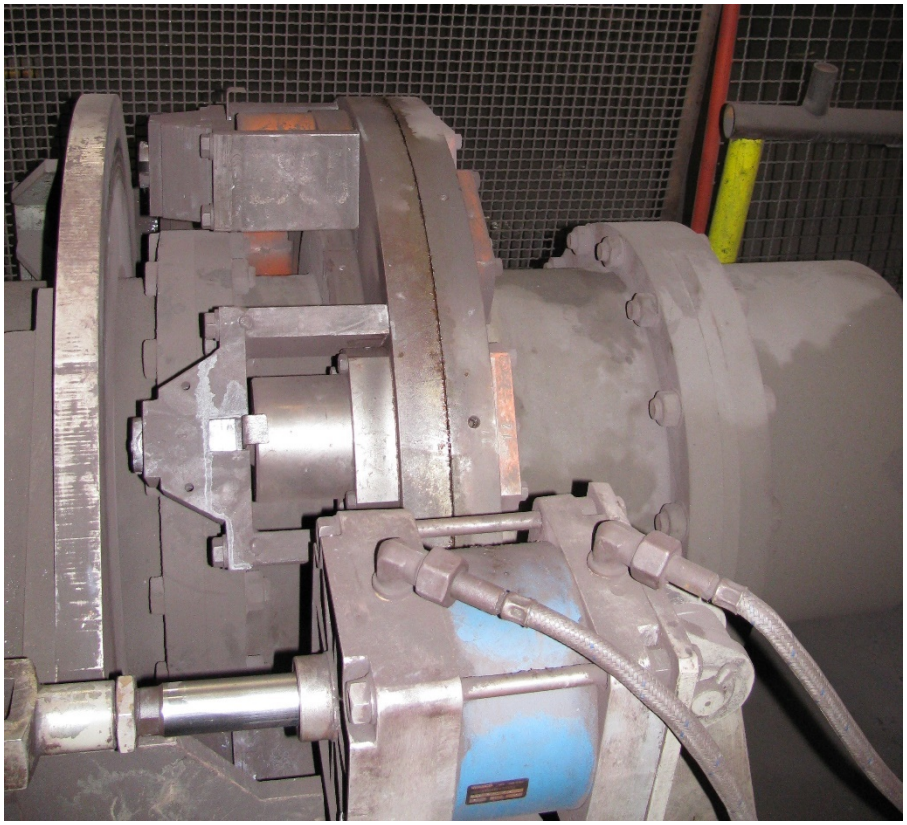


Examples of Automatic RESET for Safety-Couplings



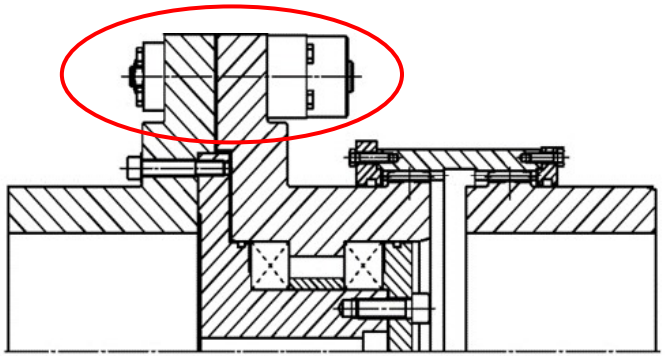
Air powered with belt driven inching drive

