

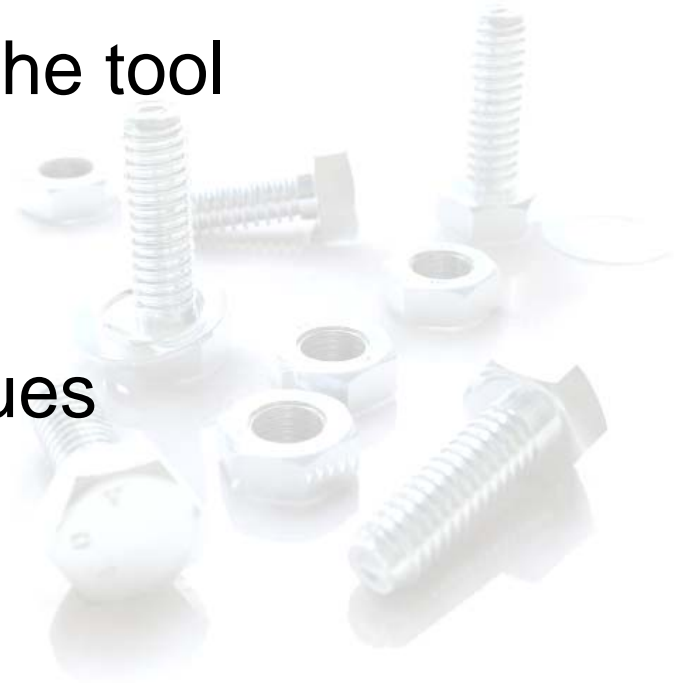


Simon Cole

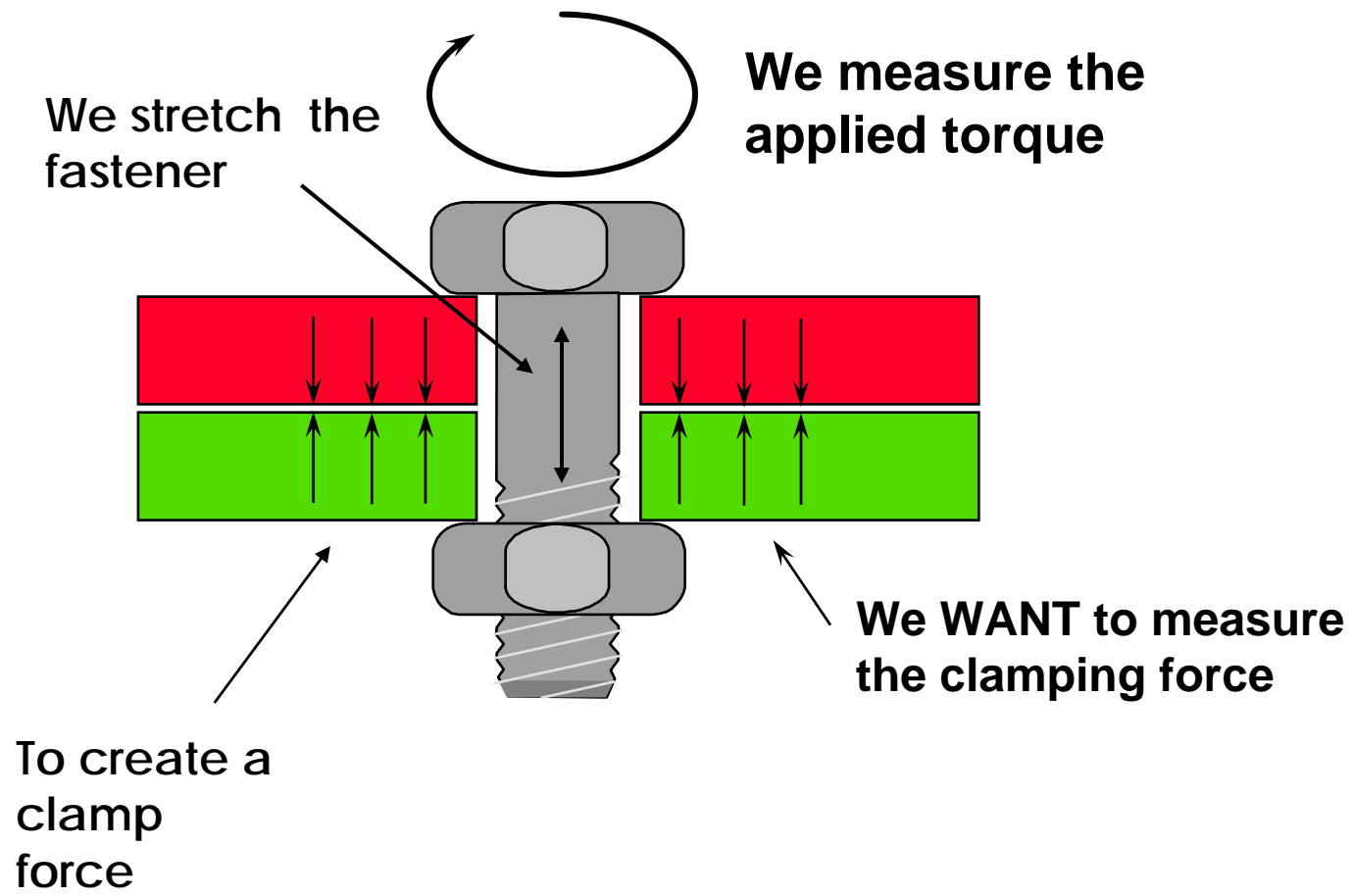
- Engineering Apprentice
- 15 yrs experience with nut running systems
- Working for the leader in motor vehicle threaded fastener assembly tools & systems

