AUTOMOTIVE INTERIOR OF THE FUTURE

Making small parts.
Making a big difference.

SMART DESIGN · PERFECT FIT · NOISE FREE · LONG LIFE

NORGLIDE® Bearings · RENCOL® Tolerance Rings

SEATING BEARING TECHNOLOGY

Graham Ellis Global Business Development

Benjamin Kümmel Global R&D Manager

Saint-Gobain Webinar (SprinGlide) 24th April 2019

SAINT-GOBAIN

- **AGENDA**
- **History and timeline of Bearings**
- New Product Family
- Collaboration and support from initial design to serial production

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NORGLIDE® Bearings · RENCOL® Tolerance Rings

WE ARE NO 1 GLOBAL SUPPLIER OF BEARINGS IN AUTOMOTIVE SEATING

Making small parts.
Making a big difference.

In 2018 we supplied an average of 11 parts into vehicles built worldwide

A total of 833 million components into seats

Close To The Customer

- R & D and testing
- Manufacturing sites

THE RIGHT PRODUCT IN THE RIGHT PLACE

Making small parts.
Making a big difference.

TRADITIONALLY, OUR NORGLIDE® Bearings SOLUTIONS OFFER YOU…

SMART DESIGN

Weight space and cost saving design

PERFECT FIT

Tolerance compensation & efficient assembly

NOISE FREE

Noise & vibration improvement

LONG LIFE

Friction control over lifetime & corrosion protection

SAINT-GOBAIN

ENGINEER TO ENGINEER!
WE WORK ALONGSIDE OUR CUSTOMERS EVERY DAY

Making small parts.
Making a big difference.

Every customer‘s needs are unique. We place great value on custom-designing our products, working in close collaboration with customers to meet their specific requirements.

NORGLIDE® HAS UNIQUE FEATURES THAT DELIVER KEY BENEFITS

Making small parts.
Making a big difference.

SMART DESIGN

1 Choice of mating metal backing

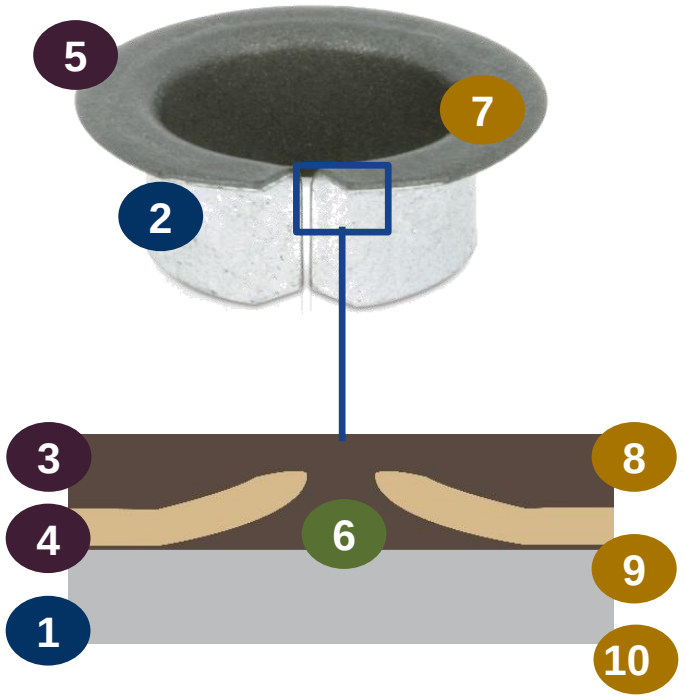
2 Thin walled structure

PERFECT FIT

3 Elasticity of PTFE layer

4 Intermediate layer for sizing

5 Tailored shape and geometries



NOISE FREE

6 Damping by homogenous thick PTFE layer

LONG LIFE

7 Choice of PTFE compound

8 Low friction & high wear depth

9 High load capabilities

10 Choice of metal and protective layer

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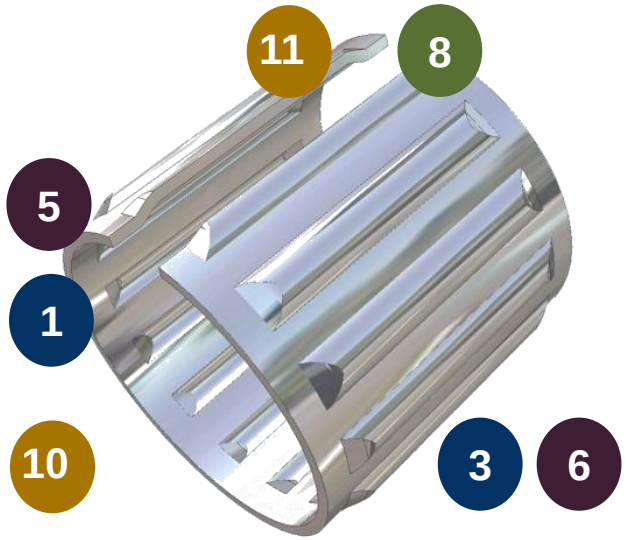
RENCOL® HAS UNIQUE DESIGN FEATURES THAT DELIVER KEY BENEFITS

Making small parts.
Making a big difference.

