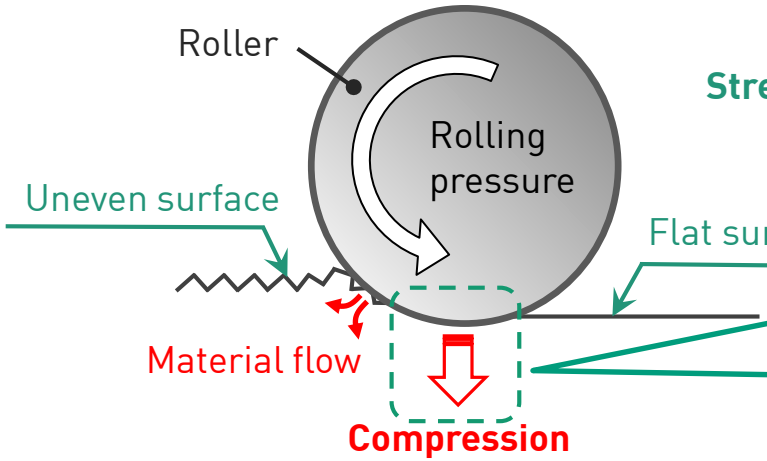
Increase endurance life of workpiece with Superoll

Strength increase mechanism

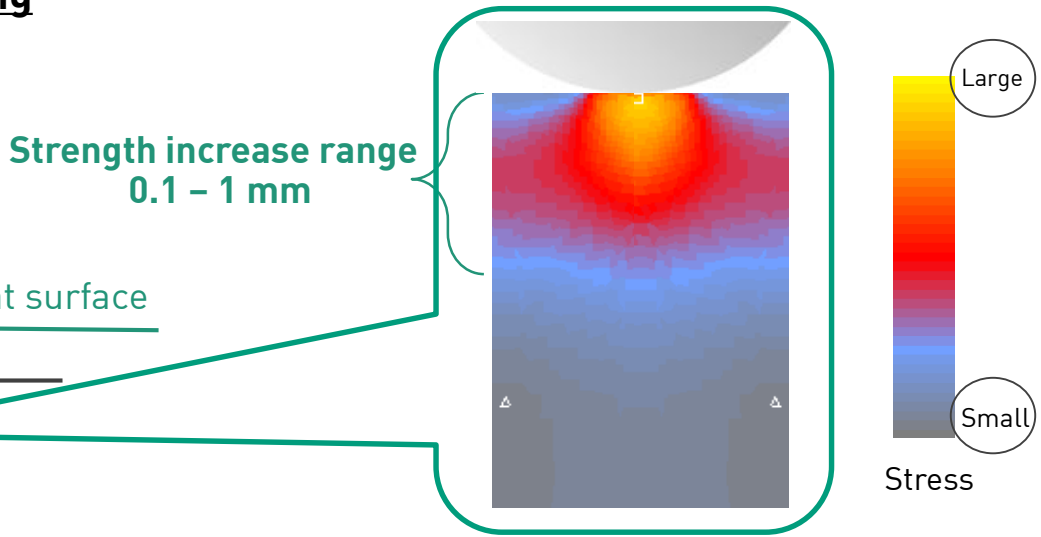
Residual stress in the compressive direction (source of strength increase) is generated when uneven metal surface evenly with rollers and those areas undergo deformation.

Image of roller burnishing



Stress conditions while burnishing

(stress analysis results)



