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COMPONENT SOLUTIONS

New perspectives for axial bushings in stabiliser linkages

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Maclean-Fogg Component Solutions GmbH

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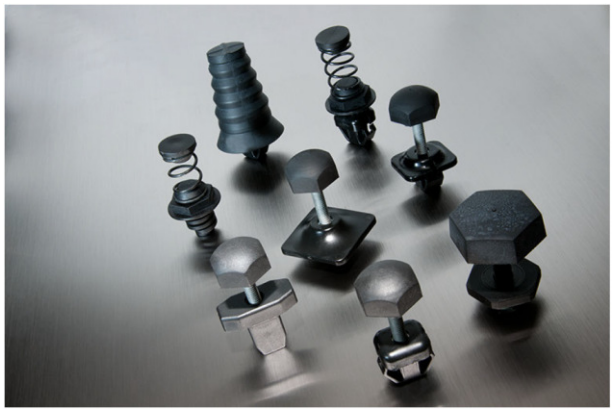
About MFCS

Global automotive supplier

- Suspension linkages
- Sensor linkages
- Fasteners

MFCS Liederbach

- R&D for suspension and sensor linkages



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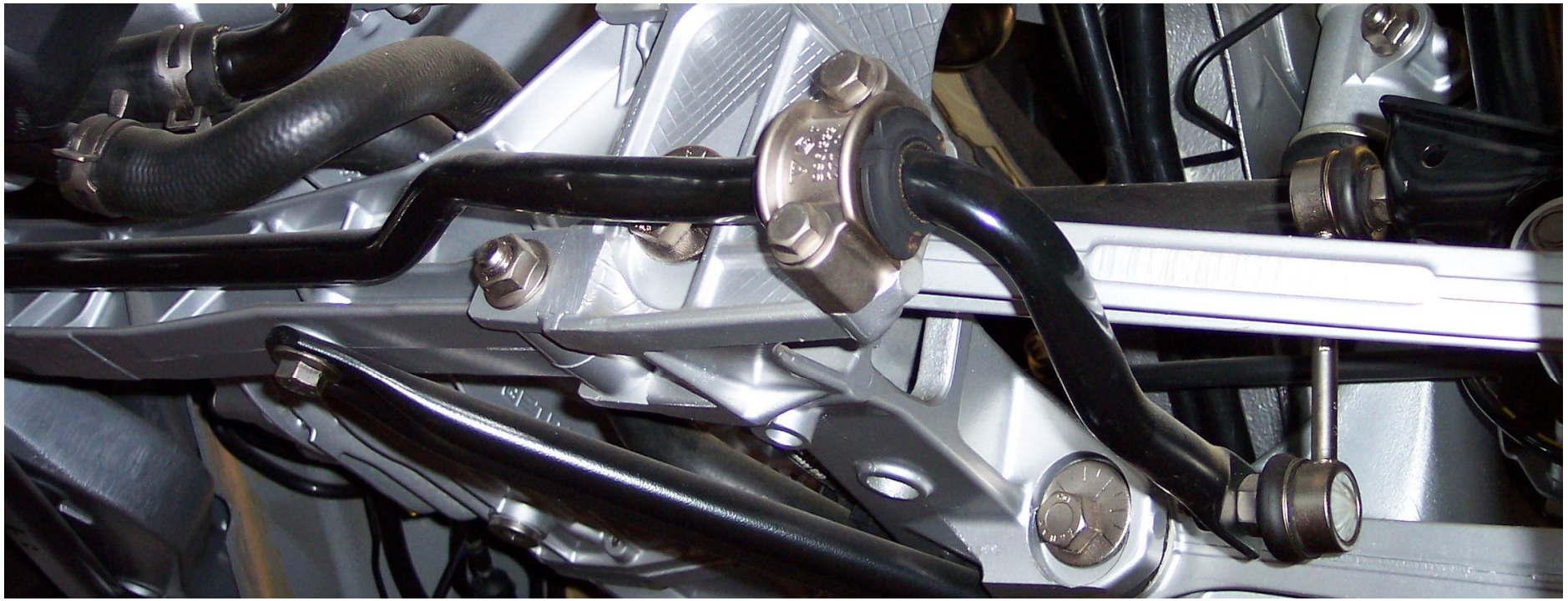
Task of a stabiliser link

...to hold two chassis hard points that move in different curves in a predefined distance to each other.

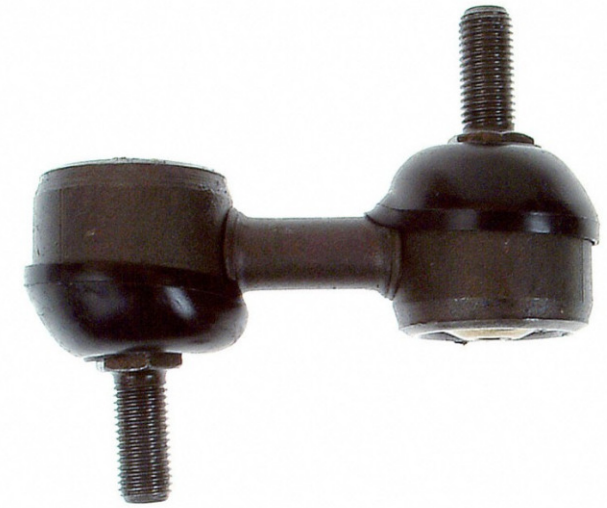
>> High axial stiffness
>> Low bending stiffness



Designs on the market today

Ball joint

- High axial stiffness
- Bending stiffness only ball joint friction
- Complex design
- Durability issues
- Interface issues



Radial Bushing

- Acceptable axial stiffness
- Bending stiffness highly dependent on orientation
- Good durability
- Interface issues

Axial Bushing

…

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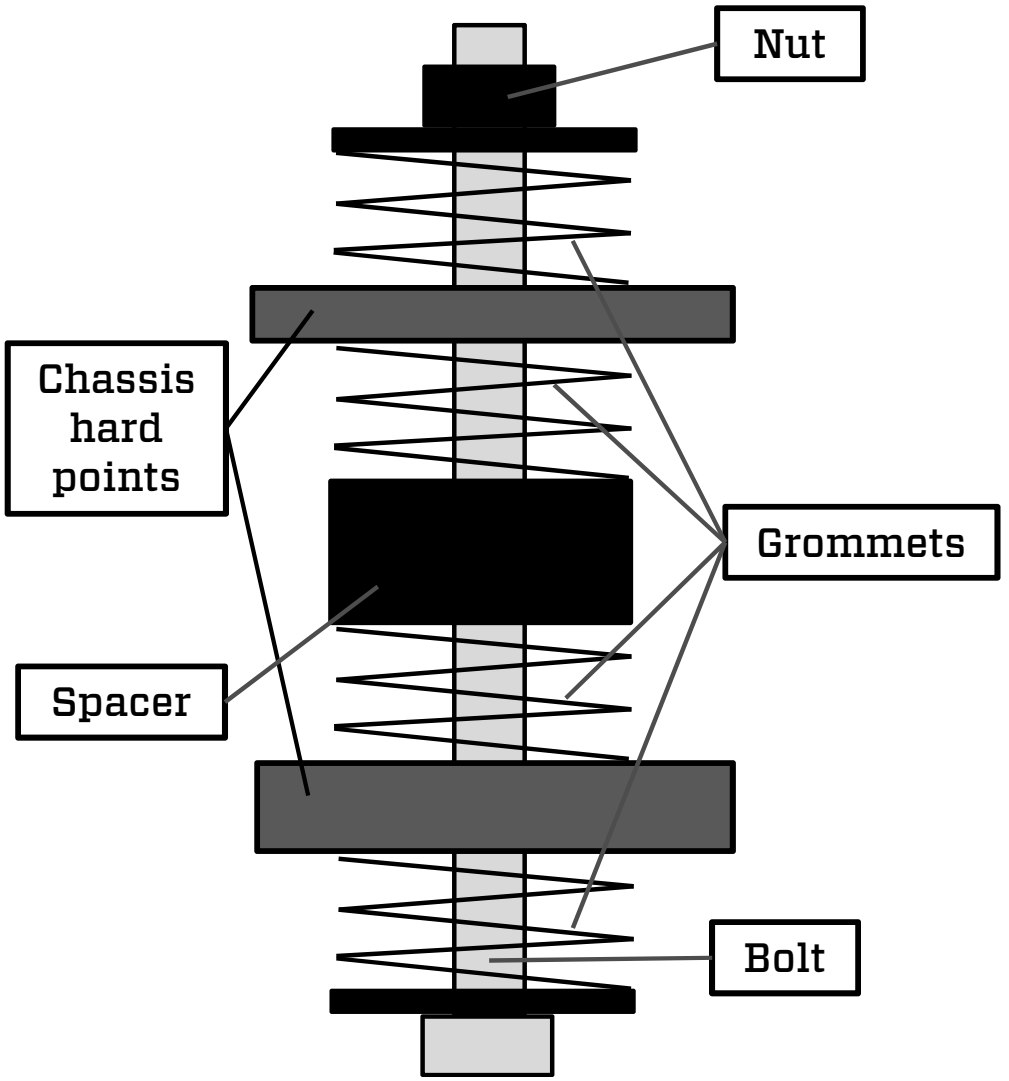
Basic layout/ mechanical model