Topics for discussion

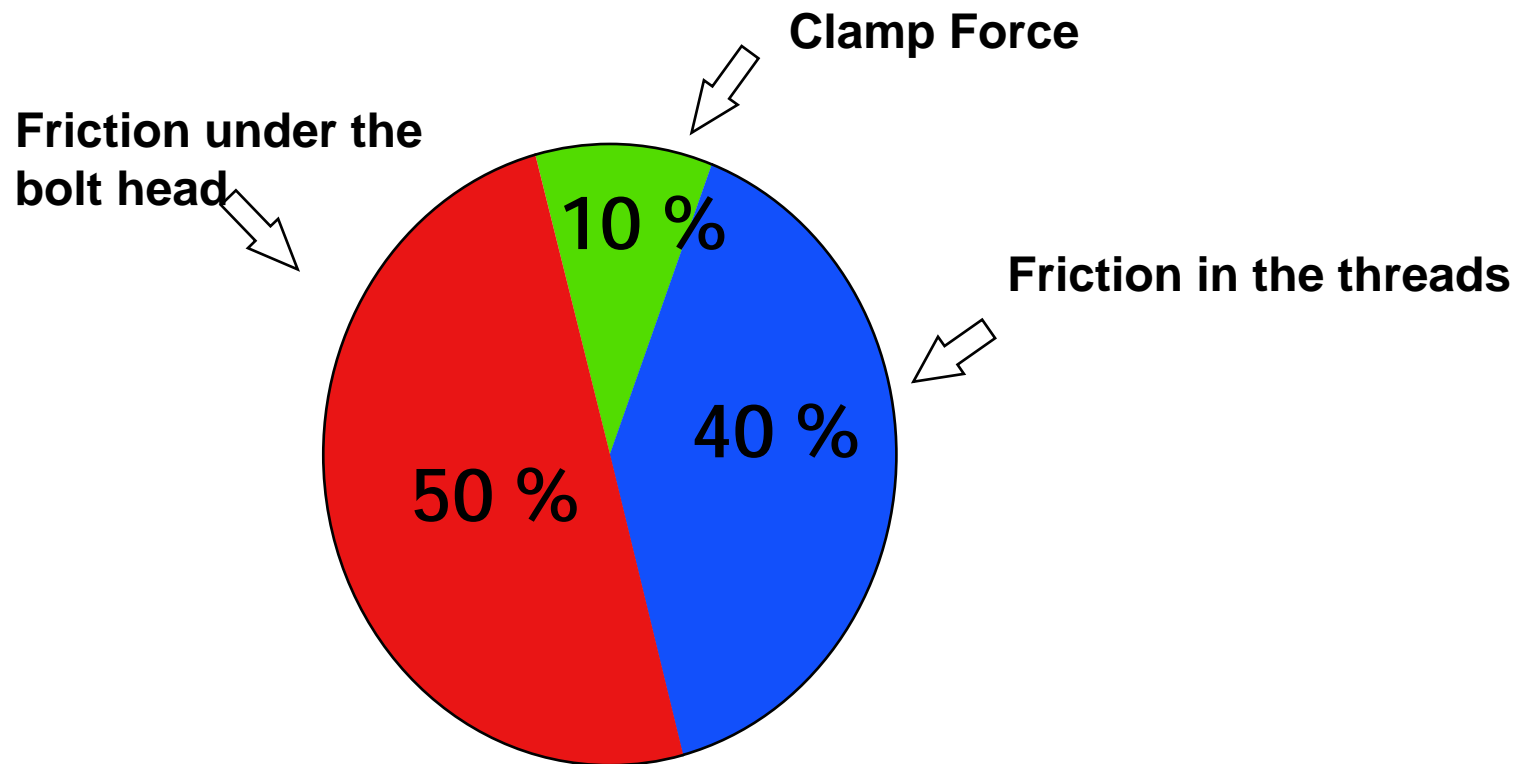
- Threaded fastener basics
- How different joints affect the tool
- Tightening strategies
- Tool selection
- Motor Vehicle Industry issues
 - Traceability
 - Zero fault production
 - CR6+Free coatings



The threaded fastener



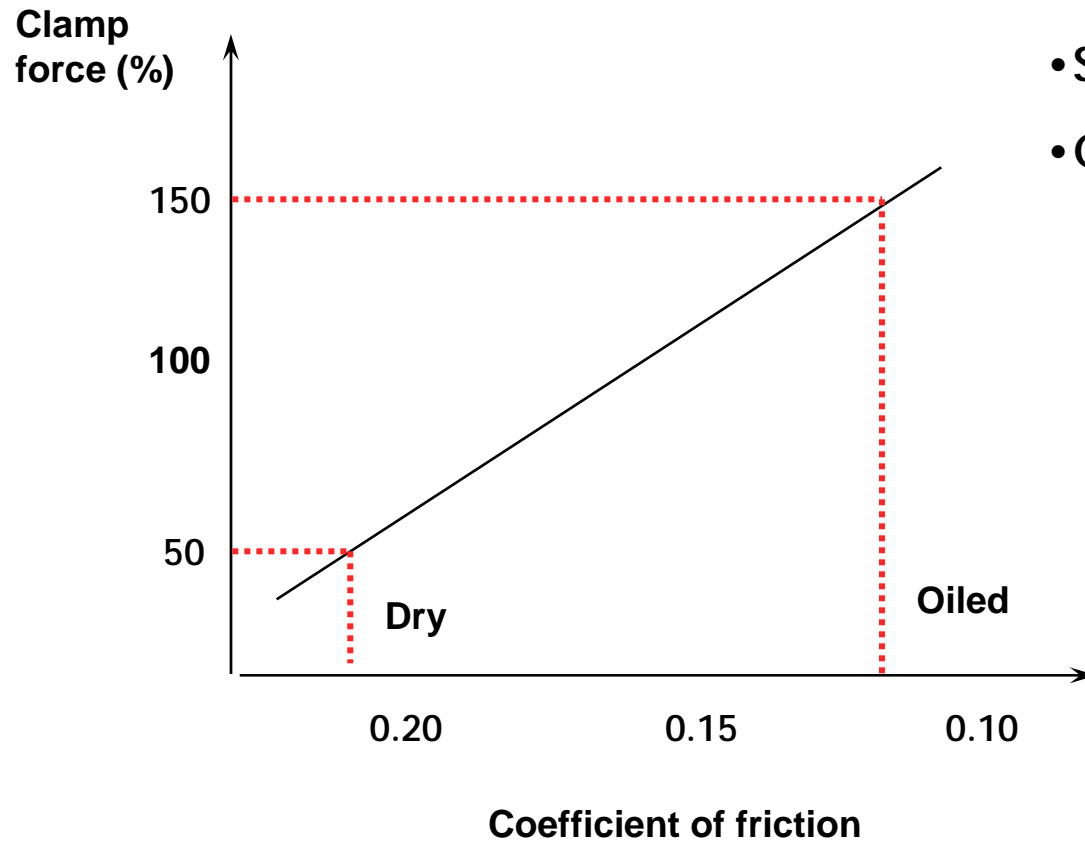
Relationship between applied Torque and resulting Clamp Force