SMART DESIGN

1 Choice of steel
2 Wave height
3 Ring & wave shape

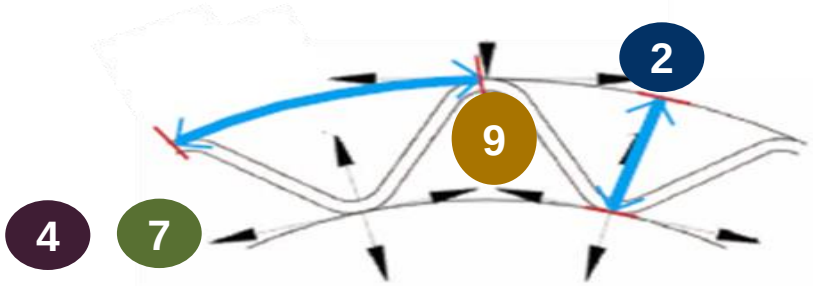


NOISE FREE

7 Overall wave design
8 Choice of steel & thickness

PERFECT FIT

4 Overall wave design
5 Steel thickness
6 Ring shape



LONG LIFE

9 Wave height & pitch
10 Ring shape
11 Steel thickness

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Making small parts.
Making a big difference.

SPRINGLIDE™

SAINT-GOBAIN

Making small parts.
Making a big difference.

SPRINGLIDE™ = RENCOL® Tolerance Rings + NORGLIDE® Bearings

+

- Wear rate and damping performance of a NORGLIDE® bushing
- Tolerance compensation, rigidity and spring rate of a RENCOL® Tolerance Ring

SAINT-GOBAIN

- **AGENDA**
- History and timeline of Bearings
- **New material** SPRINGLIDE™
- Collaboration and support from initial design to serial production

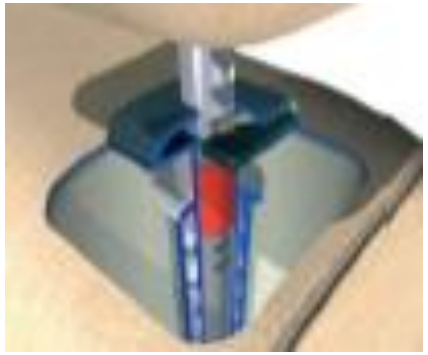
Making small parts.
Making a big difference.

SMART DESIGN · PERFECT FIT · NOISE FREE · LONG LIFE

NORGLIDE® Bearings · RENCOL® Tolerance Rings

Making small parts.
Making a big difference.

SPRINGLIDE™



Key Benefits

- Adjustable consistent sliding force under variable loads
- Zero clearance over lifetime
- Tolerance and misalignment compensation

SAINT-GOBAIN

SPRINGLIDE™ OFFERS UNIQUE MATERIAL / DESIGN COMBINATIONS THAT DELIVER KEY BENEFITS TO OUR CUSTOMERS

Making small parts.
Making a big difference.

SMART DESIGN

1 **Desired sliding force achievable by design of spring elements**

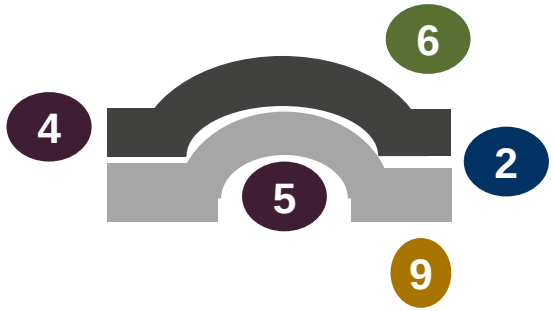
2 Thin walled structure

PERFECT FIT

3 **Stable sliding force over wide tolerance range achievable by design of spring elements**

4 Differenet PTFE compound layers available

5 Tailored shape and geometries



NOISE FREE

6 Avoiding moving noise by thick PTFE layer

7 **Desired dampening achievable by design of spring elements**

LONG LIFE

8 Low friction & high wear depth

9 High corrosion resistance by use of stainless steel

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SPRINGLIDE™ FINGER-DESIGN

IDENTIFICATION OF THE OPTIMUM DESIGN

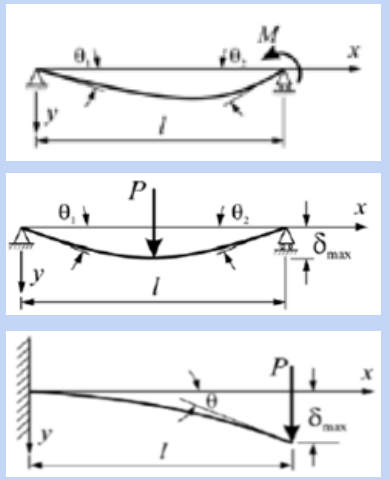
Making small parts.
Making a big difference.