Example for a axial bushing design



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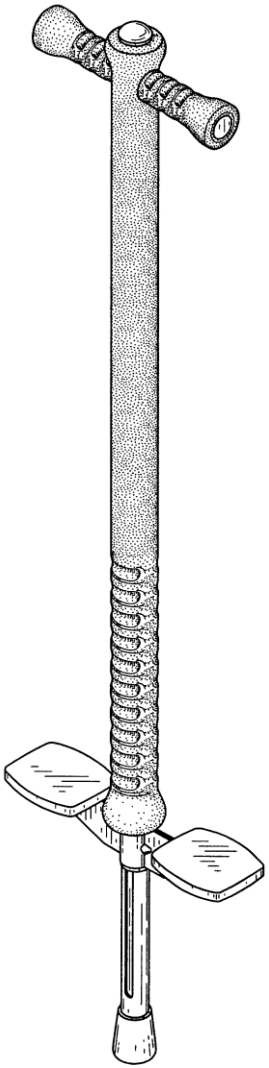
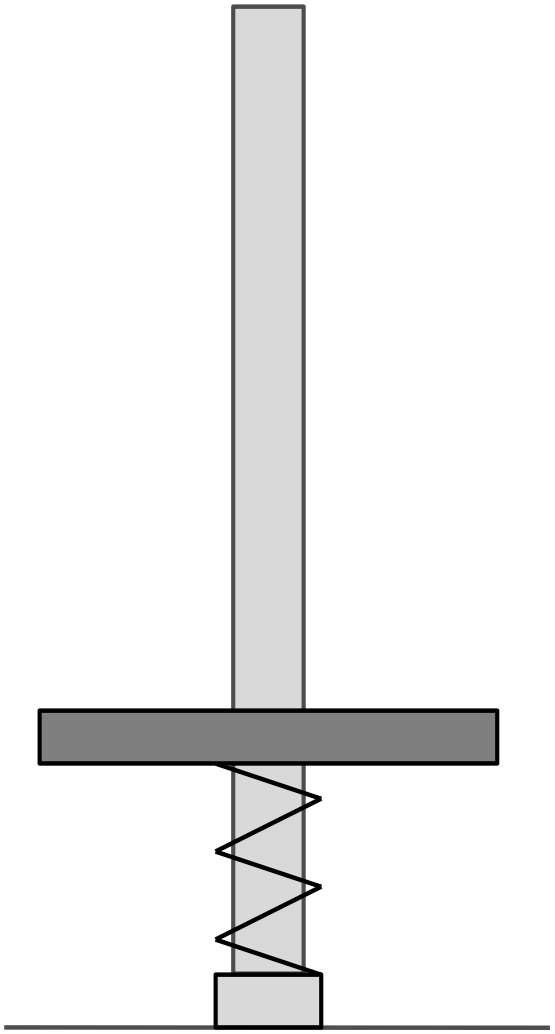
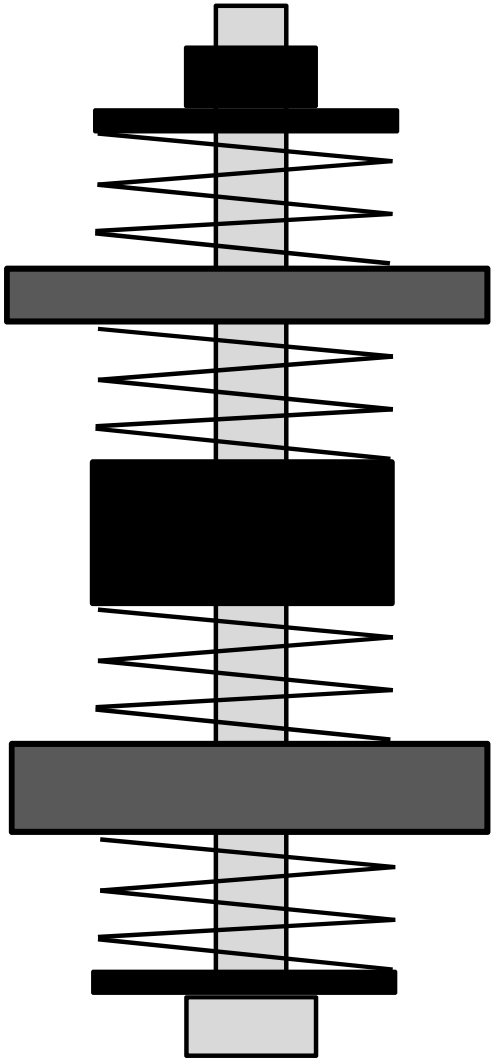
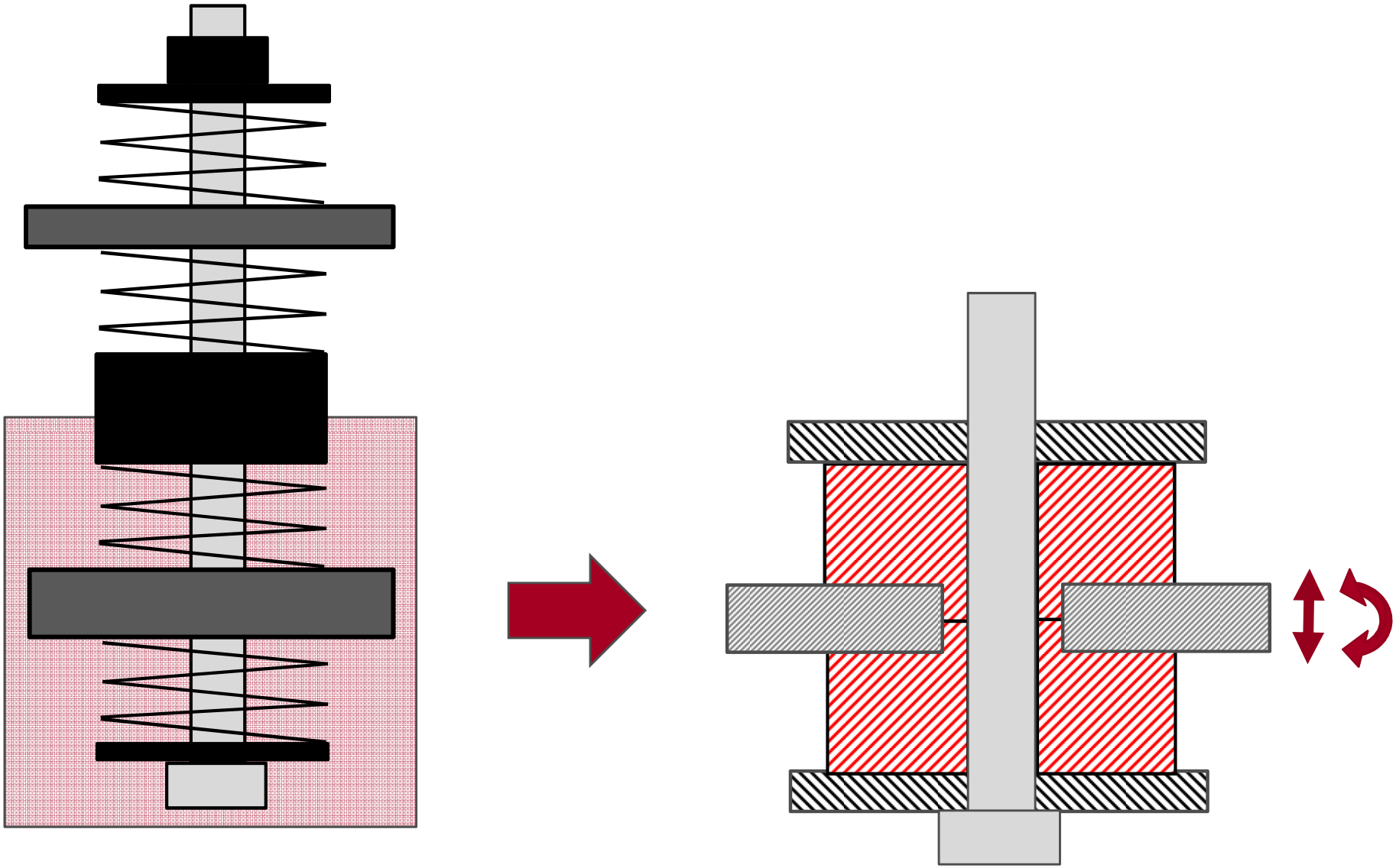
From Pogostick to PogoStik