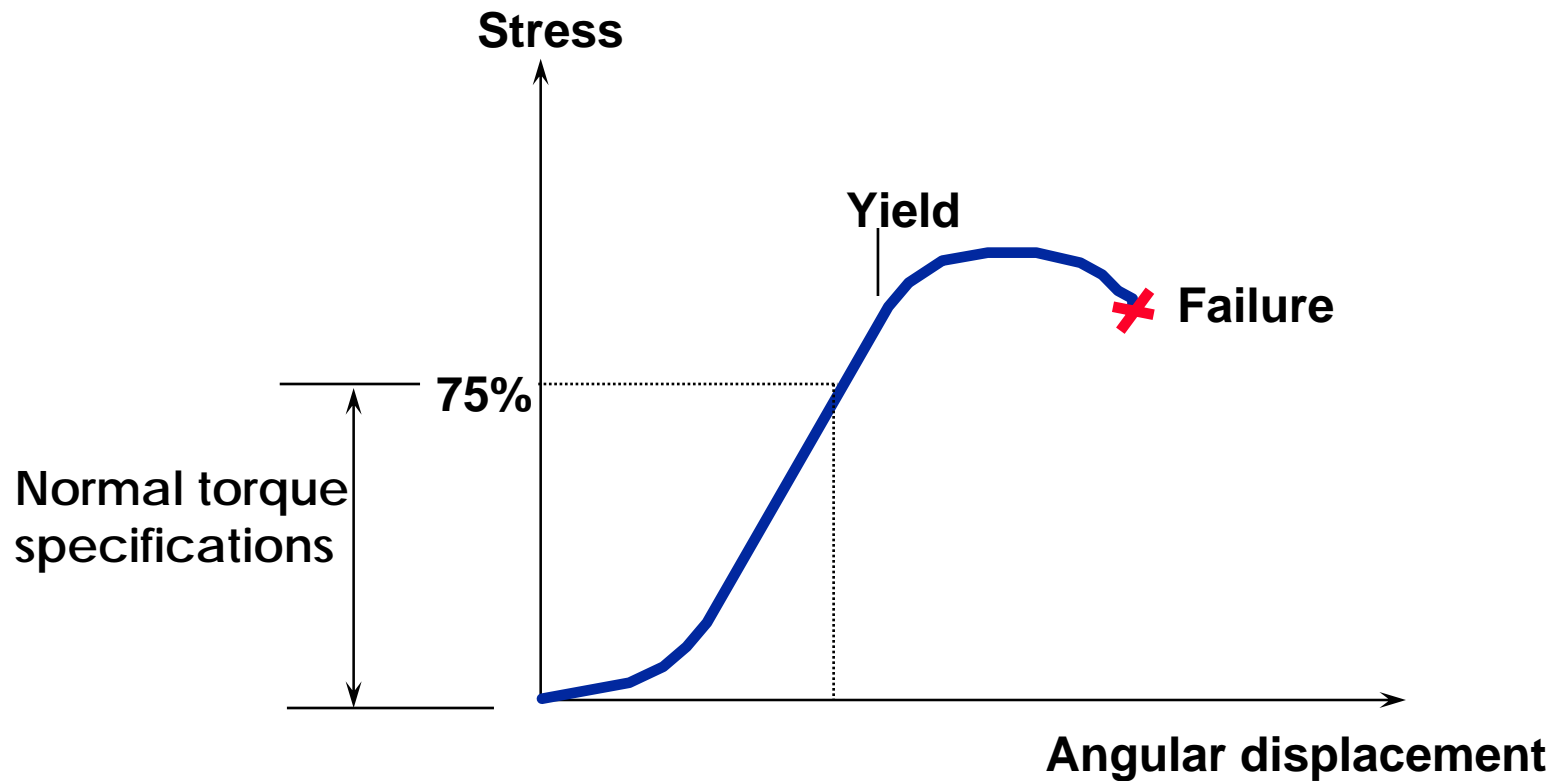
Effects of friction on clamp force

Friction variables:-

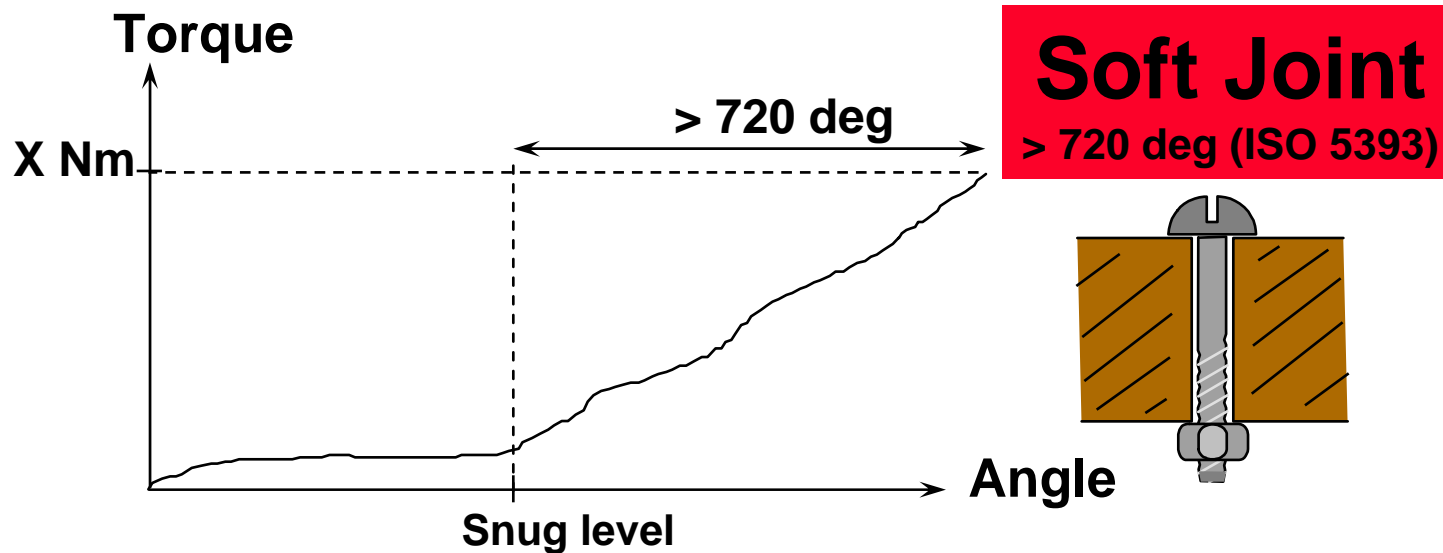
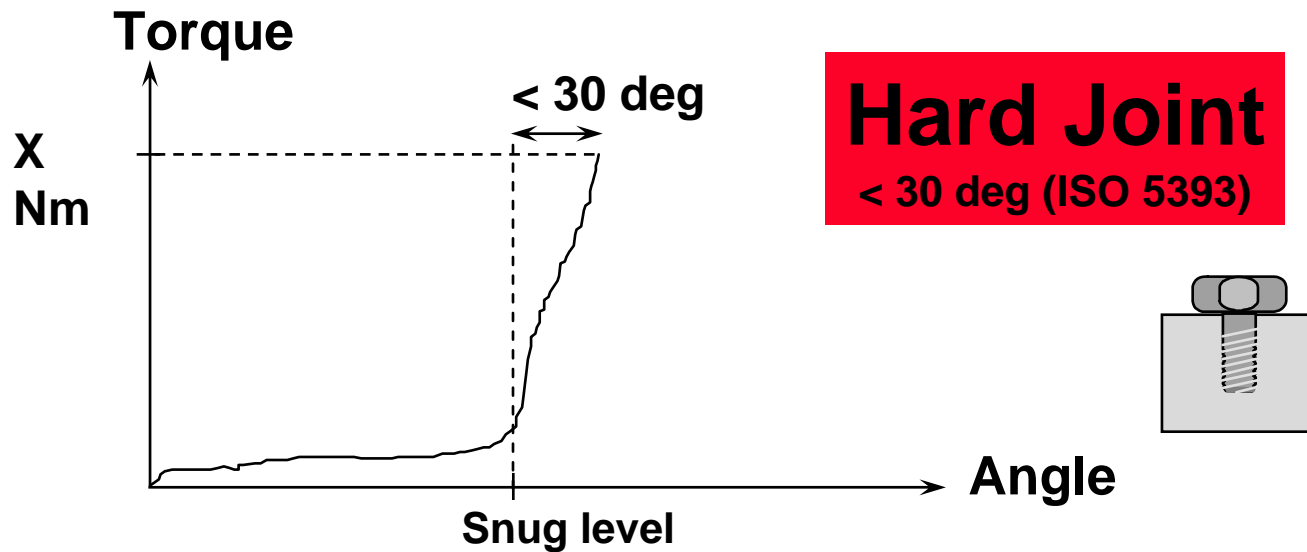
- Bolt coating
- Lubrication
- Surface finish
- Component Alignment