Design parameters

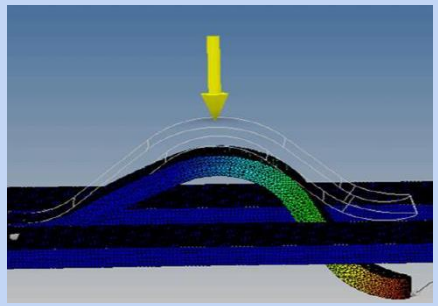
- Material thickness
- Finger width
- Finger curvature
- Finger height
- Finger length

Design Tools

Analytical



Numerical



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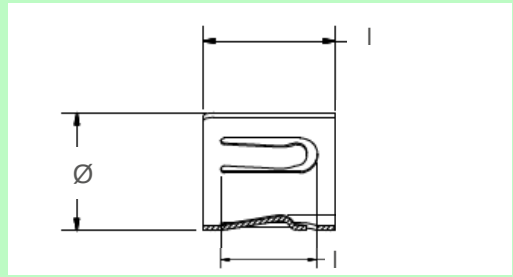

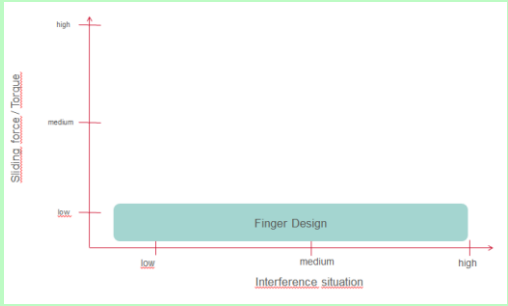

The SPRINGLIDE™ Finger-Design allows to design Low Friction Bearings with Zero Clearance for axial sliding movements. It eliminates Rattle and minimizes variation in moving force coming from tolerances or misalignments over a huge range.

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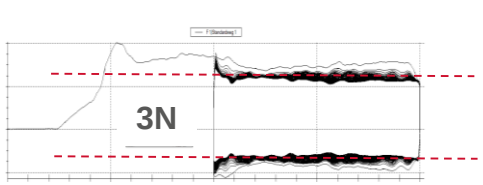
SPRINGLIDE™ FINGER-DESIGN EXAMPLE

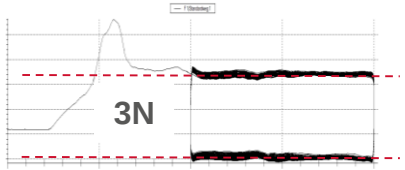
Making small parts.
Making a big difference.

The spring effect of the fingers enables misalignment compensation without any negative effects on adjustment forces or noise creation

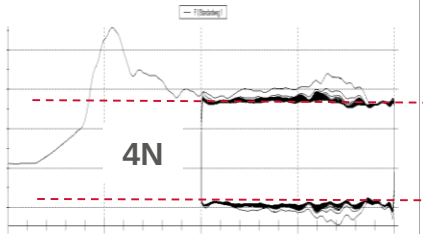
Ø Interference
0,25mm



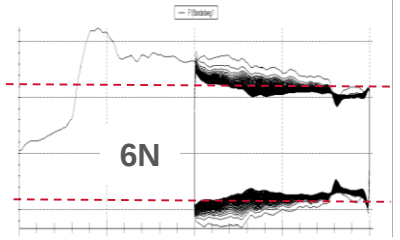
Ø Interference
0,50mm



Ø Interference
0,75mm



Ø Interference
1,00mm



PERFECT FIT

Compensation of big misalignments

NOISE FREE

Dampening PTFE layer avoids noise creation

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SPRINGLIDE™ SLOTTED-RIB-DESIGN

IDENTIFICATION OF THE OPTIMUM DESIGN

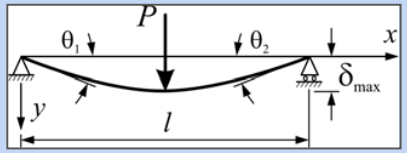
Making small parts.
Making a big difference.

Design parameters

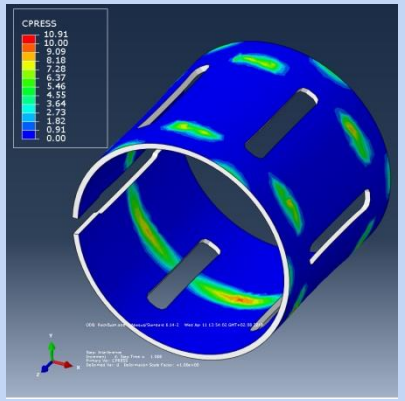
- Material thickness
- Rib width
- Rib curvature
- Rib height
- Rib length