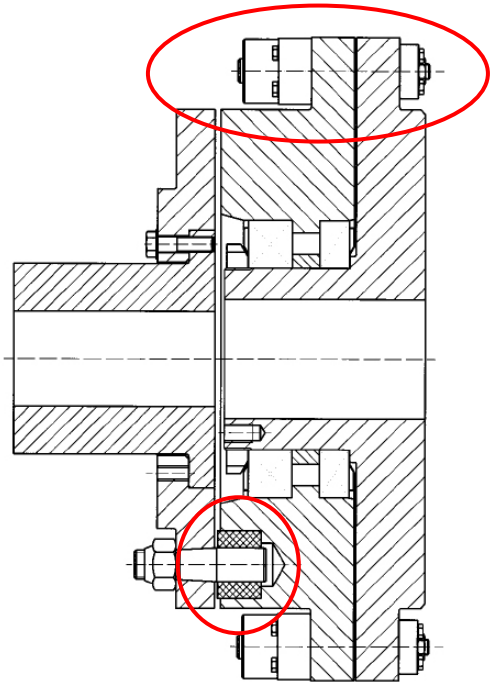
Hydraulic resetting cylinders

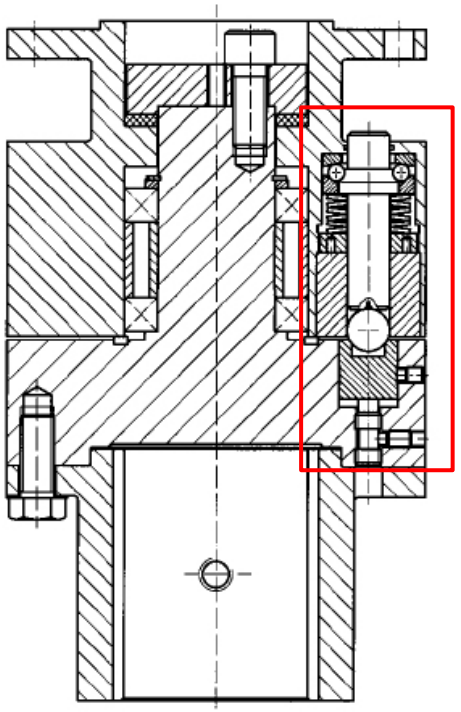


Designs examples and combinations: Unlimited applications

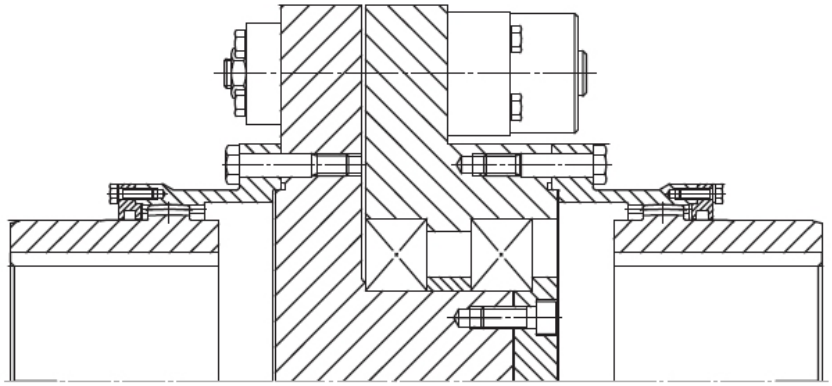
Gear-Coupling with Safety-Elements	Elastic bolt coupling with Safety-Elements	Flange type with integrated Safety-Elements