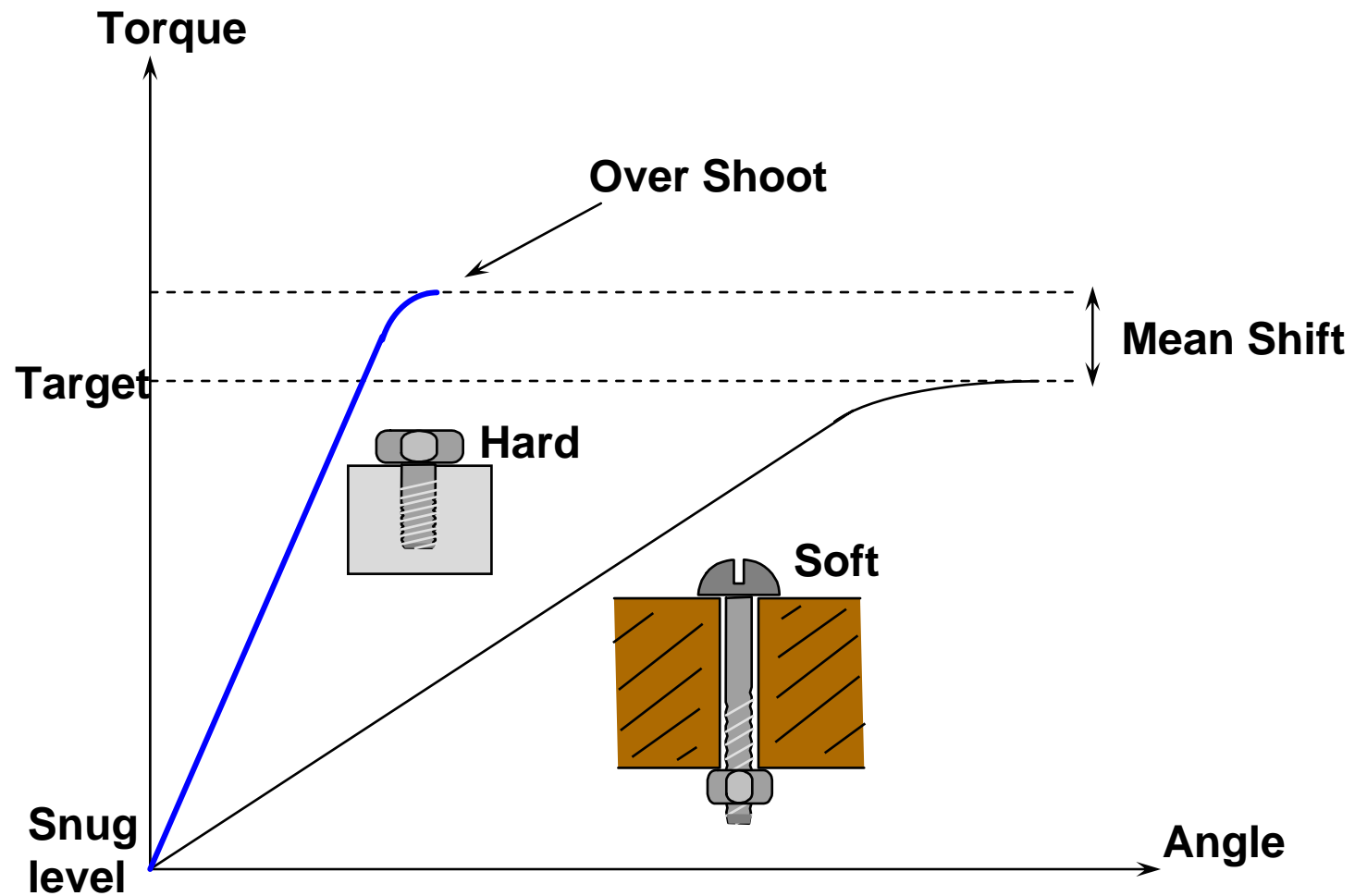
Tensile Stress / Yield Stress



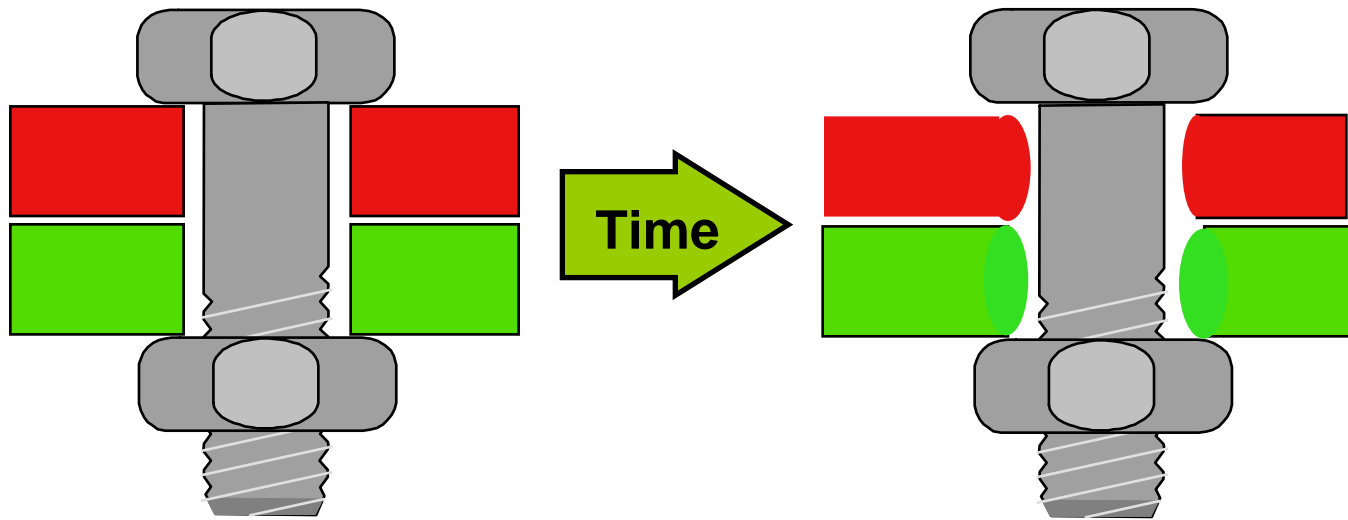
ISO 5393 – Testing of threaded fastener power tools



Hard and Soft joints



Relaxation



The material relaxes and you risk to loose clamping force!