Design Tools

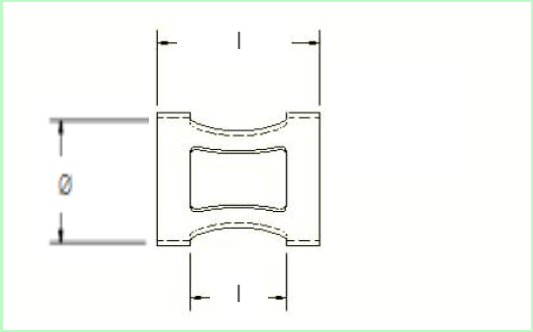
Analytical

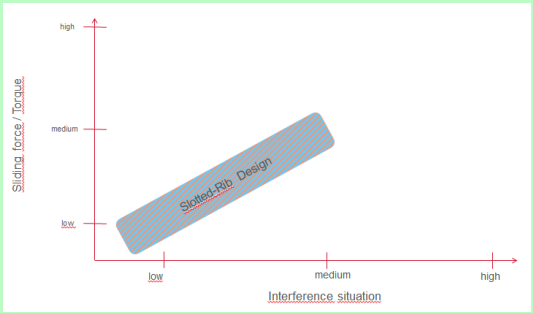


Numerical



Result





The SPRINGLIDE™ Slotted-Rib-Design allows to design Bearings with desired sliding forces and deflection behavior for rotational and axial sliding movements. It guarantees zero clearance to avoid rattle and constant sliding forces over a wide tolerance range.

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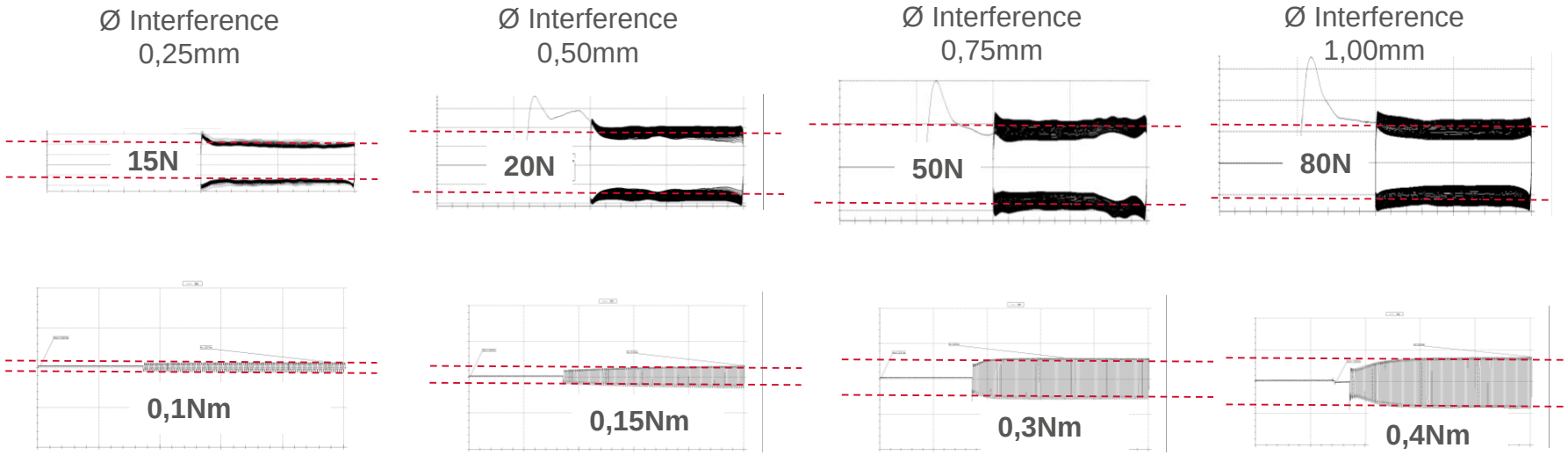
SPRINGLIDE™ SLOTTED-RIB-DESIGN EXAMPLE

Making small parts.
Making a big difference.

The slotted-rib design compensates radial tolerances without influencing the adjustment forces and reduces stick-slip effects (Rotational or Axial)



SMART DESIGN

Selective design of desired adjustment forces

PERFECT FIT

Radial tolerance compensation and reduced stick-slip effects

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SPRINGLIDE™ WAVED-DESIGN

Making small parts.
Making a big difference.

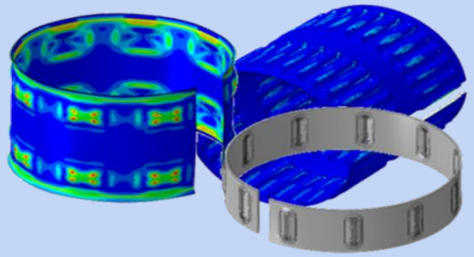
IDENTIFICATION OF THE OPTIMUM DESIGN

Design parameters

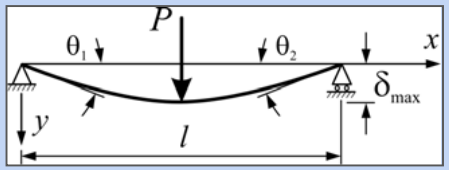
- Material thickness
- Wave width
- Wave curvature
- Wave height
- Wave length