Mechanical model / cut section



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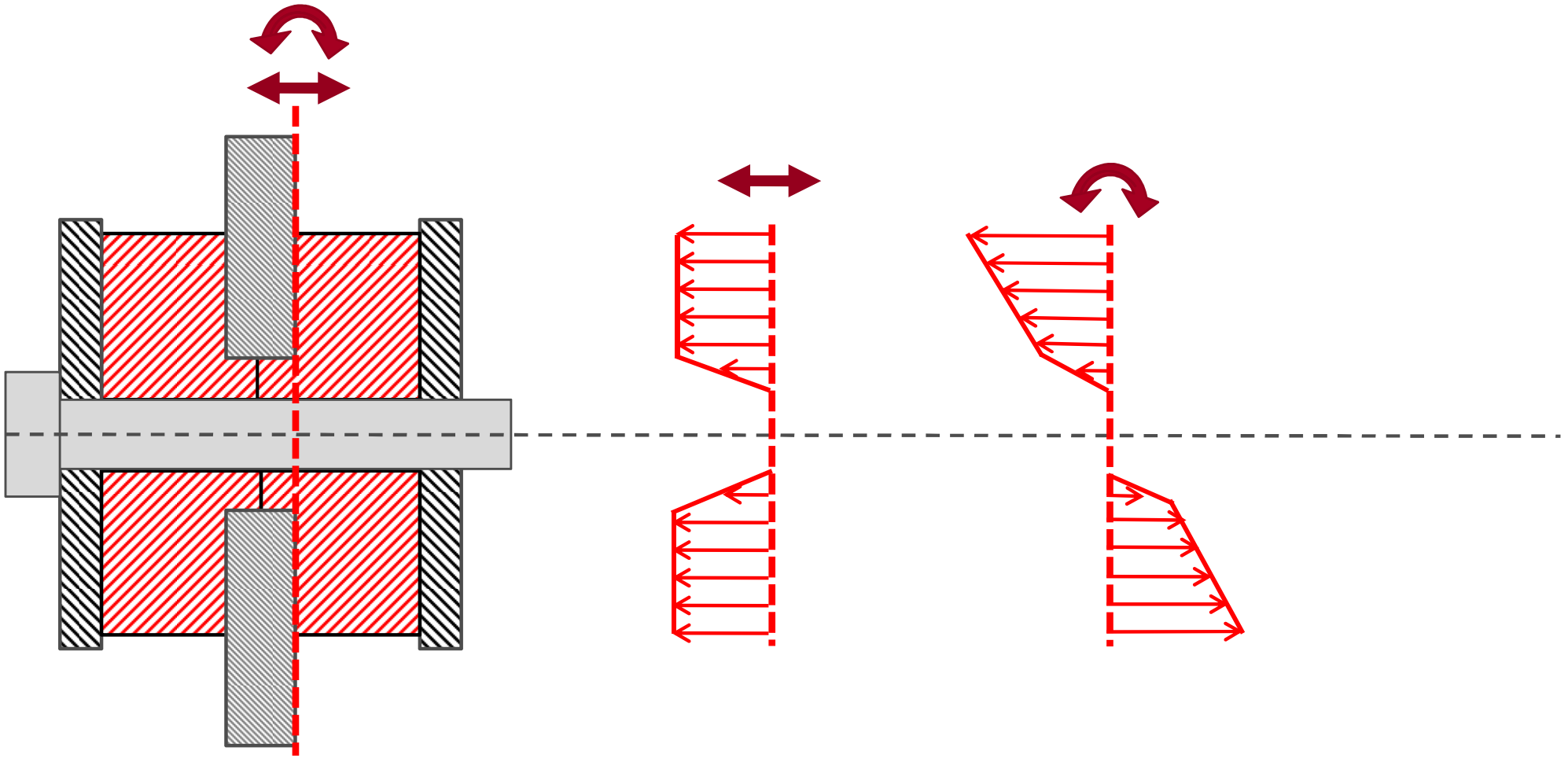
Standard axial bushing design

- Massive cylinder shaped grommets made from rubber or soft TPU
- Axial stiffness lower than 3 kN/mm
- Bending stiffness higher than 5 Nm/°



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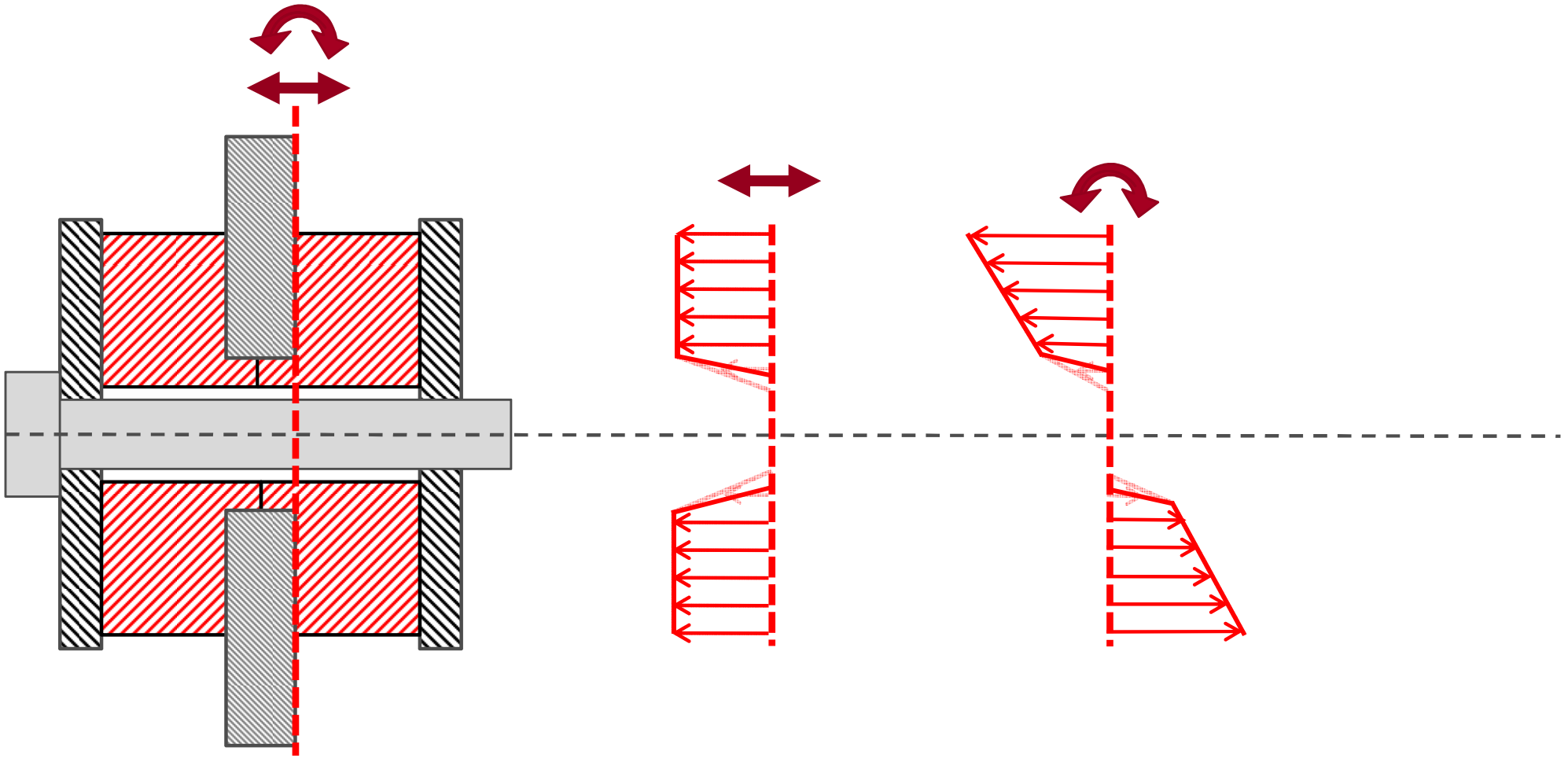
Removal of unnecessary material

- No significant loss of axial stiffness
- Horizontal guidance function unnecessary
- Lower bending stiffness