Combating Relaxation

- Increase installation torque
- Retightening the fastener
- Using two stage fastening with a relaxation pause
- “Dynatorque”
- Joint conditioning



Prevailing torque

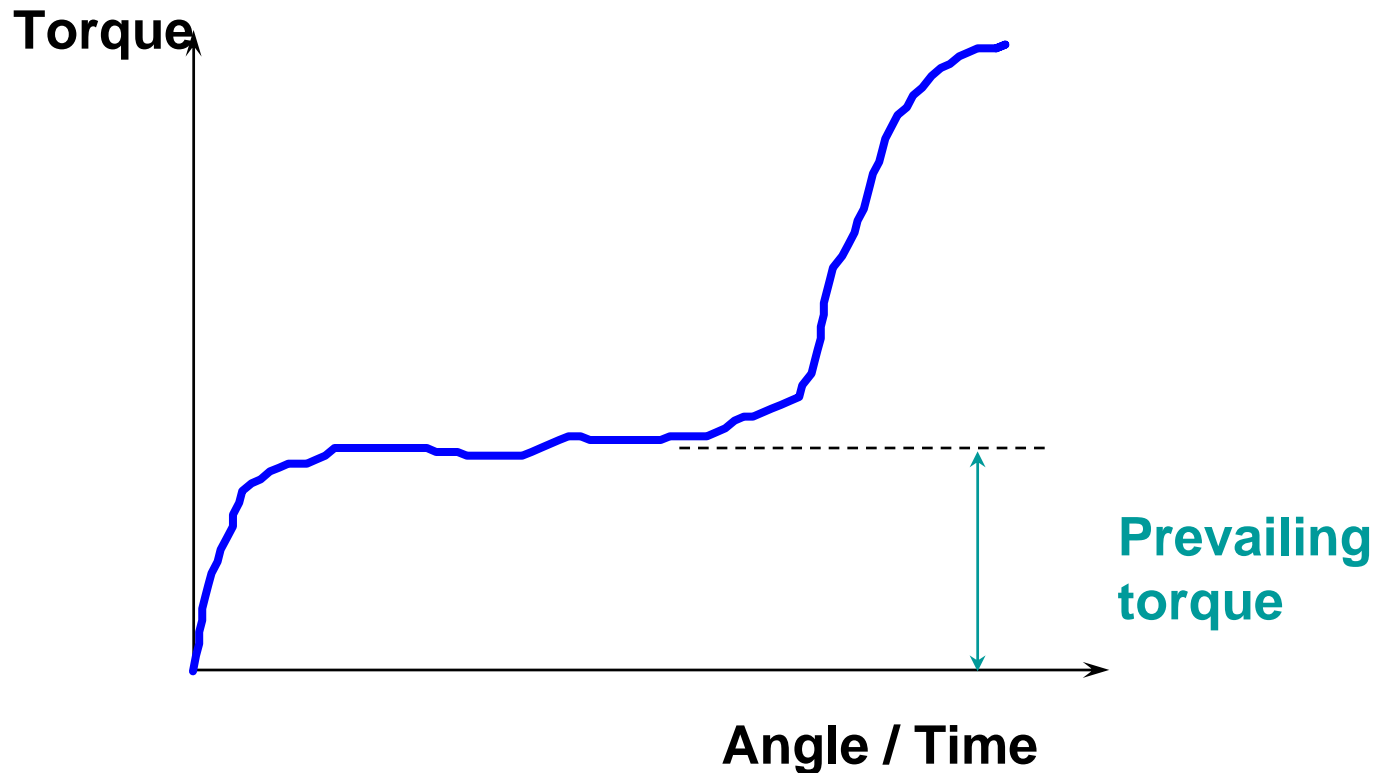
Torque to drive the fastener due to :-

- Thread locking systems
- Thread forming screws
- Misalignment of parts

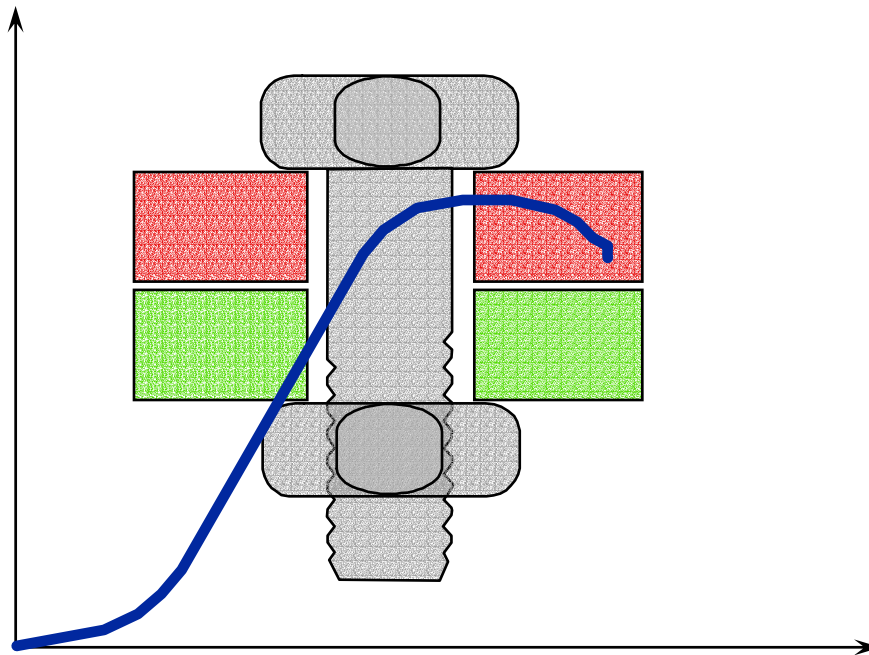
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Affects Tool selection

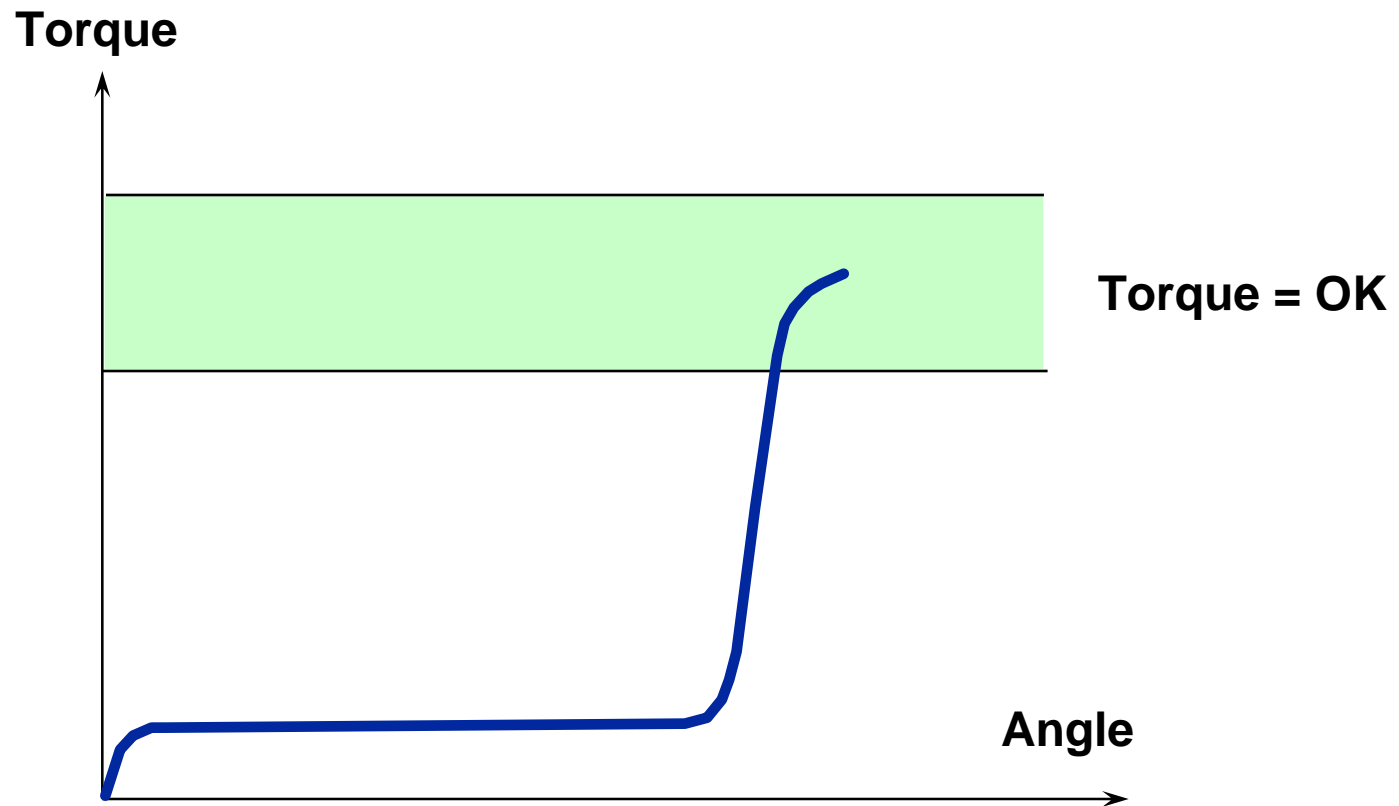
- Rundown speed
- Heat
- Detection of normal joint