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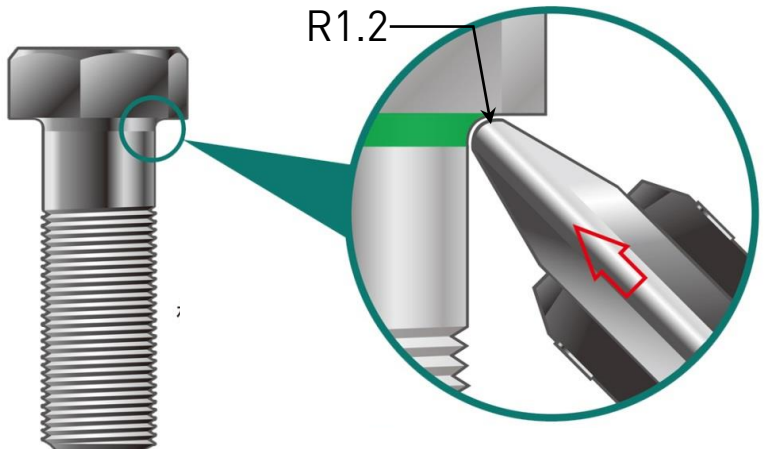
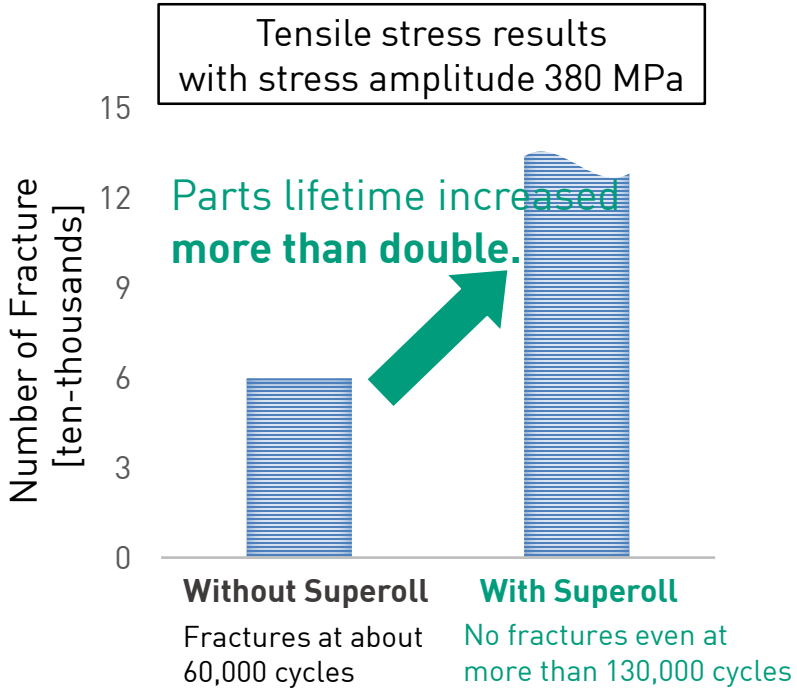
Fatigue strength increase example by Superoll

[Workpiece: Bolt head]