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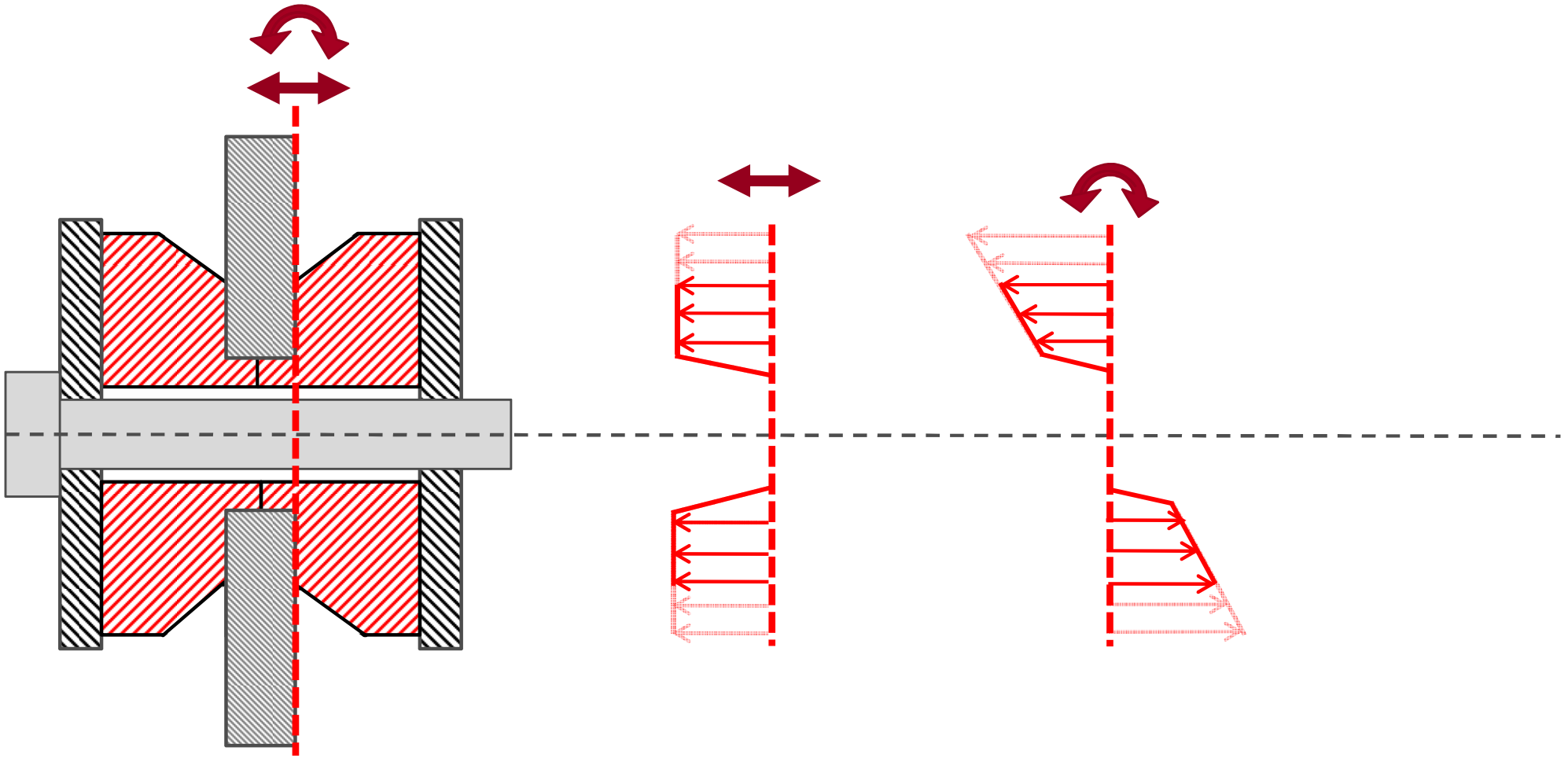
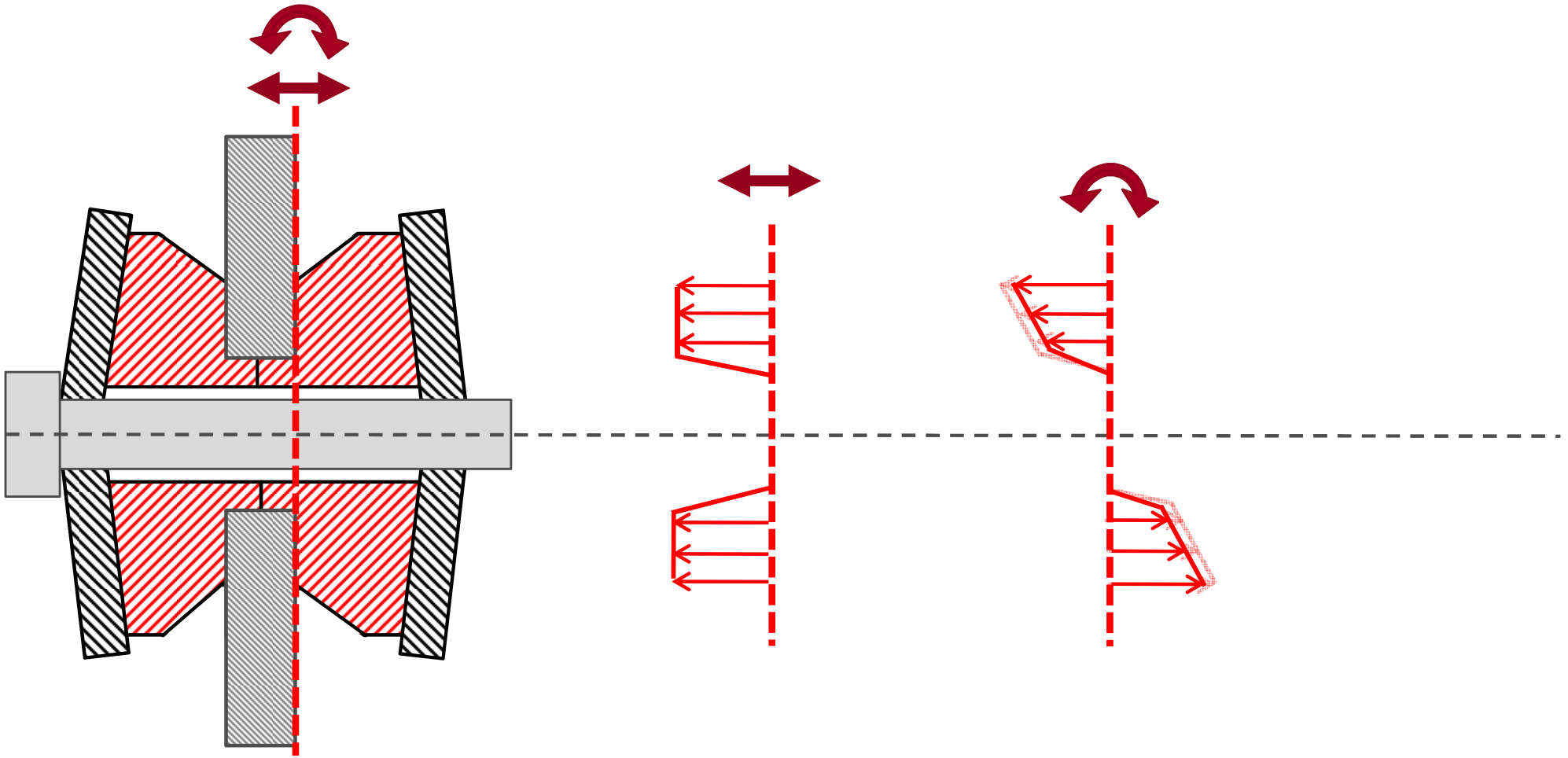
Adaption of load bearing surface

- Utilization of differences in stress distribution between load cases
- Significant improvement of axial to bending stiffness ratio
- Design enables usage of harder materials (e.g. TPU)



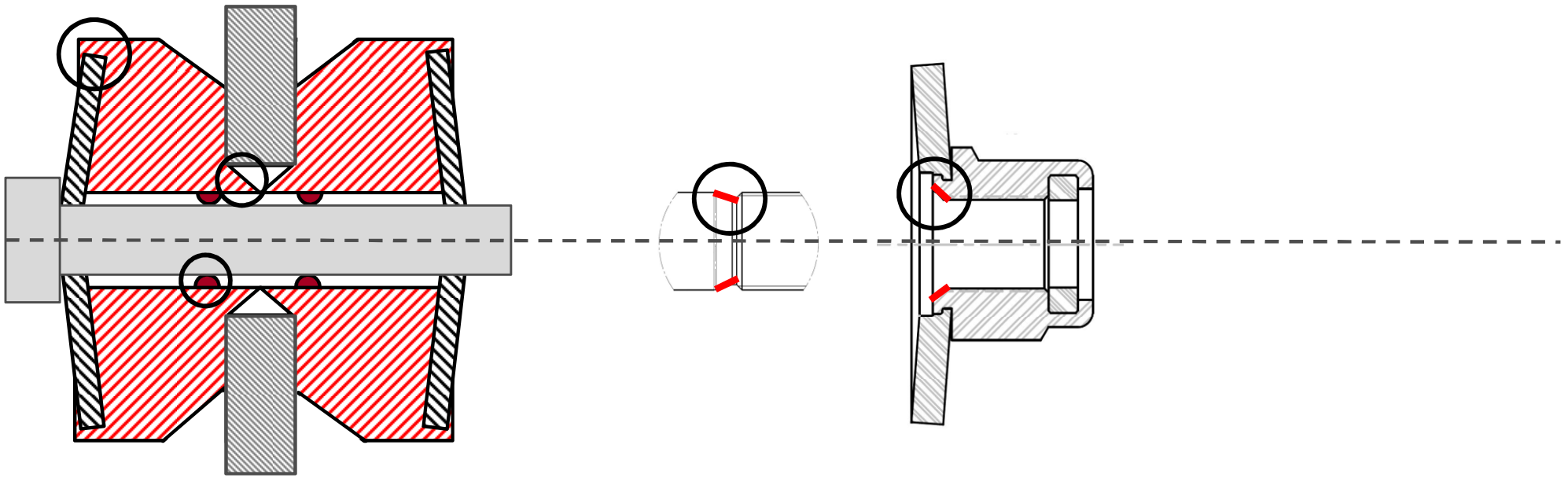
Introduction of conical washer

- Centering effect
- Lower bending stiffness

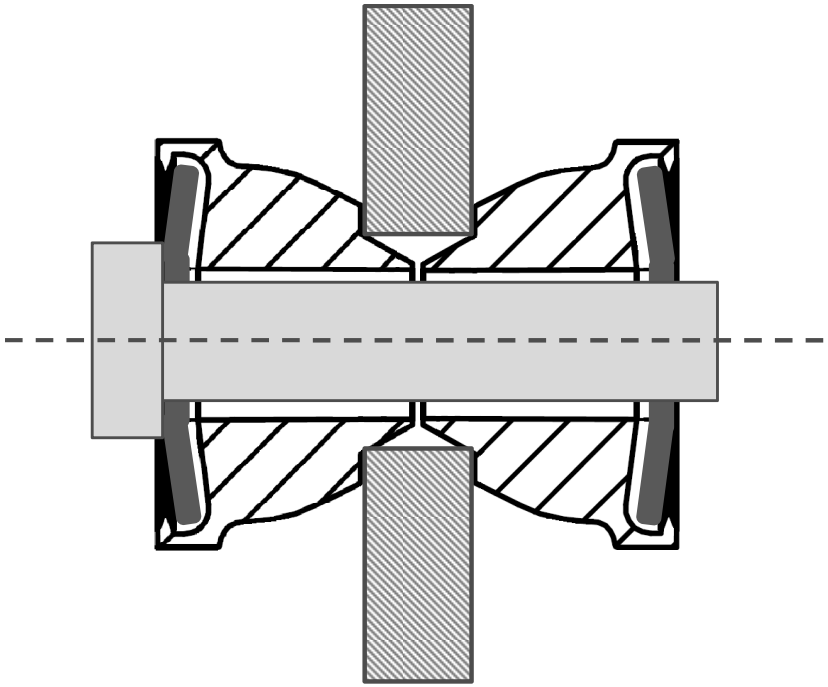


Integration of assembly aids

- Specific profile on end of threads allows torque controlled assembly
- Chamfers on grommets assure correct position on chassis hard point
- Retention feature holds grommet on bolt between assembly steps
- Snap-fit feature on grommet interlocks with washer or spacer