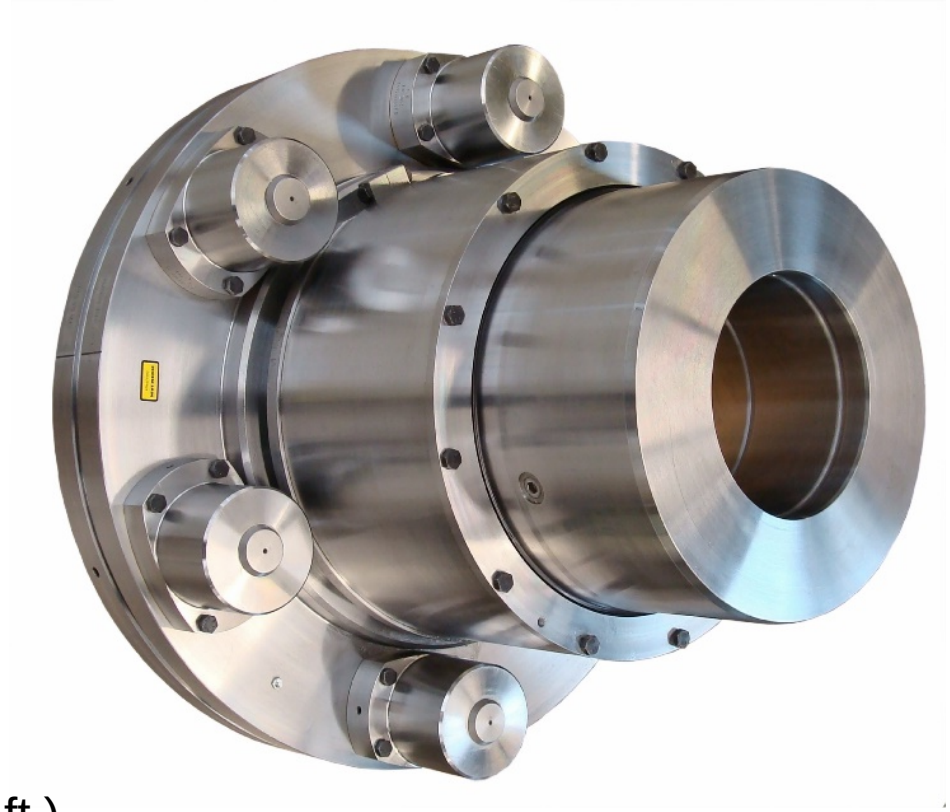






Example: Safety-Gear-Couplings

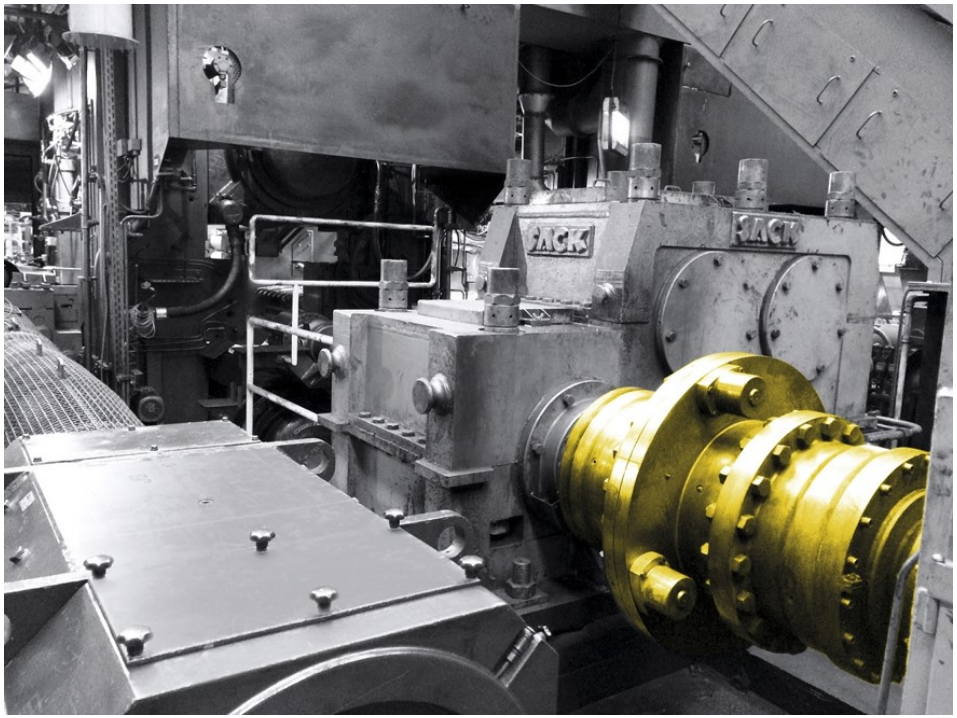




Type SE-GLX