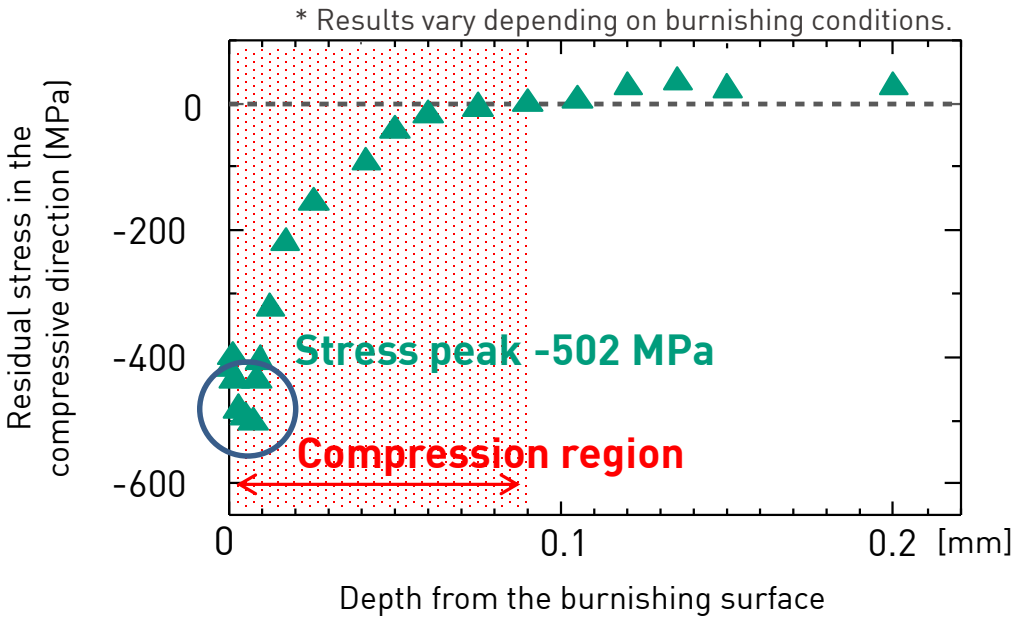


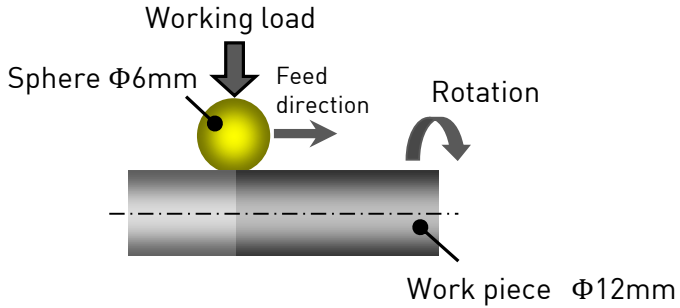
Titanium alloy



Increase endurance life of workpiece with Superoll

Superolls can apply residual stress in the compressive direction at the same level as tensile strength near the surface.





Work piece

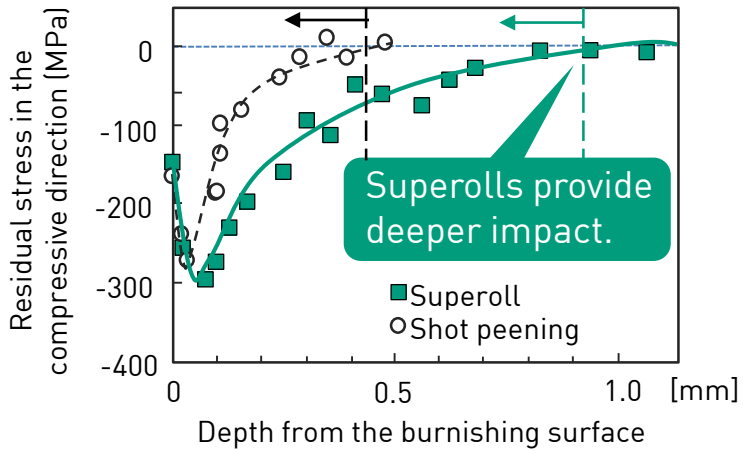
Shape	: Shaft [Φ12mm]
Material	: A2017-T4
Tensile strength	: 550 MPa
0.2% yield stress	: 510 MPa

Increase endurance life of workpiece with Superoll

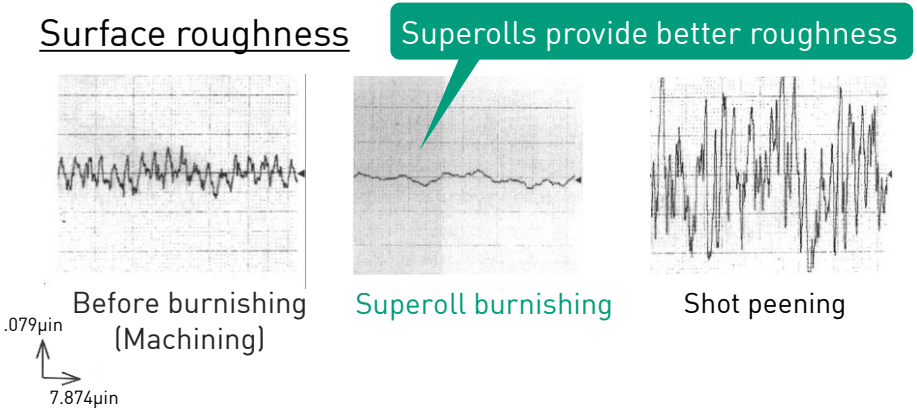
Superolls apply stress as well as improve surface roughness

Compression strength comparison and surface finish improvement between Superoll burnishing and shot peening