MFCS PogoStik design



SPS PogoStik with rubber grommets

- 0,82 kN/mm @ 0,83 Nm/°

RS PogoStik with TPU grommets

- 4,73 kN/mm @ 1,72 Nm/°

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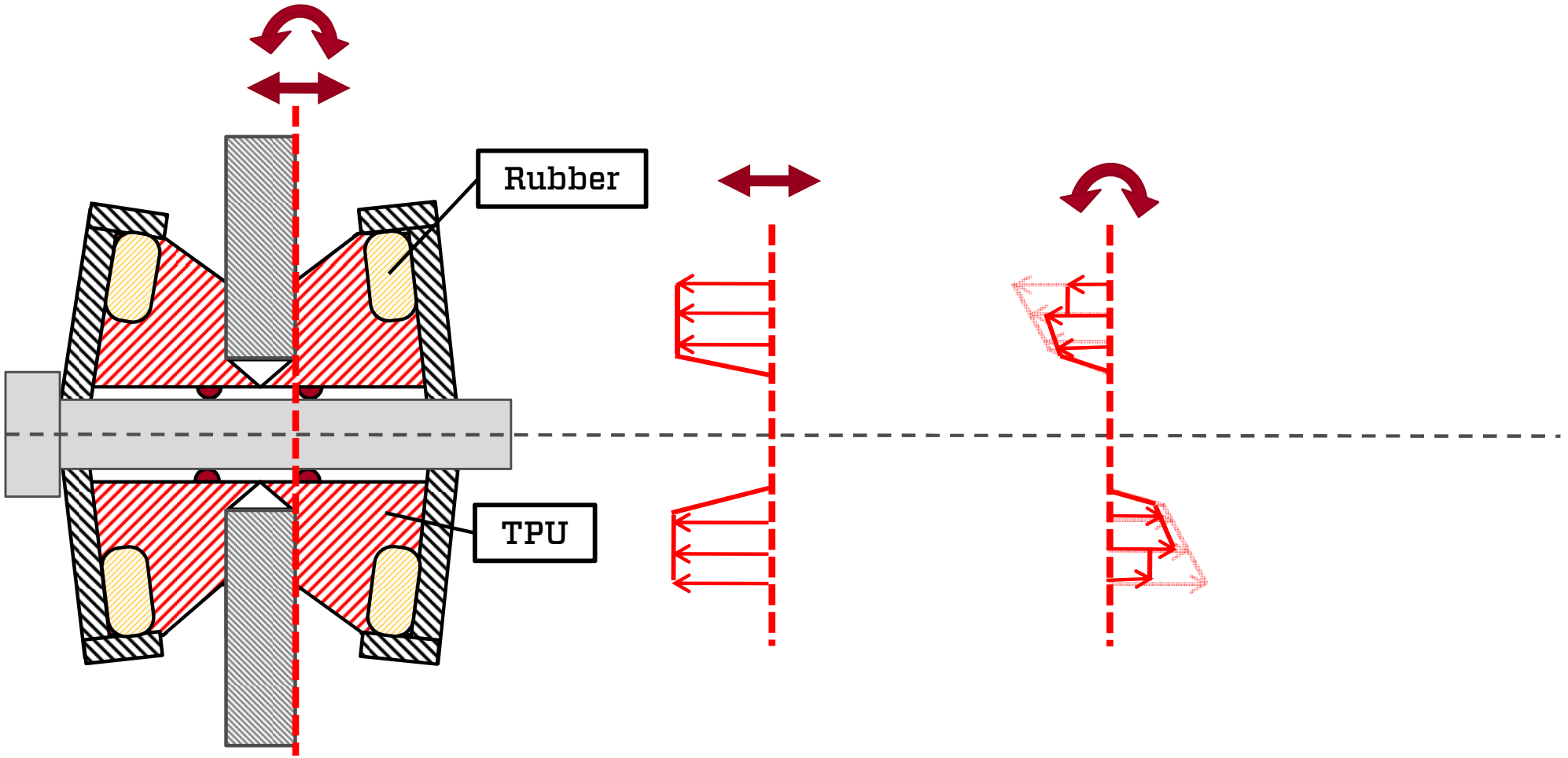
High performance design

- Enclosed rubber ring can only deflect under bending loads
- Even harder TPU types feasible with acceptable bending stiffness



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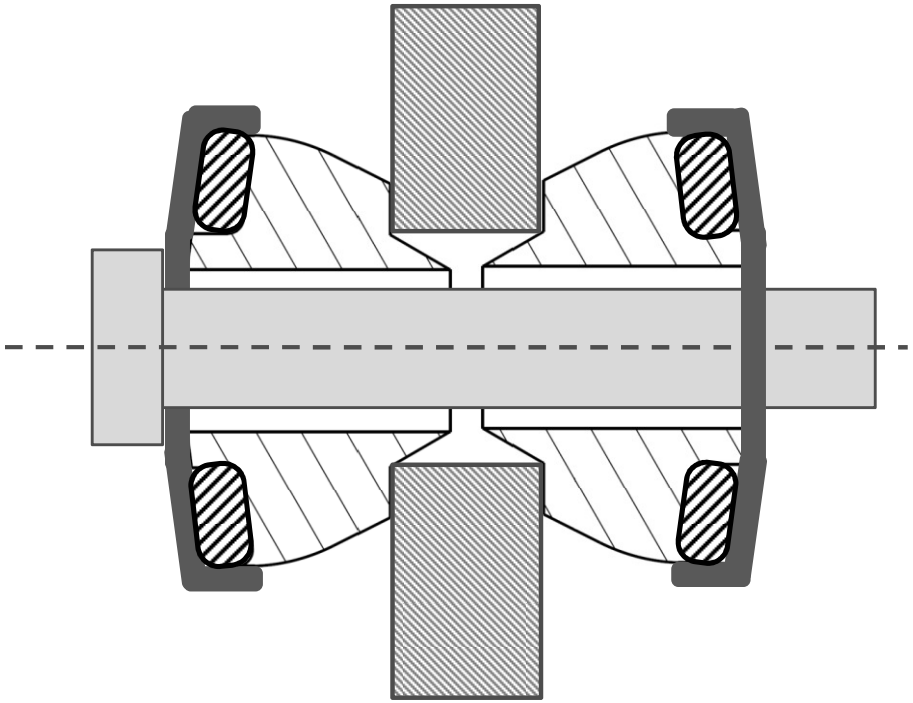
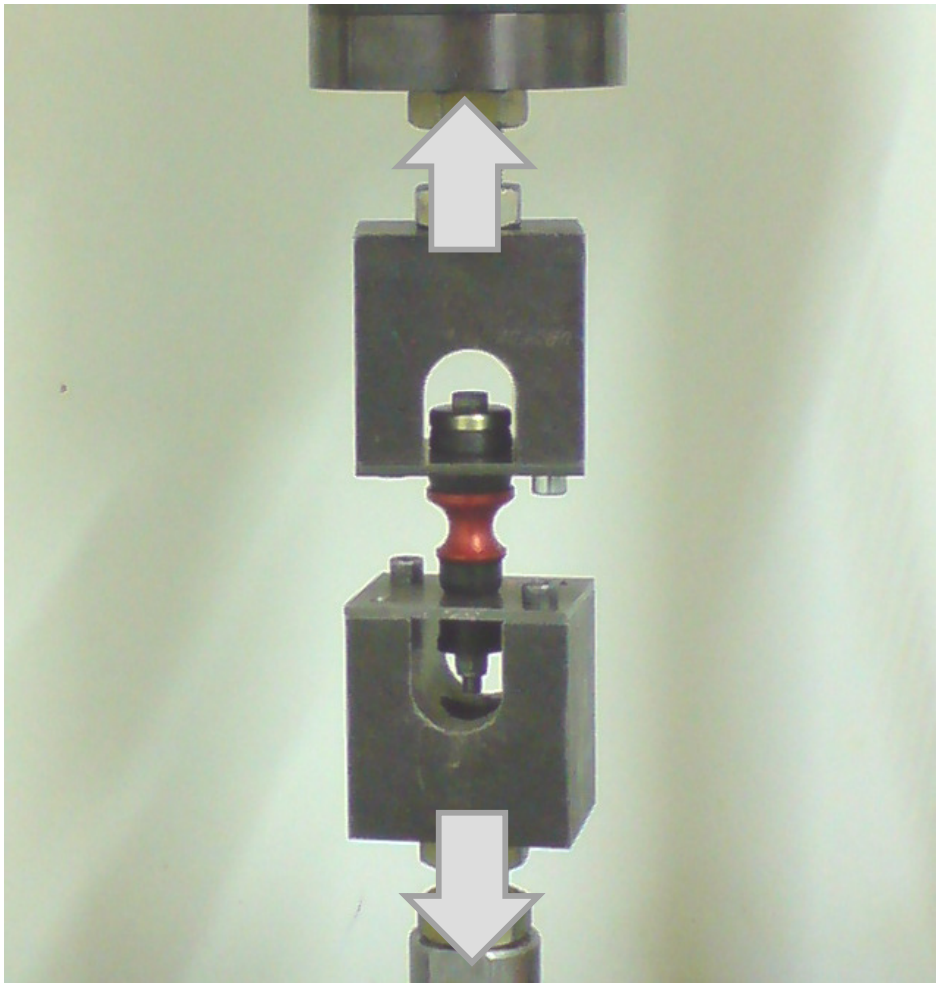
MFCS HiPerStik design



HiPerStik (prototype)