Design Tools

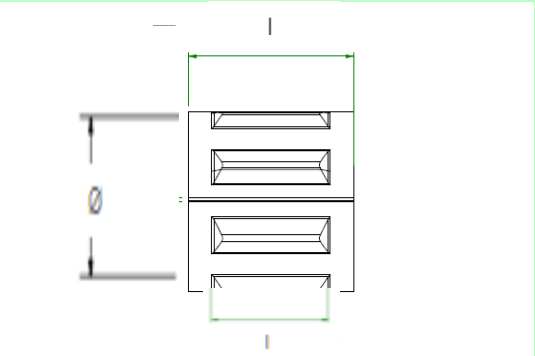
Numerical

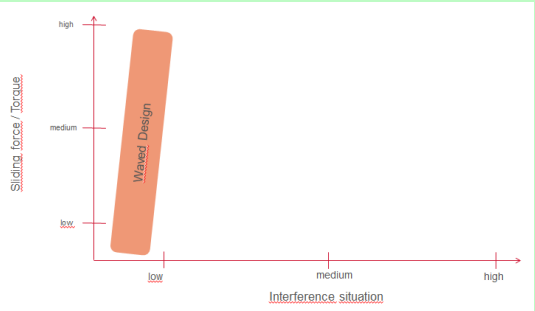


Analytical



Result





The SPRINGLIDE™ Waved-Design allows to design Bearings with higher torque for rotational sliding movements. It guarantees zero clearance to avoid rattle and constant sliding forces over lifetime.

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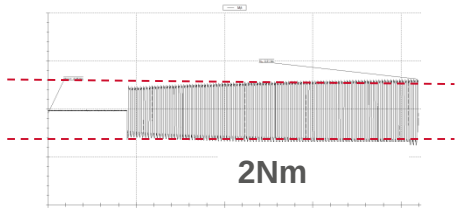
SPRINGLIDE™ WAVED-DESIGN EXAMPLE

Making small parts.
Making a big difference.

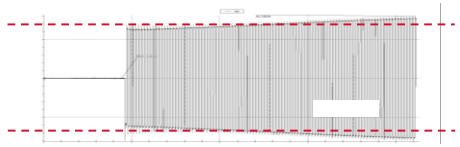
With the waved design selective torque over the complete lifetime can be achieved

Ø Interference
0,1mm



2Nm

Ø Interference
0,25mm



8Nm

SMART DESIGN

Torque adjustment through wave design possible

NOISE FREE

Dampening PTFE layer avoids noise creation

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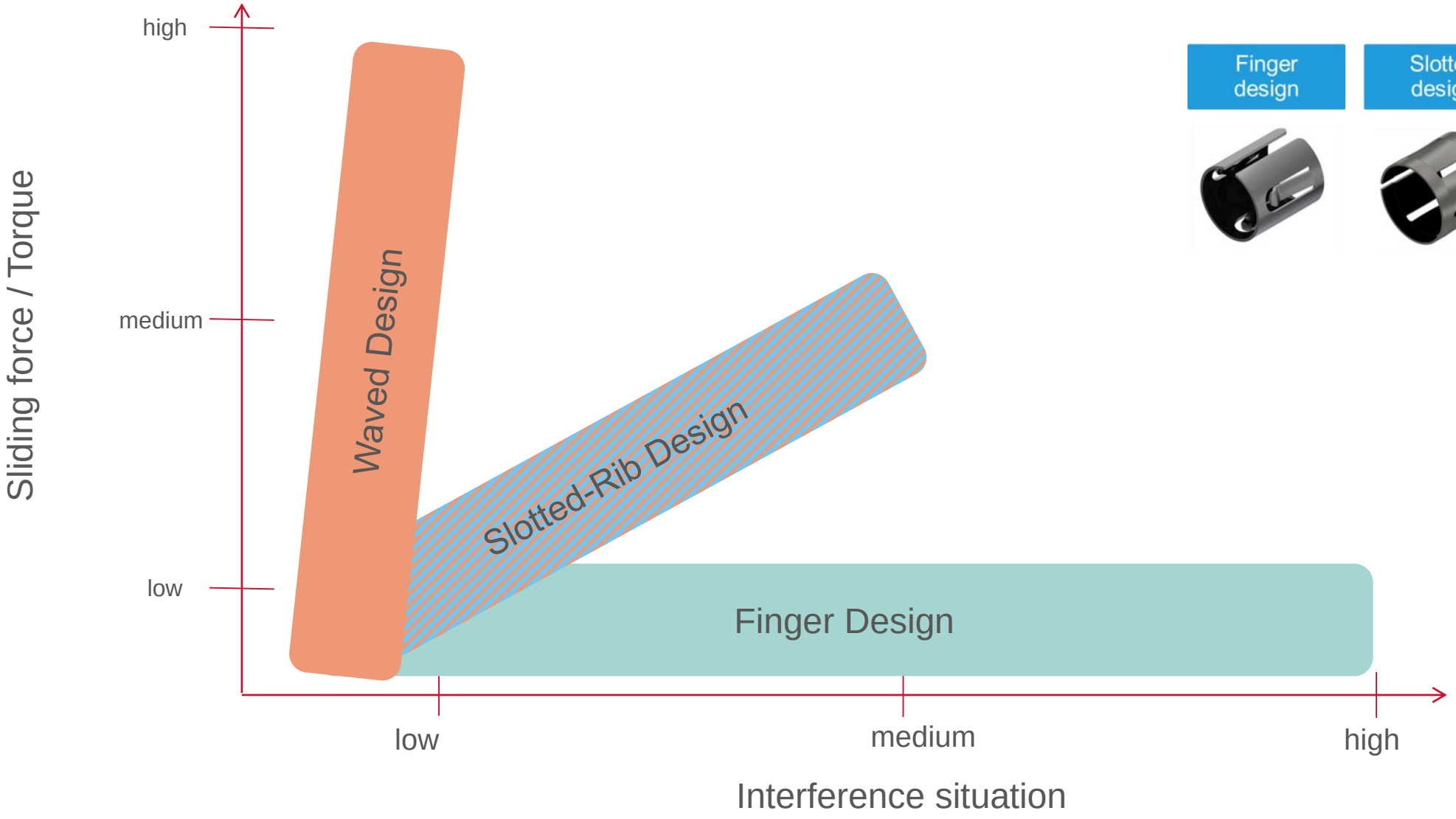
SPRINGLIDE™ DESIGN RECOMMENDATION

