

# Welcome to the TKK-Mounting Training

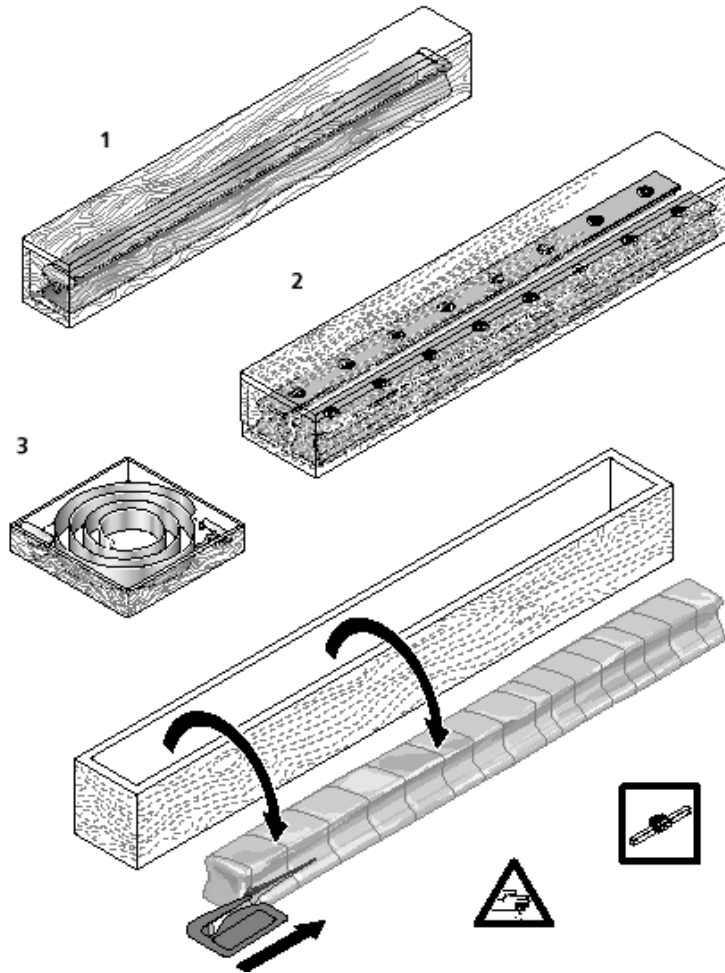
BRL/VPR5

Heike Olschewski



### Linear Motion and Assembly Technologies

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## One-piece guide rails

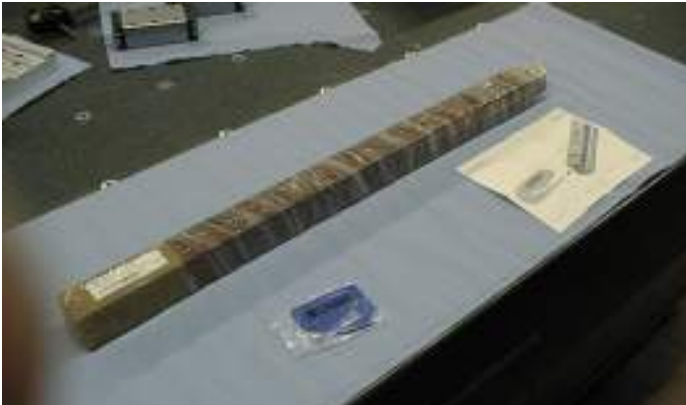
- If a Rail Seal is also ordered, one-piece guide rails are supplied with already clipped-on Rail Seal and screwed-down protective caps in one package (1).