- 7,34 kN/mm @ 2,30 Nm/°

Axial stiffness
measured on complete assembly



Axial stiffness
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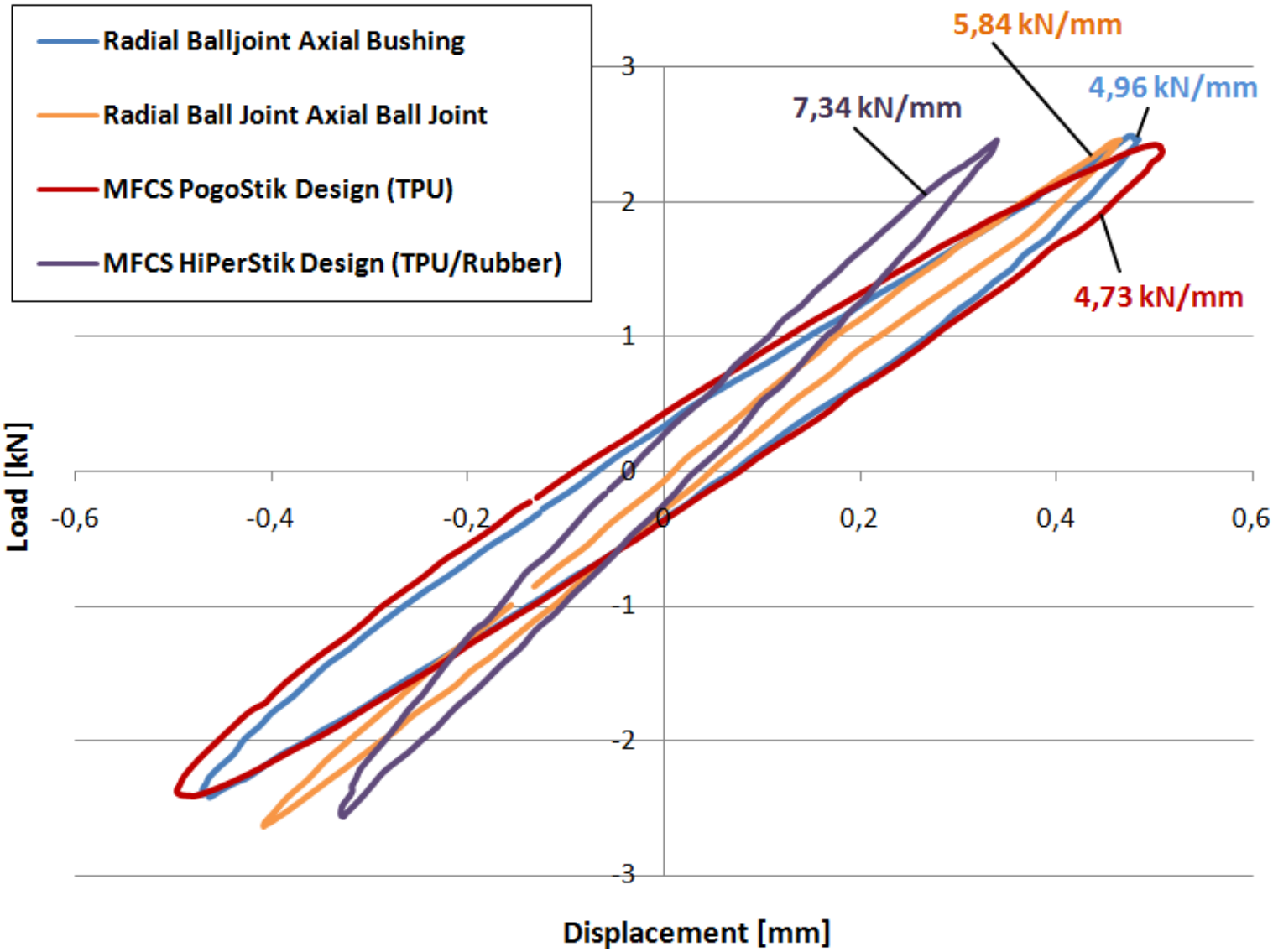

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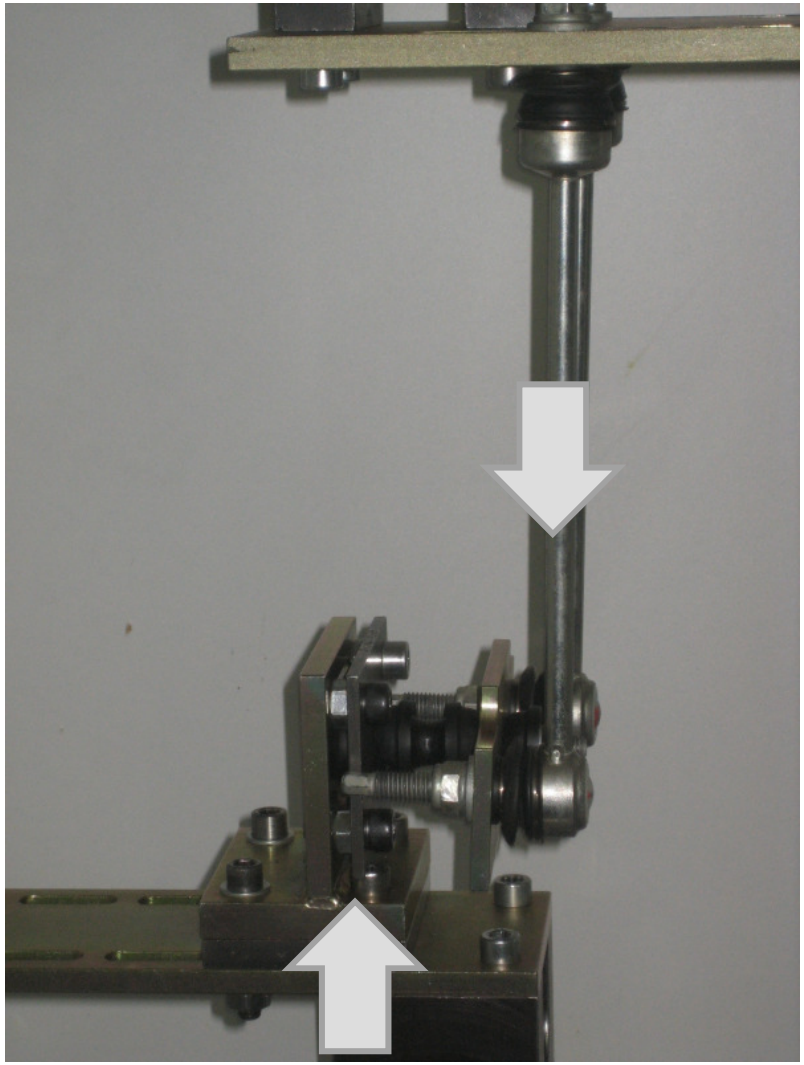
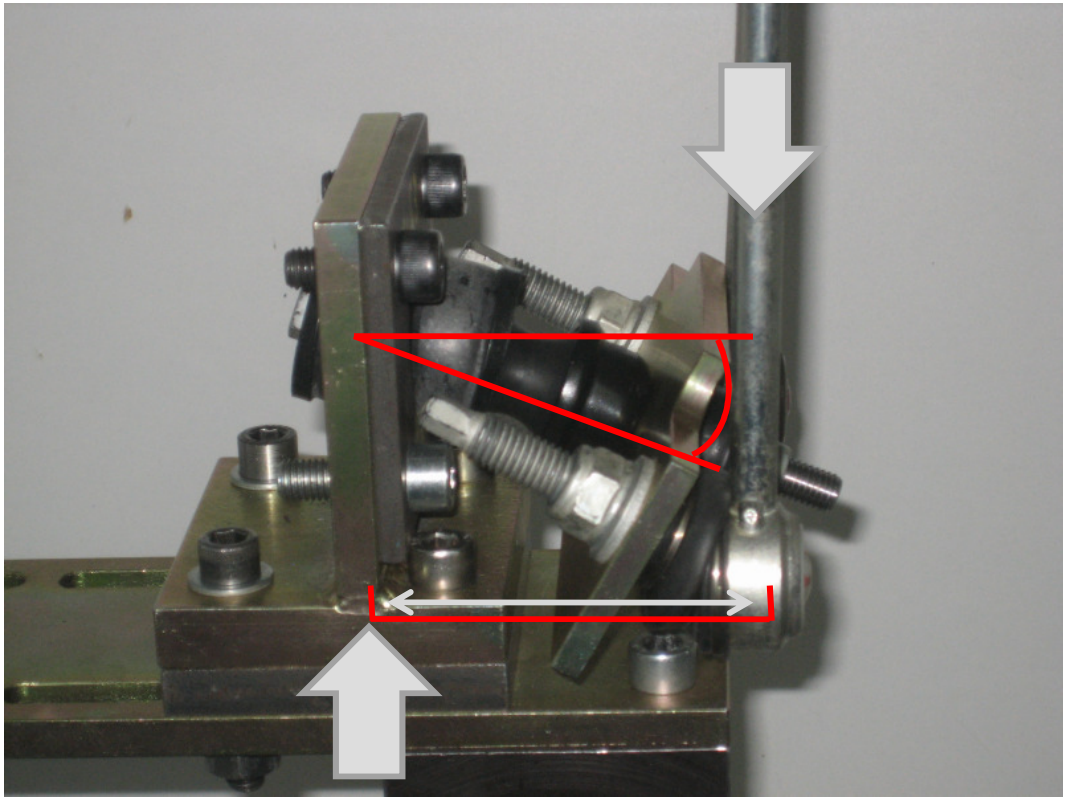
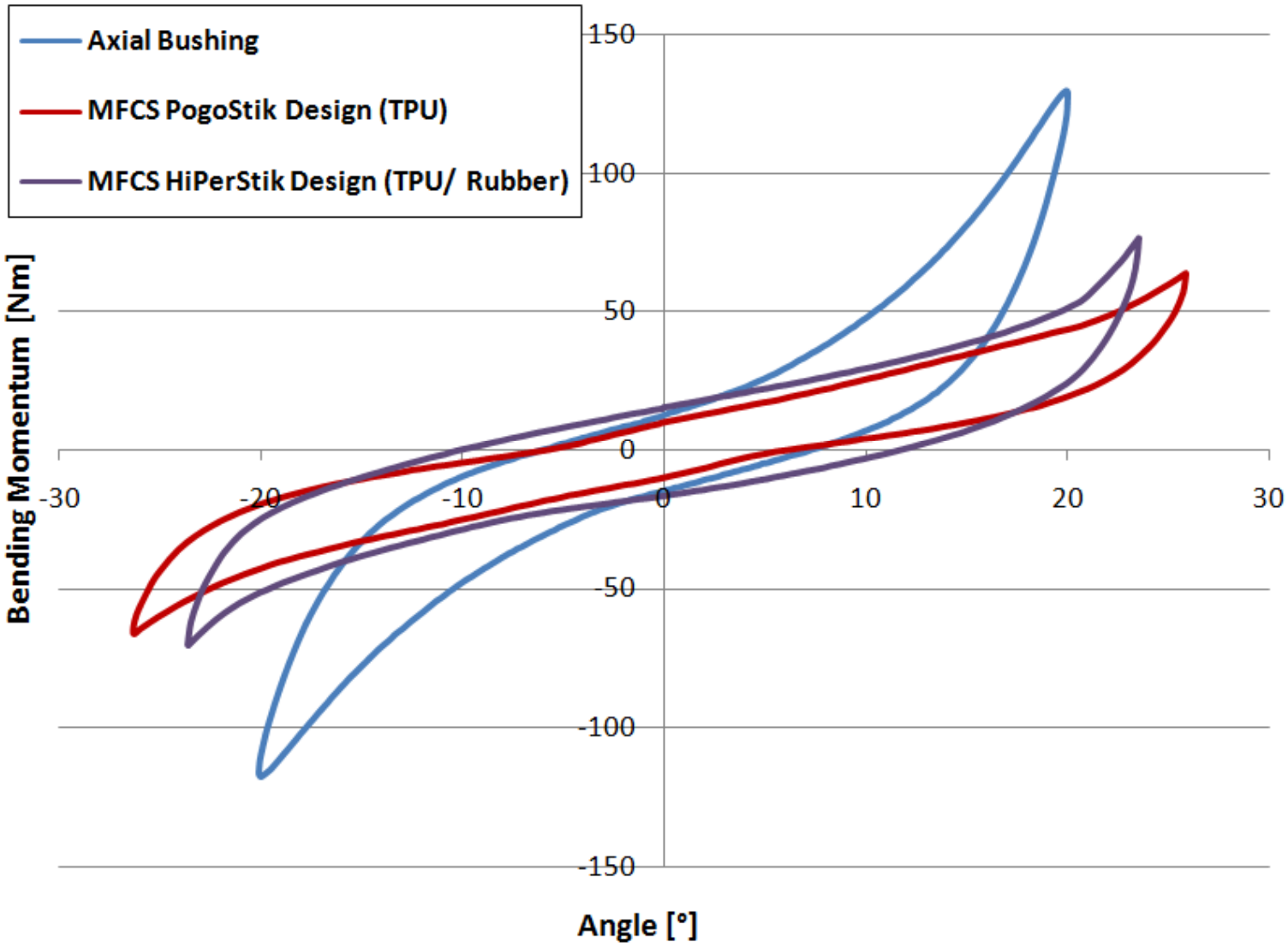
Bending stiffness
measured on a single interface