Making small parts.
Making a big difference.



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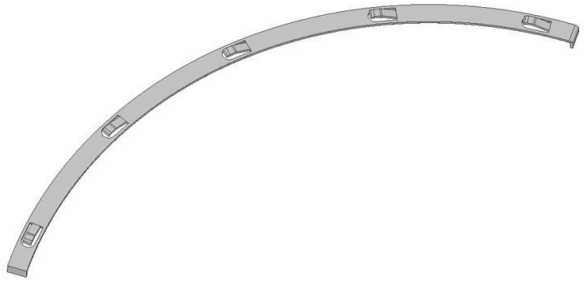
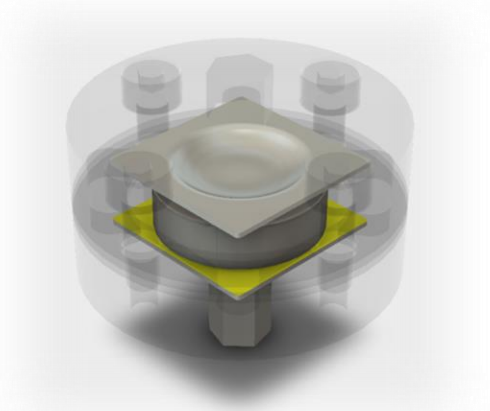
SPRINGLIDE™

Making small parts.
Making a big difference.

Non ring-bushing products using Springlide™





The combination of the thick PTFE layer with the stainless steel enables us to offer also products beyond the bushings for pivot points

SAINT-GOBAIN

SPRINGLIDE™

Making small parts.
Making a big difference.