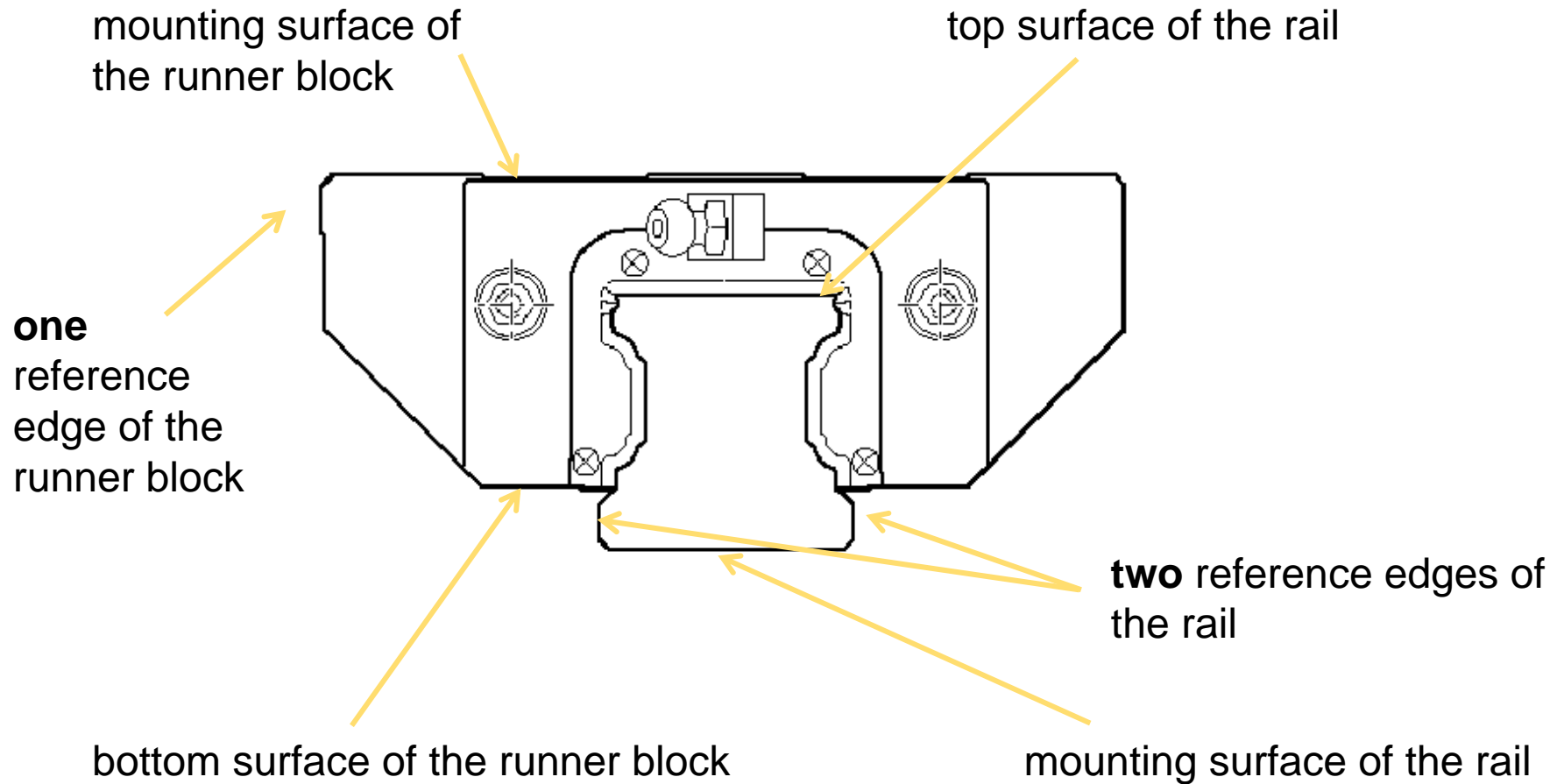
## Composite guide rails:

- Matching sections of a composite guide rail are identified by a label on the packaging.
- The guide rails (2) are shipped in their own packaging, irrespective of the Rail Seal also possibly ordered.
- The Rail Seal is supplied in one piece matching the overall length, together with protective caps, screws and washers, in its own packaging (3). This packaging is marked with the same production job number as the guide rail labels.