Residual stress from compressive direction



Surface roughness



Workpiece

Shape : Shaft [Φ5mm]
Material : A2017-T4

Tensile strength : 535 MPa
0.2% yield stress : 494 MPa

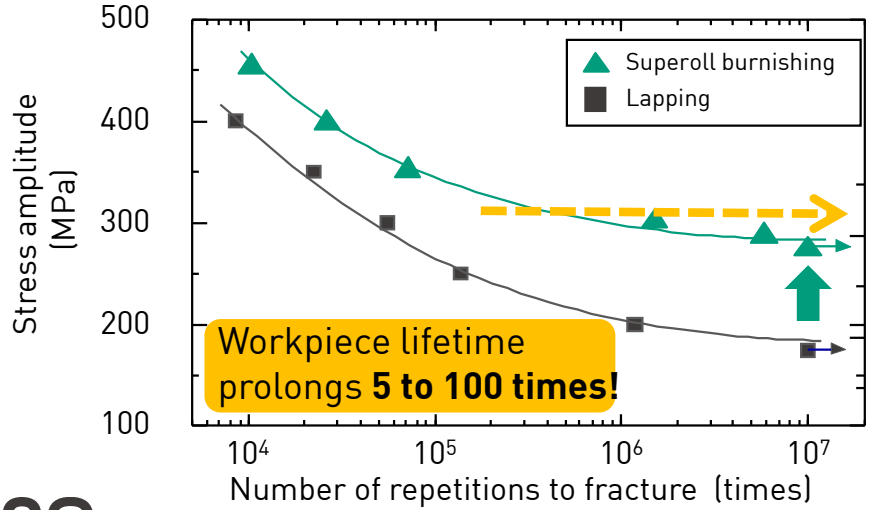
* Results vary depending on burnishing conditions.

Increase endurance life of workpiece with Superoll

What kind of benefits by the increase of fatigue strength?

1. Life time of work piece is prolonged
2. Improving fatigue strength can allow for thinner lighter components.

Results of rotary bending fatigue test



Material: A2017-T4

Fatigue strength increases at 57%

Fatigue strength 275 MPa

Fatigue strength 175 MPa

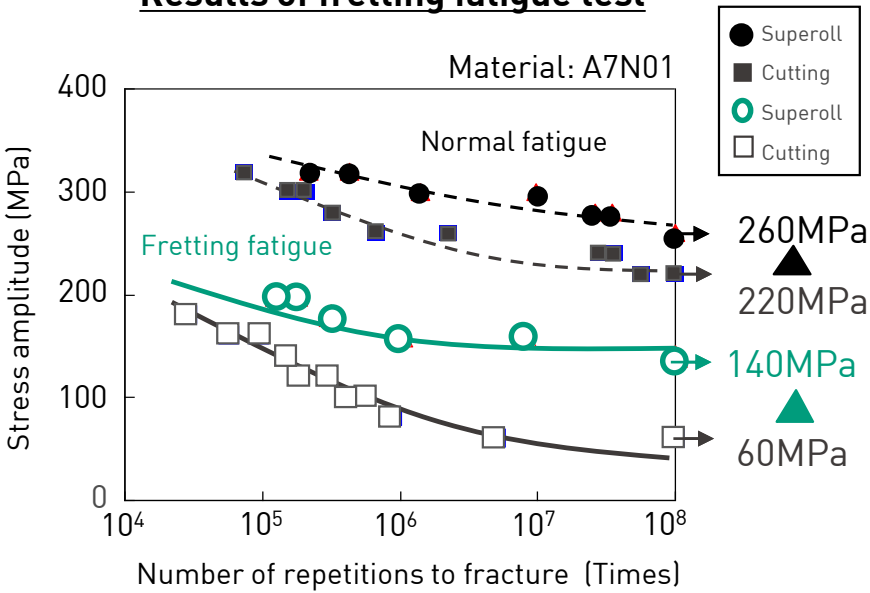
SUGINO

Increase endurance life of workpiece with Superoll

Superolls also improve fretting fatigue strength

Drastically improves fatigue strength in environments where fretting is occurring.

Results of fretting fatigue test



20% increase

Fretting fatigue strength 130% increase

What is Fretting?

Metals chafed due to minor vibrations

What is Fretting fatigue strength?

A type of fatigue strength that is generated by Fretting and stress amplitude from external sources.

Superolls are more effective in environments where fretting is occurring.