Bending stiffness
measured on a single interface



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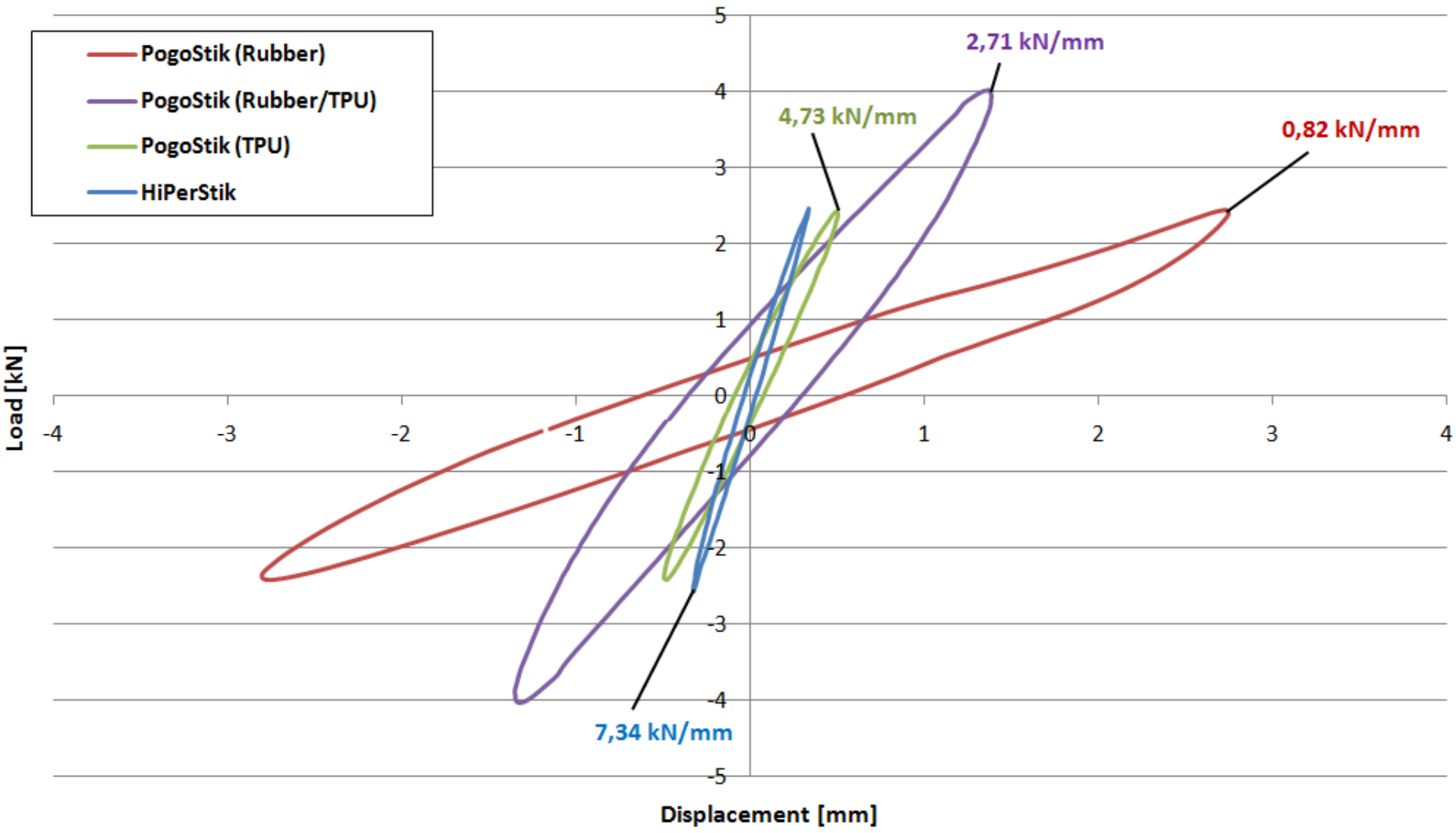
MFCS PogoStik/HiPerStik portfolio

Axial stiffness range



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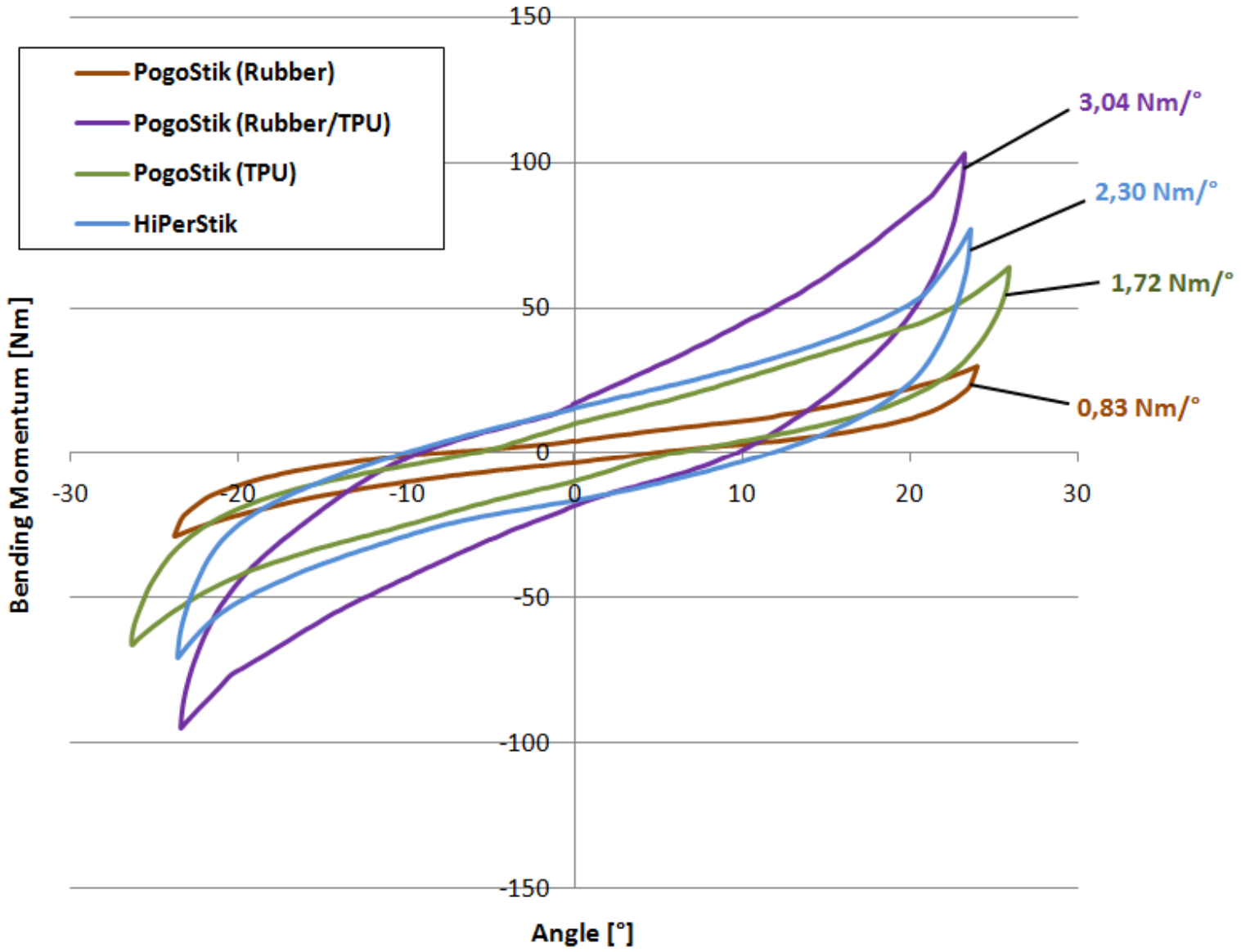
Bending stiffness range