## Unpacking

- Do not recycle packaging until mounting has been completed!
- The packaging can protect not yet mounted guide rails or Rail Seals while mounting work is in progress
- Carefully remove guide rails from the packaging
- Use a cutter to cut through the wrapping paper





# Dressing of the Mounting Surface of the Rail with a Dressing Stone



Dressing of the  
Mounting Surface of  
the Rail leads to  
smooth out potential  
existing roughness



- Both sides of the guide rail bottom act as reference edges
- Dressing of the reference edges leads to smooth out smooth out potential existing roughness
- Both sides have to be dressed

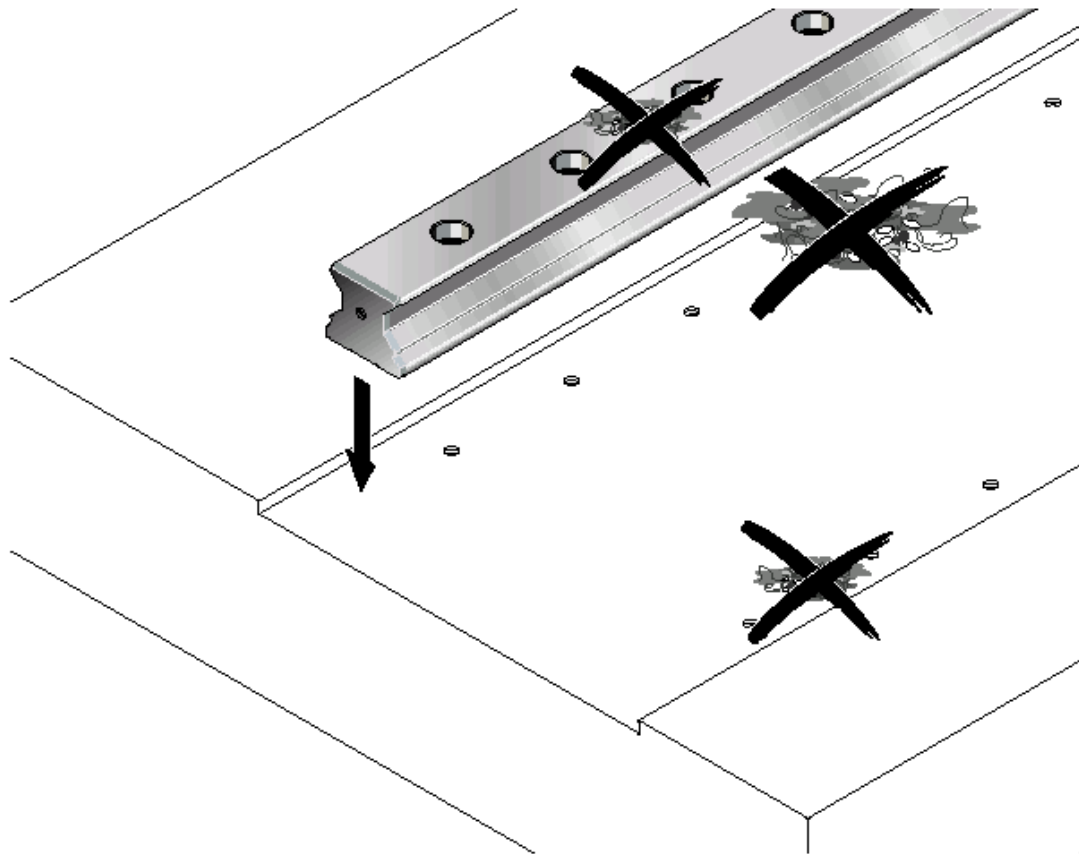



# Cleaning of the Guide Rail Bottom with Spirit



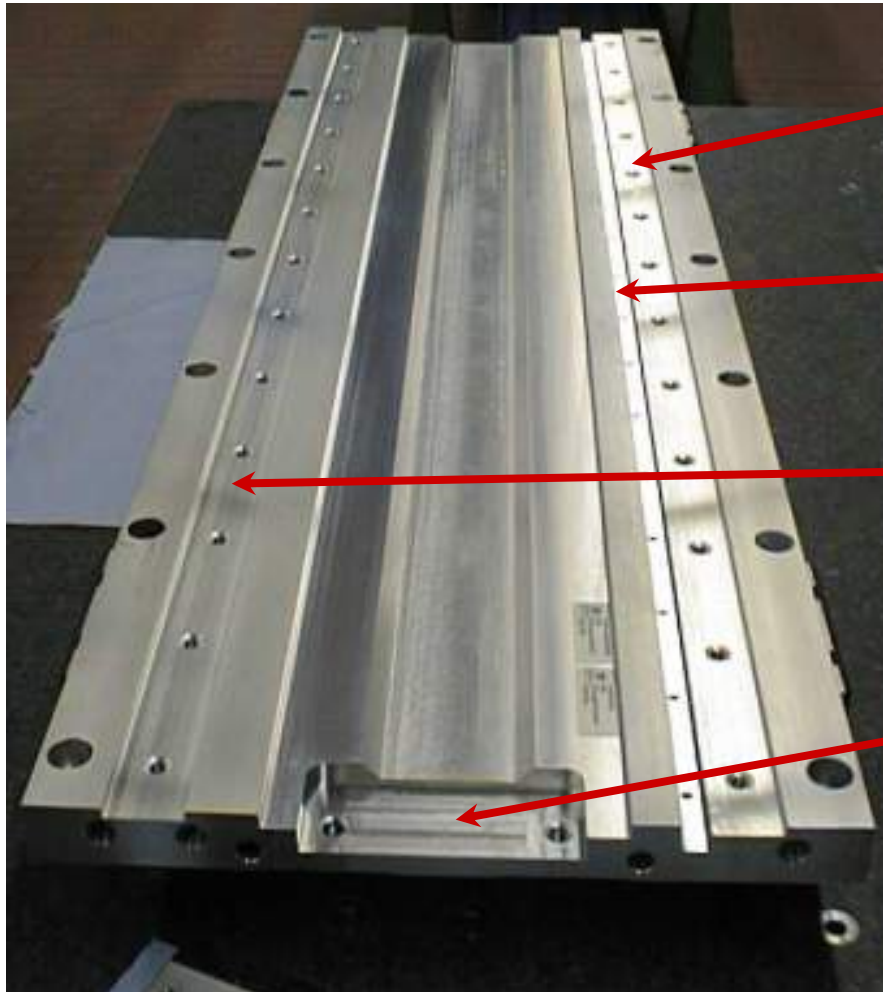
By cleaning the rail using spirit the preservative will be removed





 Joint construction and working area have to be cleaned well before mounting!