Non ring-bushing products using Springlide™

SMART DESIGN — Reduction of system height and weight

PERFECT FIT — Compensation of axial and radial tolerances

NOISE FREE — Reduces rattle and decouples vibrations

LONG LIFE — Reliable and consistent torque performance over lifetime

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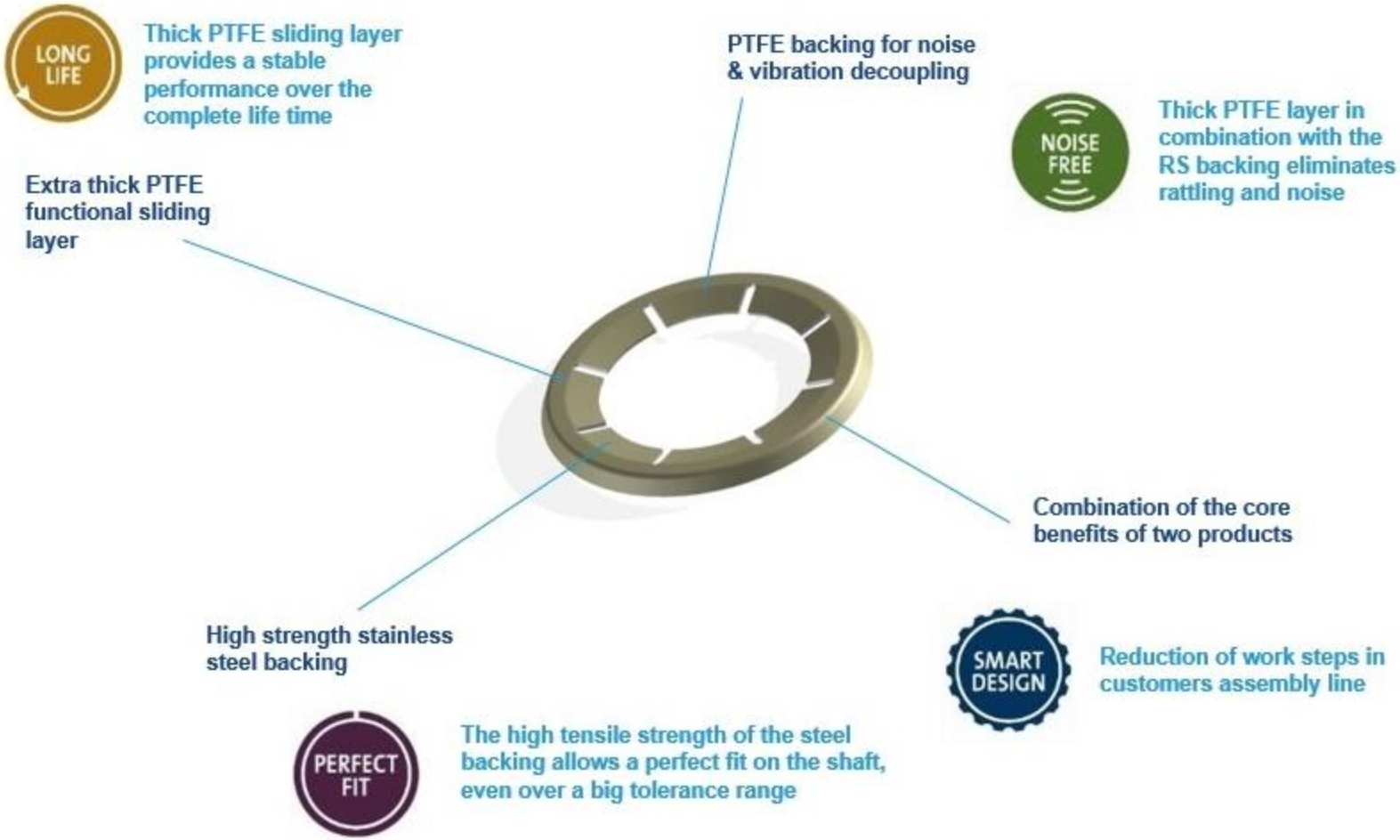
SPRINGLIDE™

Making small parts.
Making a big difference.

Non ring-bushing products using Springlide™



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SPRINGLIDE™

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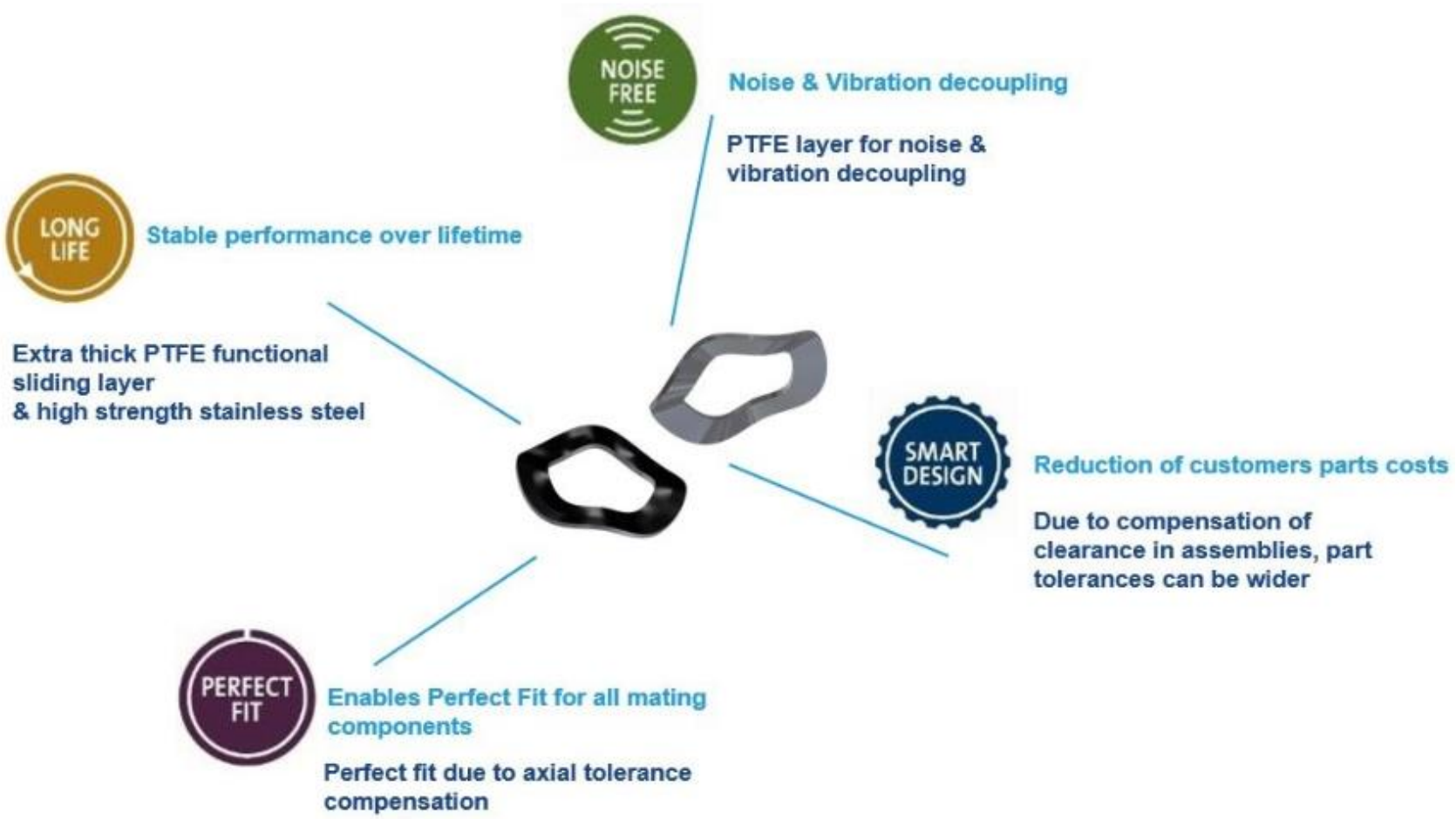
Non ring-bushing products using Springlide™