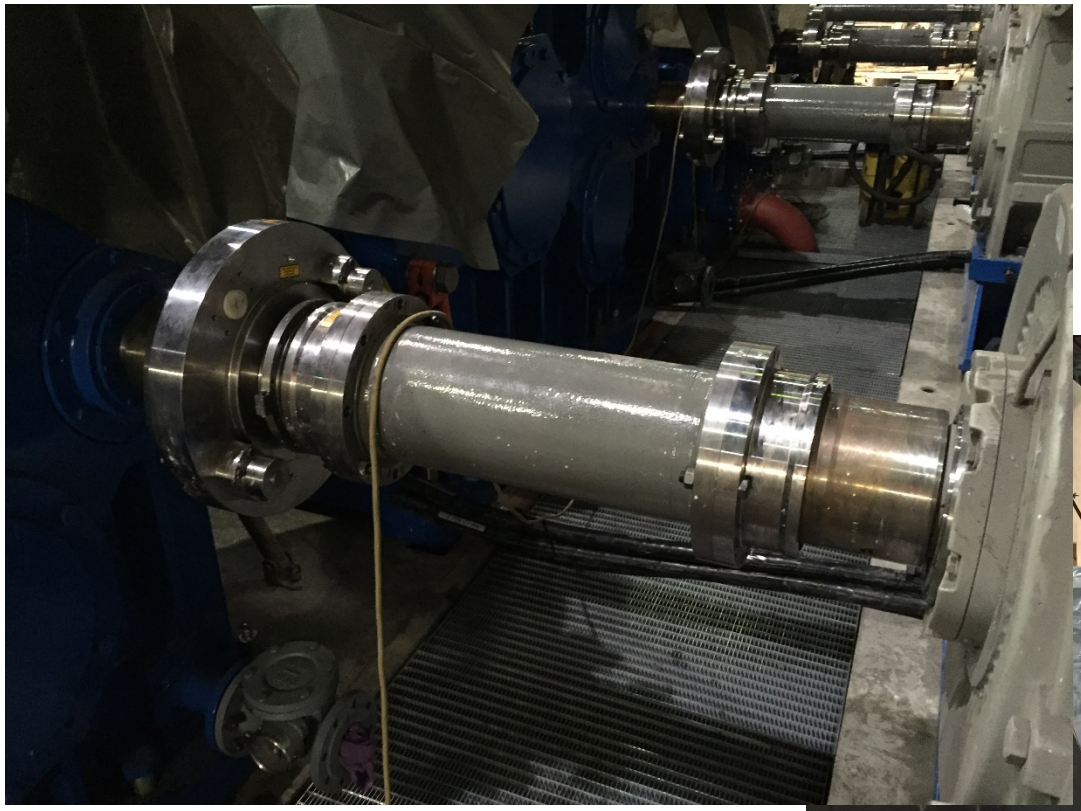
Torques up to 235 kNm (173,300 lb.ft.)
Shut-off torques up to 200 kNm (147,500 lb.ft)