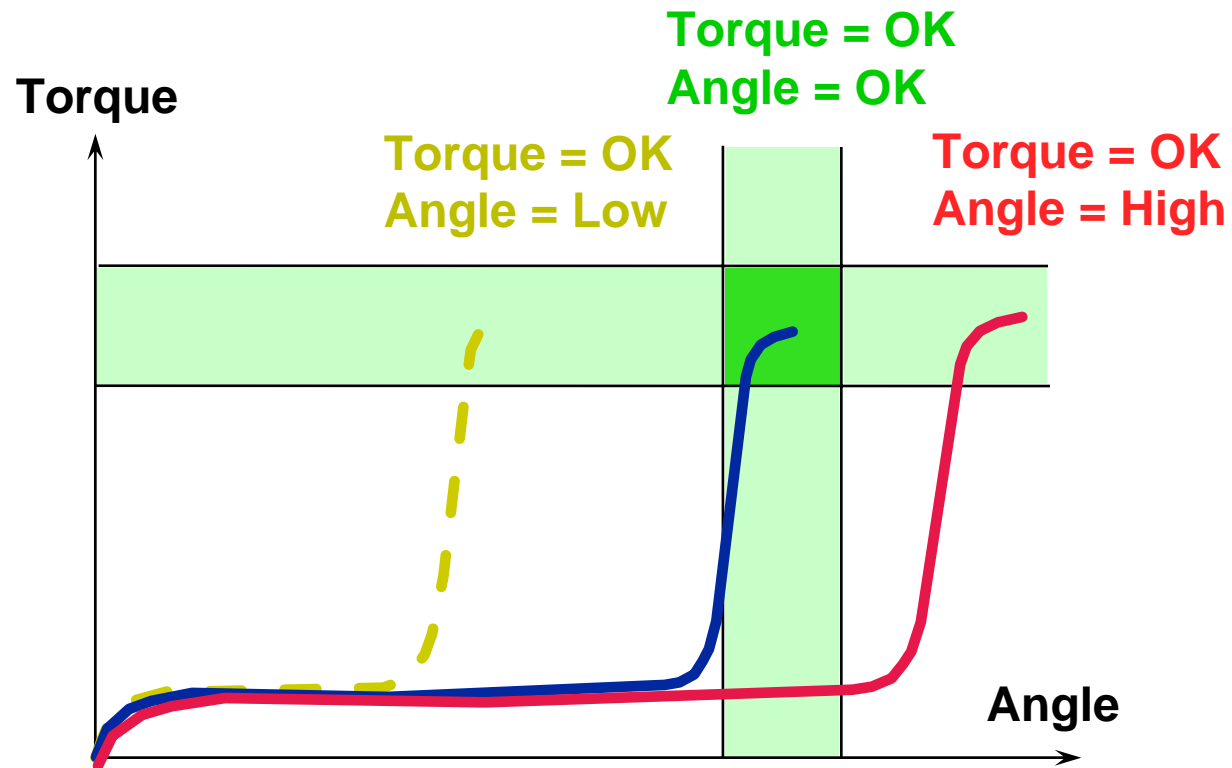
Tightening Strategies



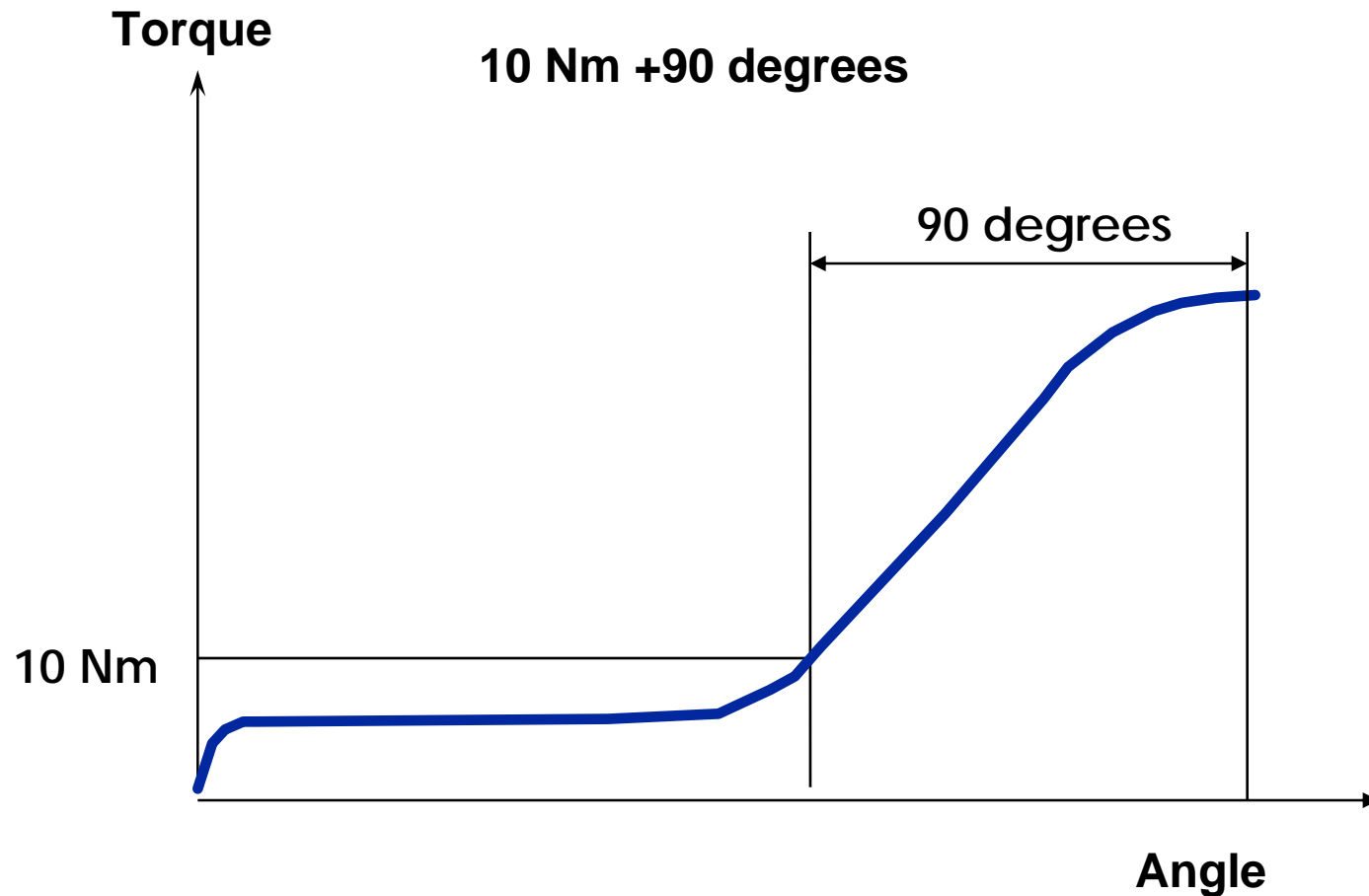
Torque Control



Torque + Angle Monitoring Detects reject parts

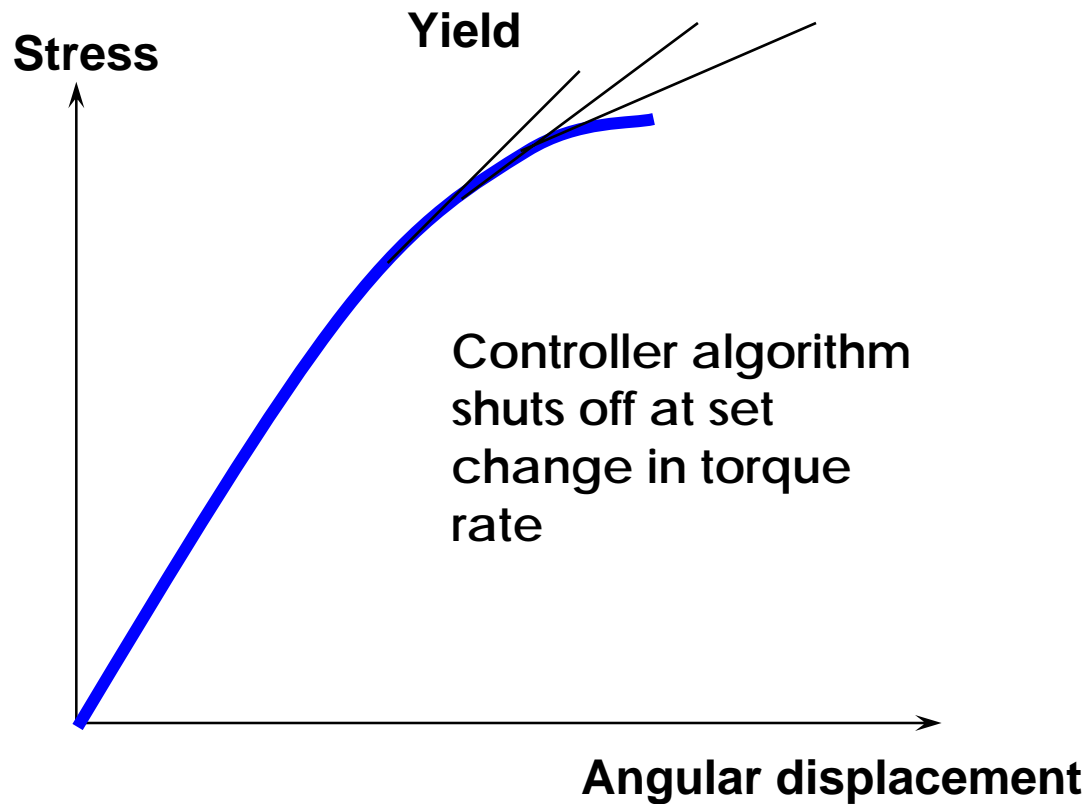


Torque + Angle Control Increases clamp force accuracy



Yield Control

The best clamp force accuracy



Tool selection

- Choosing the correct tool is not easy
- There is no one-size fits all solution
- Productivity, ergonomics and quality must all be considered



Choosing the right tools for the job



Technical Capability Index

	Shut off Pneumatic	Pulse tool + Controller	DC Non Transdxr	DC Transdxr
Accuracy	+/- 12.5 %	+/- 15%	+/- 10 %	+/- 5 %
Reaction support required	7Nm+	NO	7Nm+	7Nm+
Operator feedback	No	Yes	Yes	Yes
Torque settings	1	Yes	6	15
Batch counting	No	Yes	Yes	Yes
Line control	No	Yes	Yes	Yes
Green window (in limits)	No	Yes	Yes	Yes
Angle counting	No	Yes	Yes	Yes
Complex fastening	No	No	No	Yes
Statistics	No	No	No	Yes
Traceability	No	No	No	Yes
Data transfer	No	Status only	Status only	Yes

Motor Vehicle Industry Issues



Traceability



New legislative demands;

US legislation – The TREAD Act



National Highway Traffic Safety Administration
United States Department of Transportation