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SPRINGLIDE™

Making small parts.
Making a big difference.

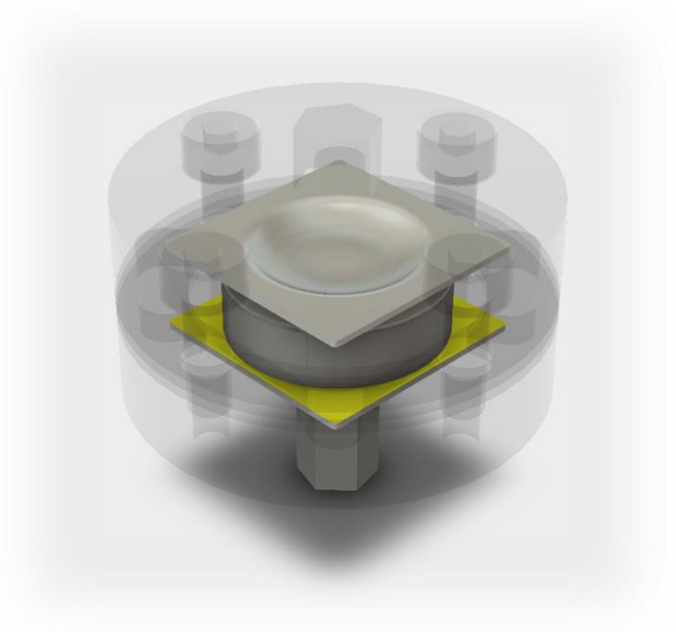
Non ring-bushing products using Springlide™

SMART DESIGN — Compensation of environmental temperature influence to customized torque

PERFECT FIT — All in one solution due to high customizability

NOISE FREE — No more stick-slip, squeak, rattle and metal contact noise

LONG LIFE — The new formulation of functional layer provide stable performance over lifetime



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- **AGENDA**
- History and timeline of Bearings
- New material SPRINGLIDE™
- **Collaboration and support from initial design to serial production**

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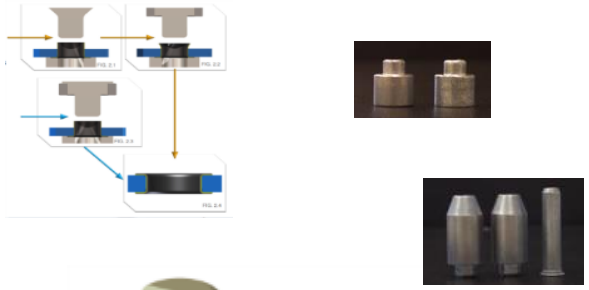
NORGLIDE® Bearings · RENCOL® Tolerance Rings

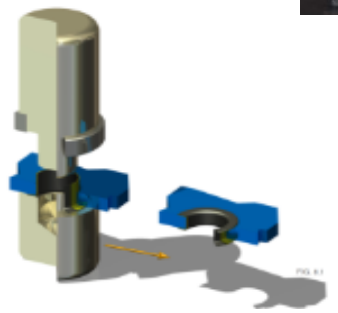
Making small parts.
Making a big difference.

Concept & Prototype → Development & Test → Production

The right material in
the right place

Full development
and test support





Technical support during
and after production

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Making small parts.
Making a big difference.

THANK YOU FOR YOUR ATTENTION

PLEASE VISIT THE BOOTH TO DISCUSS YOUR CHALLENGES

SPRINGLIDE™

NORGLIDE® Bearings

RENCOL® Tolerance Rings

SAINT-GOBAIN