Increase endurance life of workpiece with Superoll

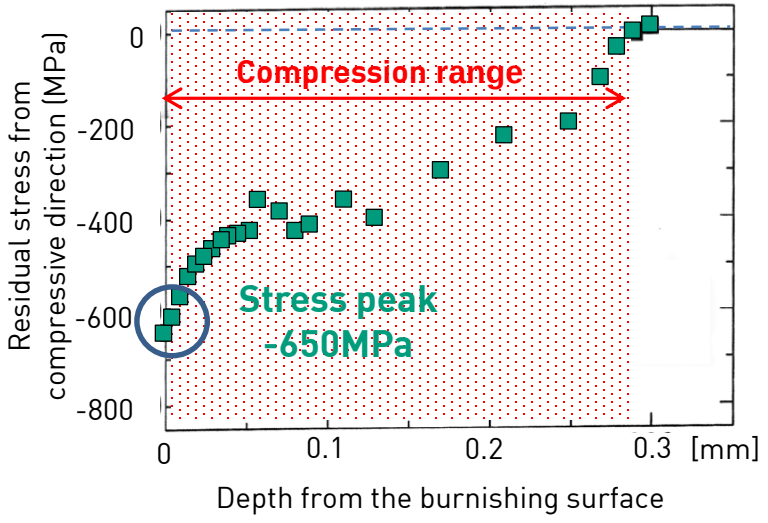
Strength increase case1 : steel alloy

Work piece

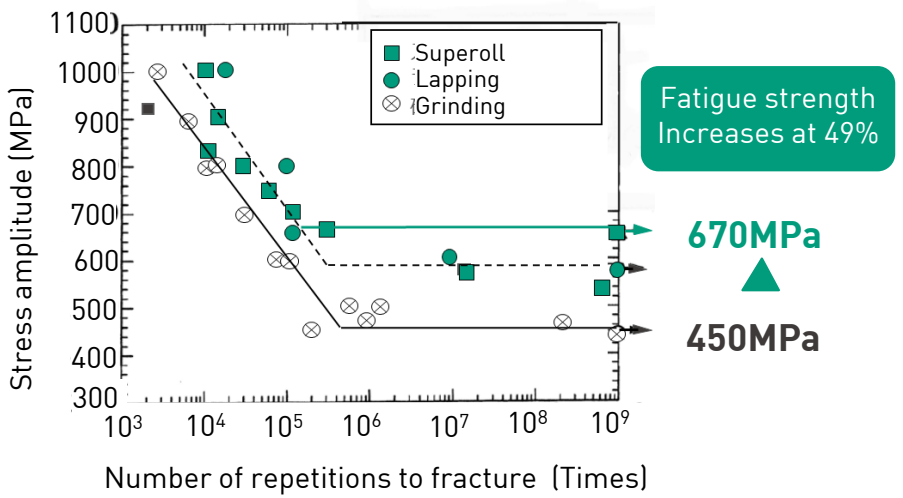
Shape : Shaft [Φ8mm]
Material: SCM435

Tensile strength : 930 MPa
0.2% yield stress : 785 MPa

Improve residual stress in the compressive direction by Superoll burnishing



Improve fatigue strength by Superoll burnishing

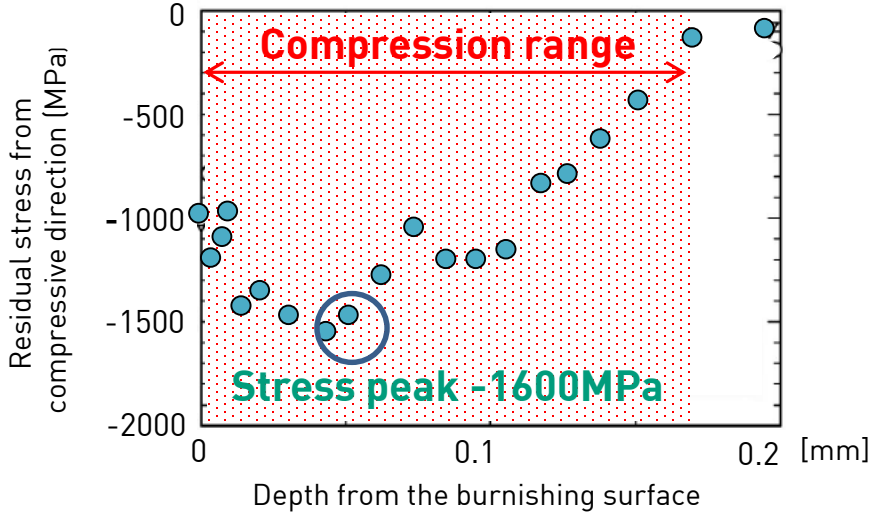


Increase endurance life of workpiece with Superoll

Strength increase case2 : Bearing steel (sintered material)

Work piece
Shap : Shaft (Φ3mm)
Material : SUJ2

Improve residual stress in the compressive direction by Superoll burnishing



Improve fatigue strength by Superoll burnishing