Example: Roughing Mills Safety-Couplings



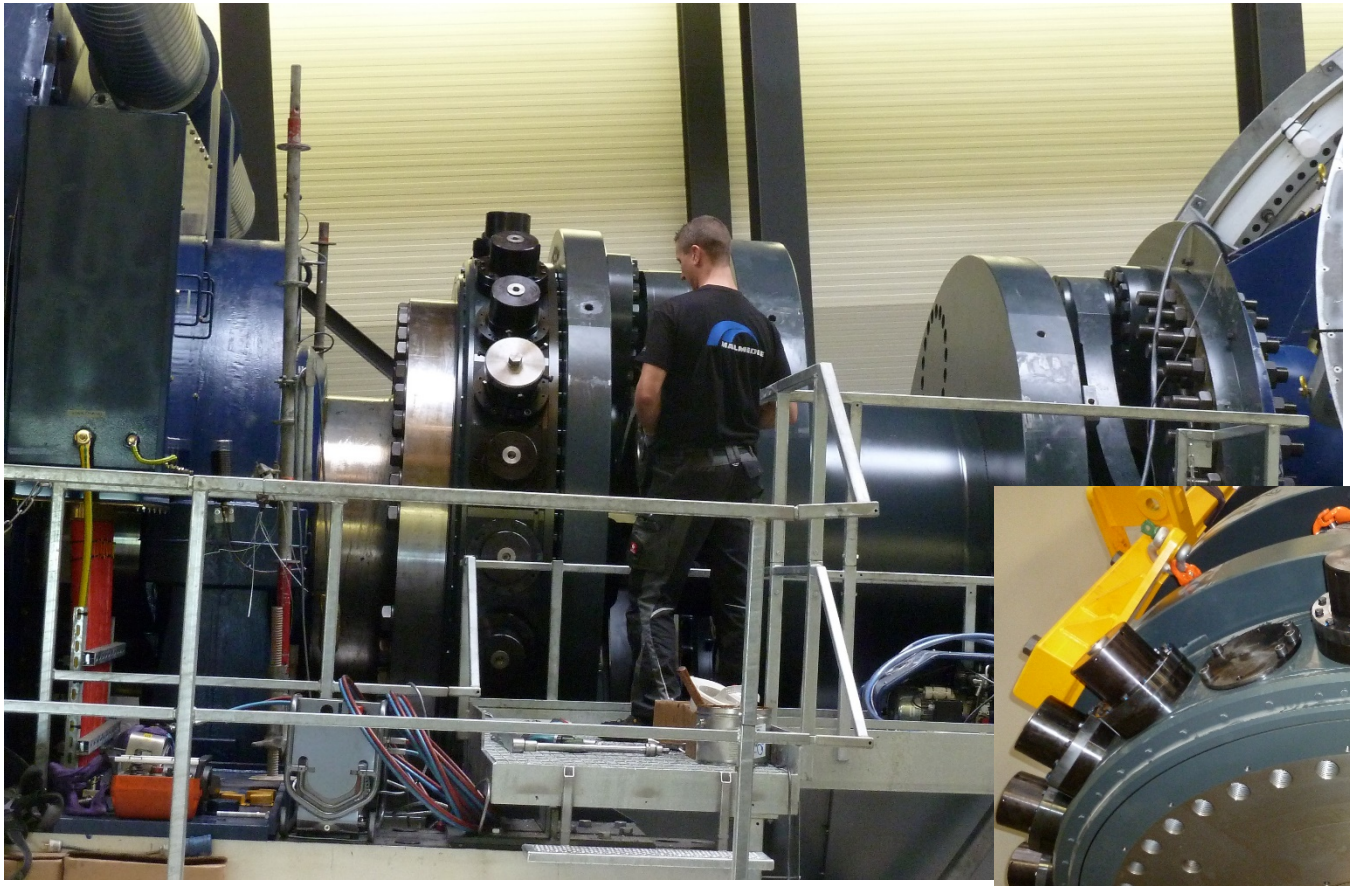
Example: Bar Mill Safety-Couplings

Example: Strip Mill Safety-Couplings



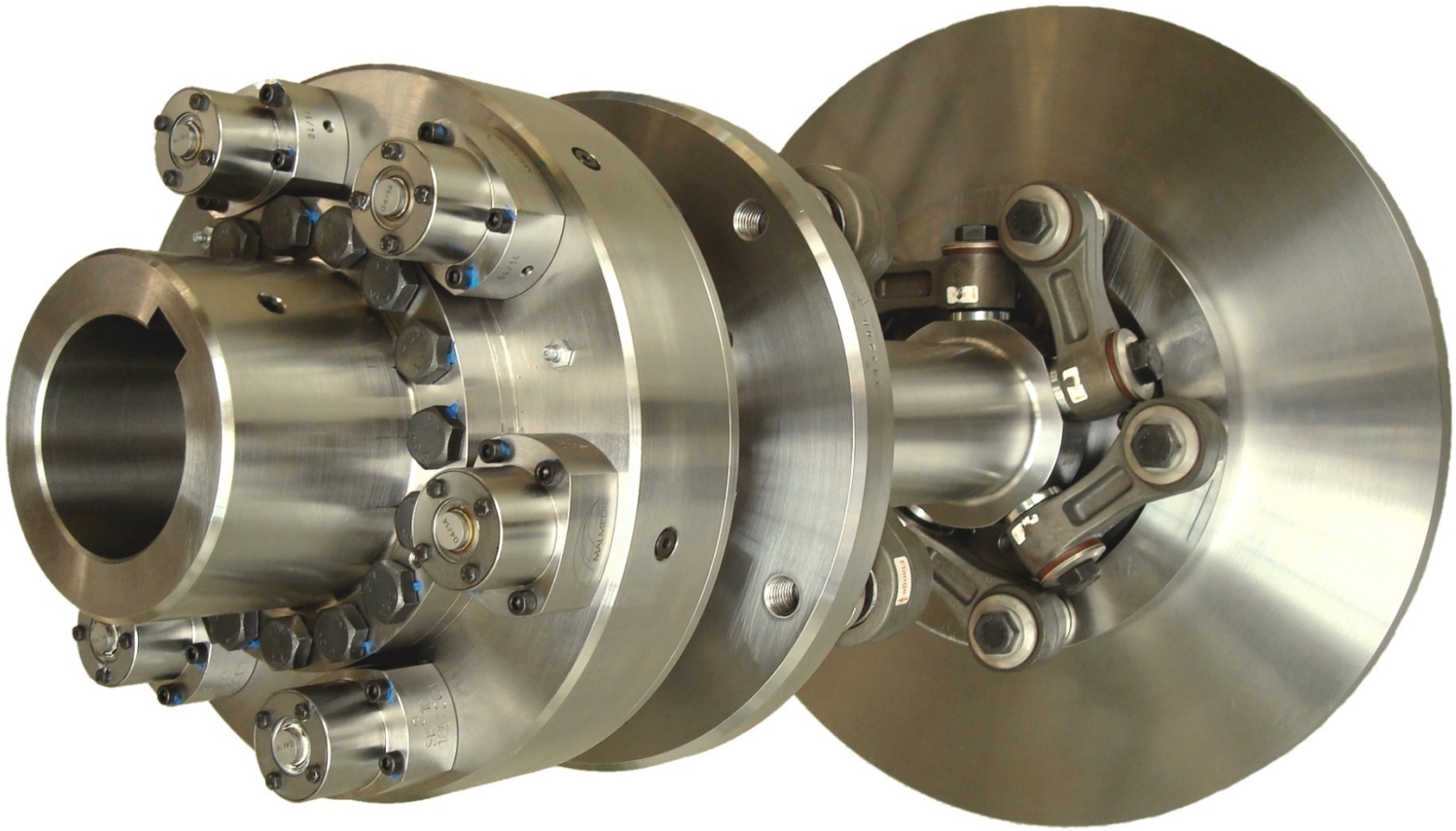
Safety Coupling with Gear Spindle

Example: Wind Turbine Test Stand with Safety-Couplings

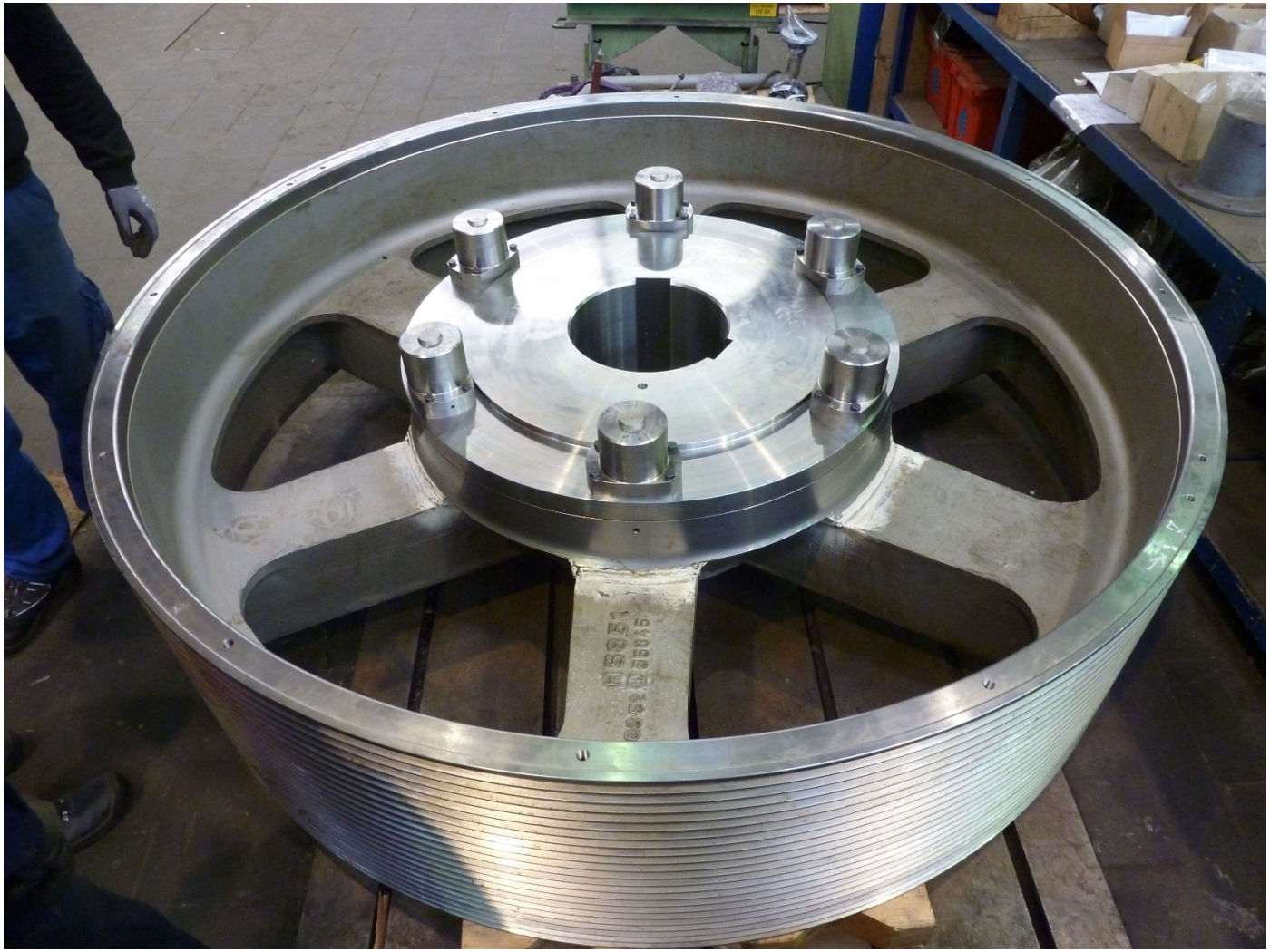


Over 10,000,000 ft./lbs.

Special Example: Safety-Couplings with CentaLINK and Brake Disc



Special Example: Safety-Coupling with Rope Drum



Other Solutions: Replacement of Universal Joints

Universal Joint Head replaced by Gear-Joint-Head

Customer: SSAB Steel Sweden
Service life with cardan shaft head: approx. **6-8 month**
Service life with Gear-Joint head: approx. **6-8 years**

10 x longer wear life !

Gear-Joint-Head Type AKNX 220
Max. torque = 9300 kNm (6,859,300 lb.ft.)

Max. possible angular deviation = +/- 2.5°

CONNECTING POWER

AT ITS SAFEST

Thank you for your attention

Email: info@malmedie.com