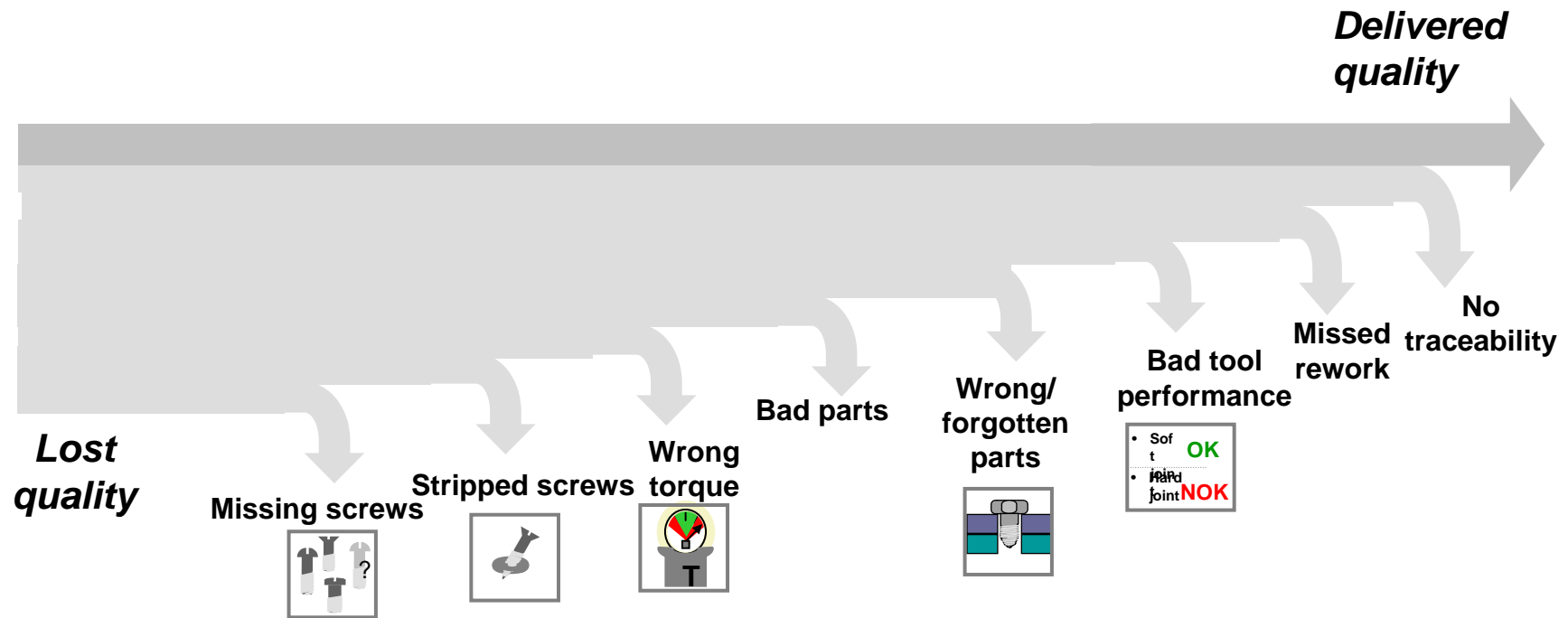
- The TREAD Act applies to manufacturers in and exporters to the US.
- Reaction to the Firestone tyre/Ford Explorer accidents
- It is valid for vehicle, bus, truck & motor cycle manufacturers & suppliers
- Must report any non compliance or defect in 24 categories (airbag, steering, powertrain, etc) within 5 days

ICS 25.140.00; 43.020		VDI-RICHTLINIEN		Juli 1999 July 1999	
VEREIN DEUTSCHER INGENIEURE	Einsatz von Schraubssystemen in der Automobilindustrie	Application of fastening systems in the automotive industry		VDI 2862	Ausg. deutsch/englisch Issue German/English

Fool Proofing



A few general problems occur within the assembly industry



Five steps to zero fault fastening

Quality Critical – the vast majority of joints

Step 1
Torque OK



Step 2
Batch OK



Step 3
Joint OK



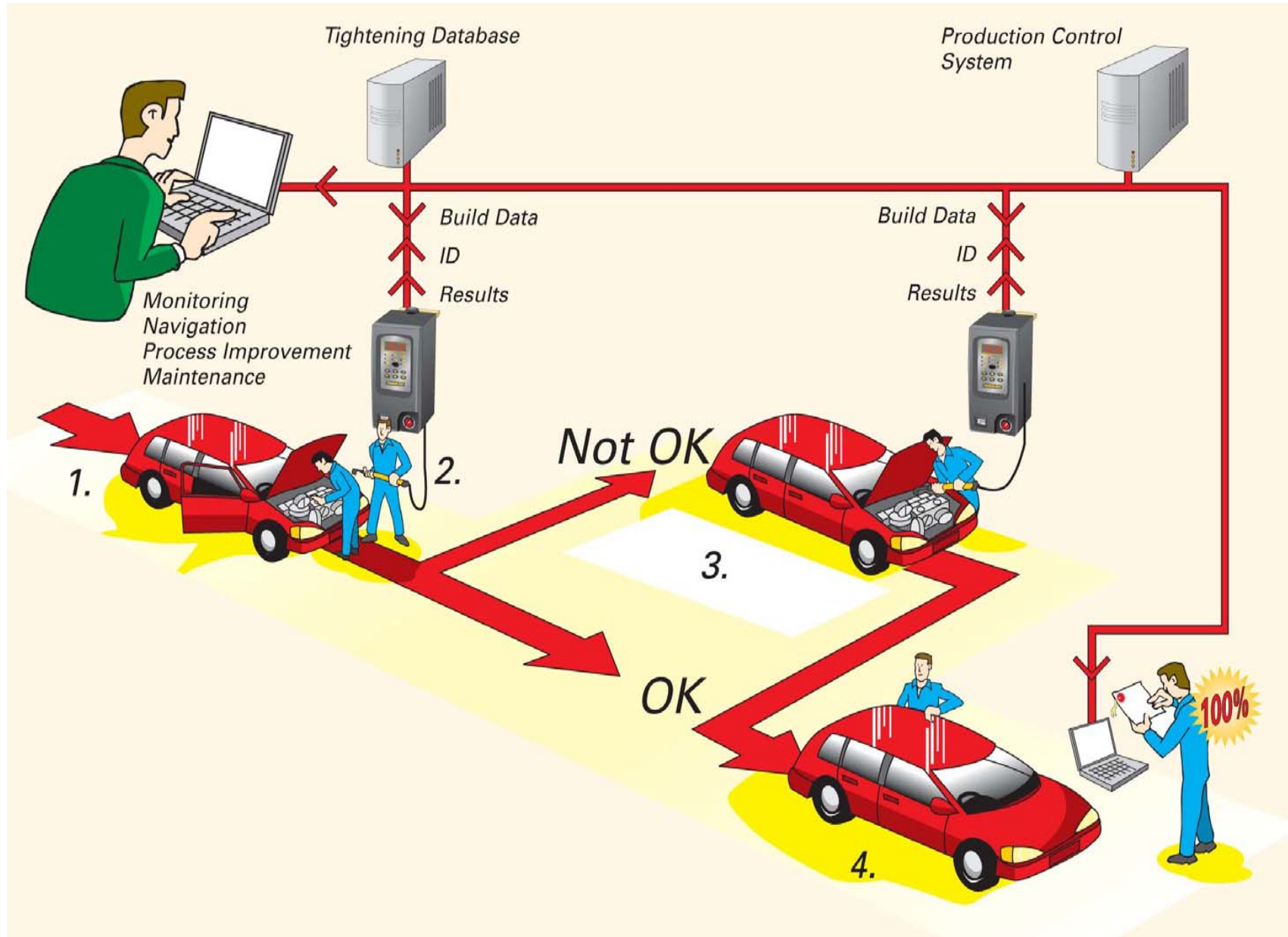
Step 4
Safety critical OK
(Data collection)



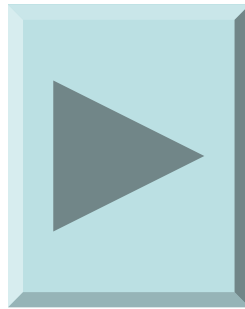
Step 5
Zero fault fastening
(Controlled rework)



Step 5. To assure zero fault fastening



Example BMW Mini Oxford Plant



Cr6+ Free coatings

- Study in US showed 15% of joints required torque change
- 66% of the changes were so great they needed different equipment
- Lack of knowledge & awareness of possible impact
- Lack of testing
- Passing the responsibility down the supply chain