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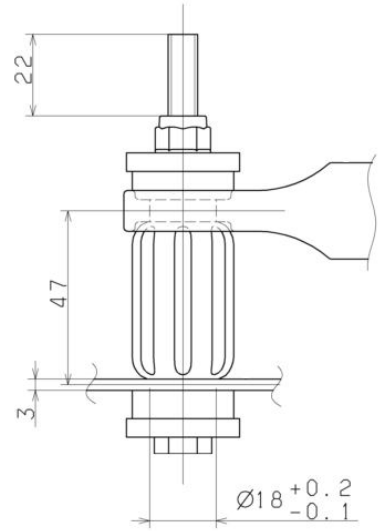
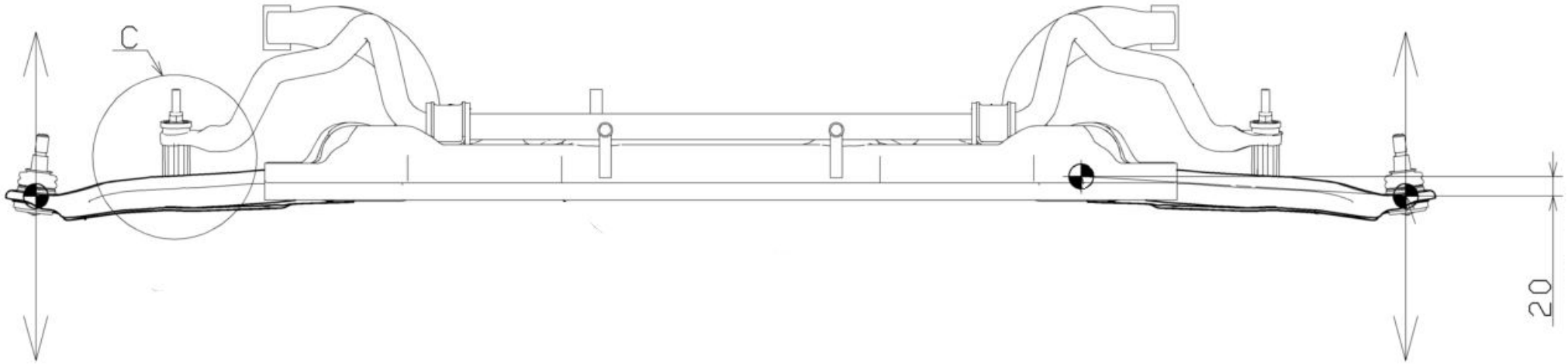
Integration examples:
Subcompact car front axle





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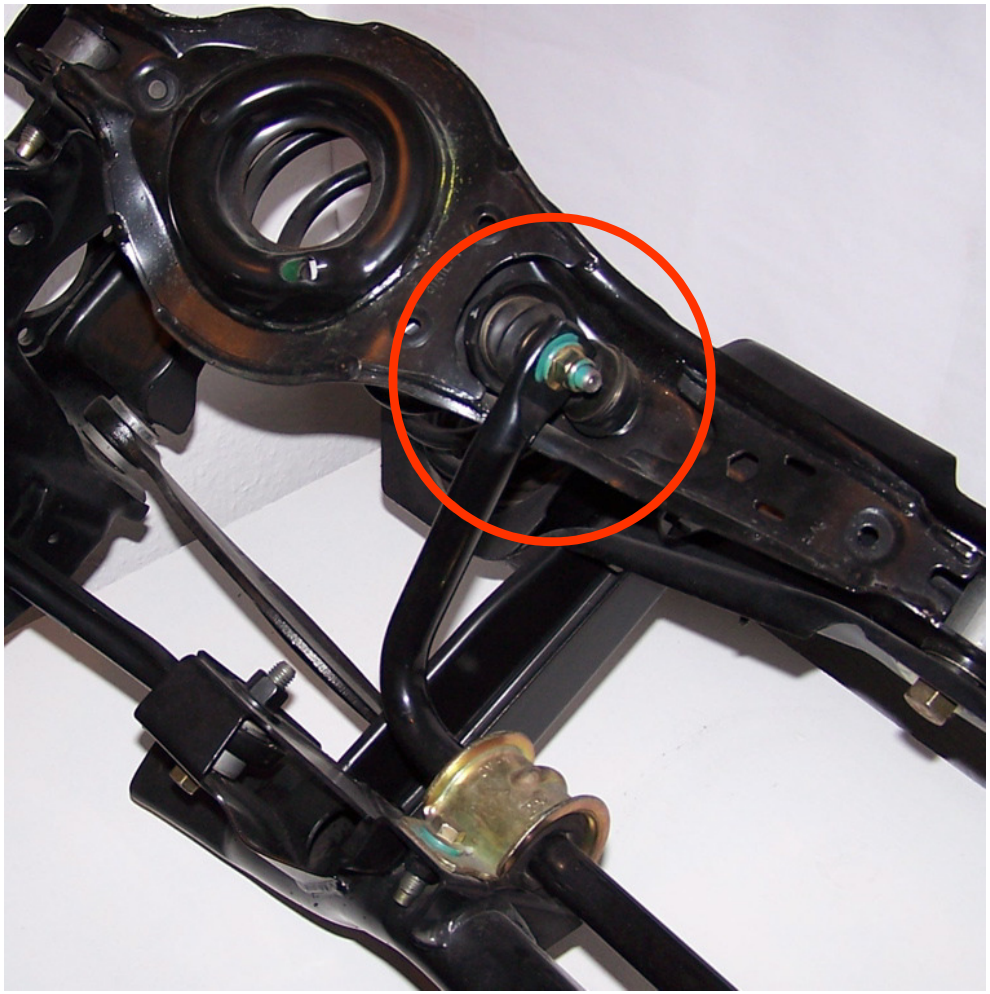
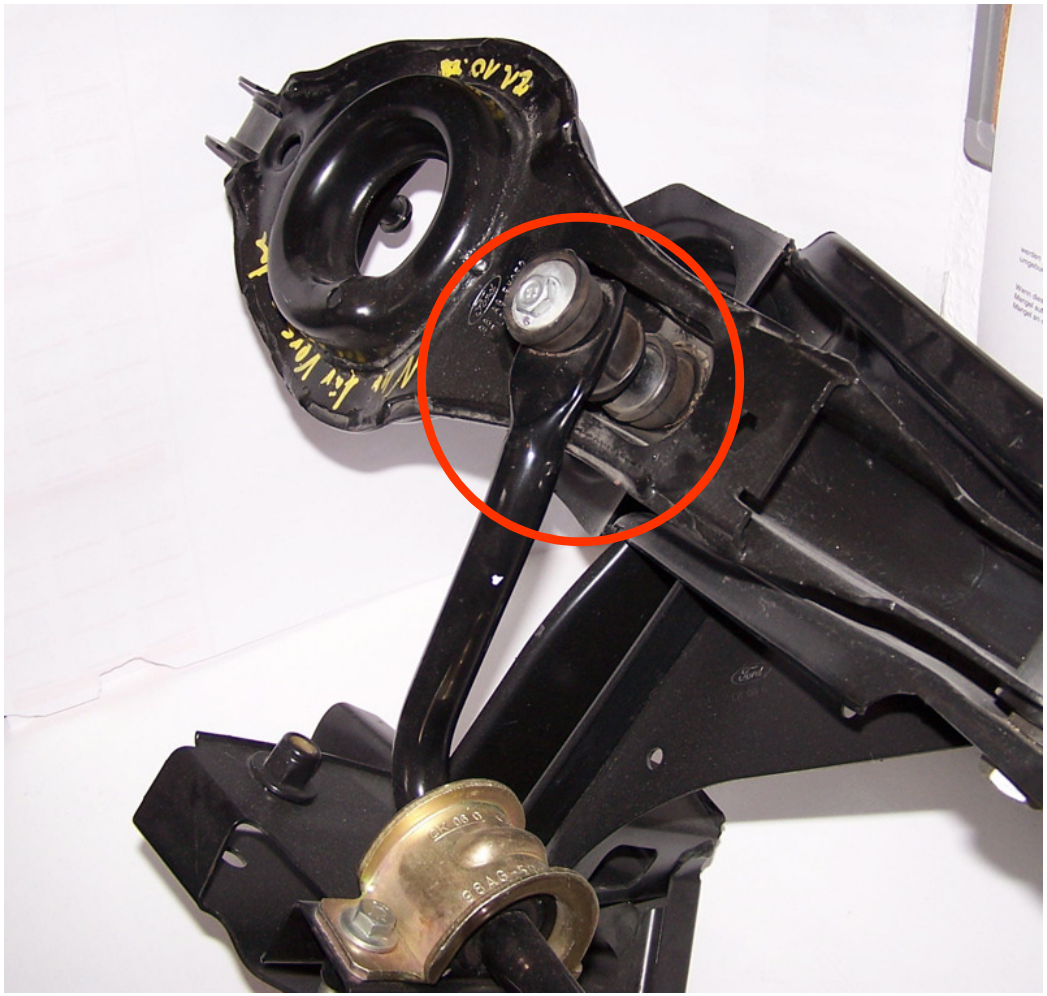
Integration examples:
Compact car rear axle

DBJ ⟷ PogoStik®





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Integration examples:
Light truck application

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Thanks a lot for your time!

Questions?

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