Mounting area of the rails have to be cleaned well



Contact surface of the first guide rail

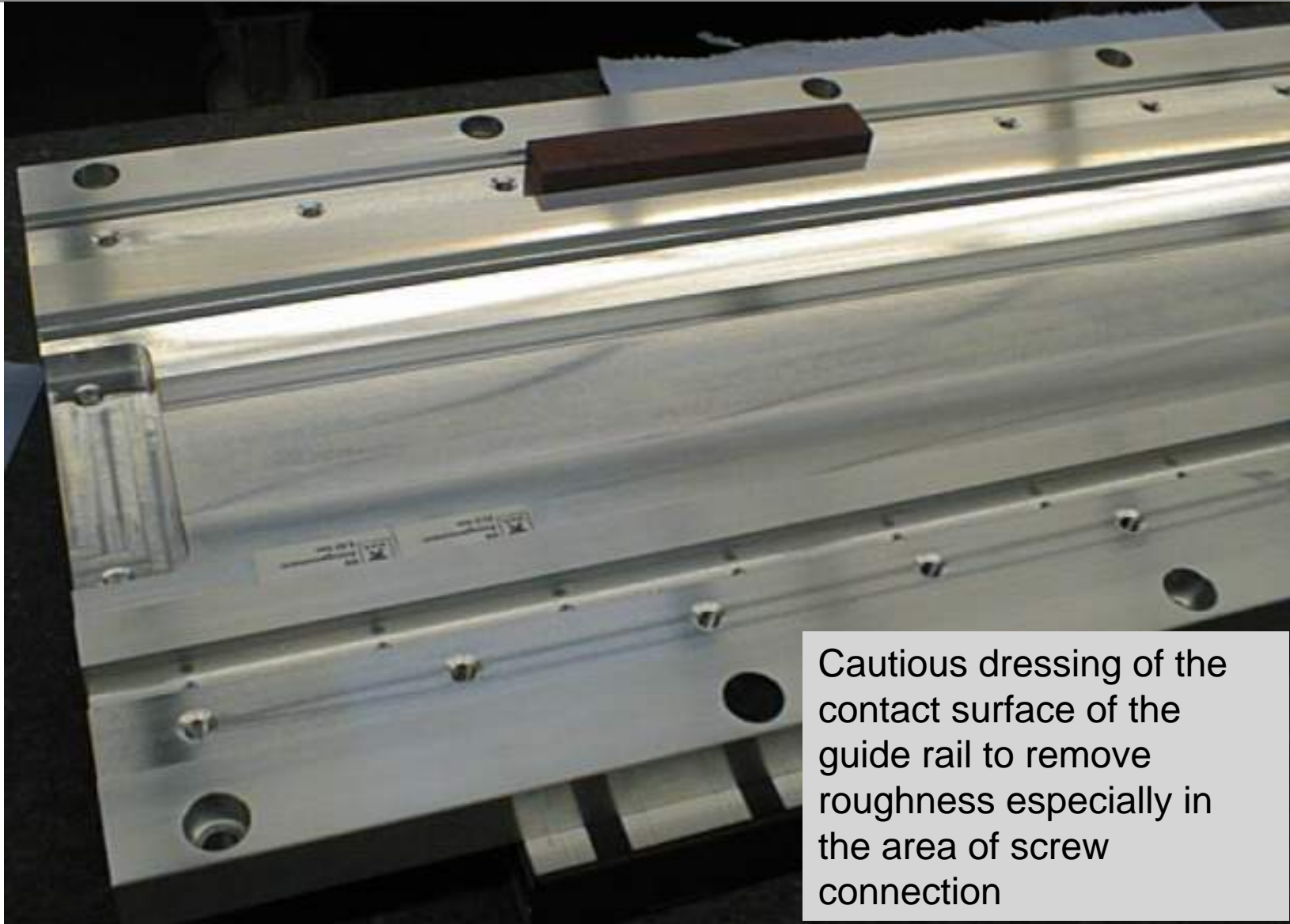
Collet of wedge profile retaining strip

Contact surface of the second floating bedded guide rail

Contact surface of the ball screw drive floating bearing of the bearing support at end of spindle

# TKK - Base Plate

## Dressing of the Rail Guide Contact Surface



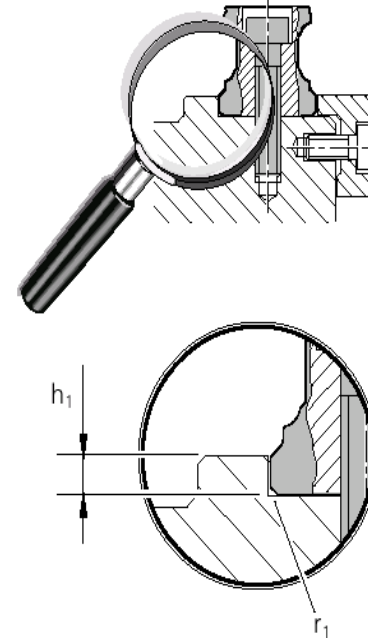
Cautious dressing of the contact surface of the guide rail to remove roughness especially in the area of screw connection



After Dressing, the rail guide contact surface has to be cleaned with spirit



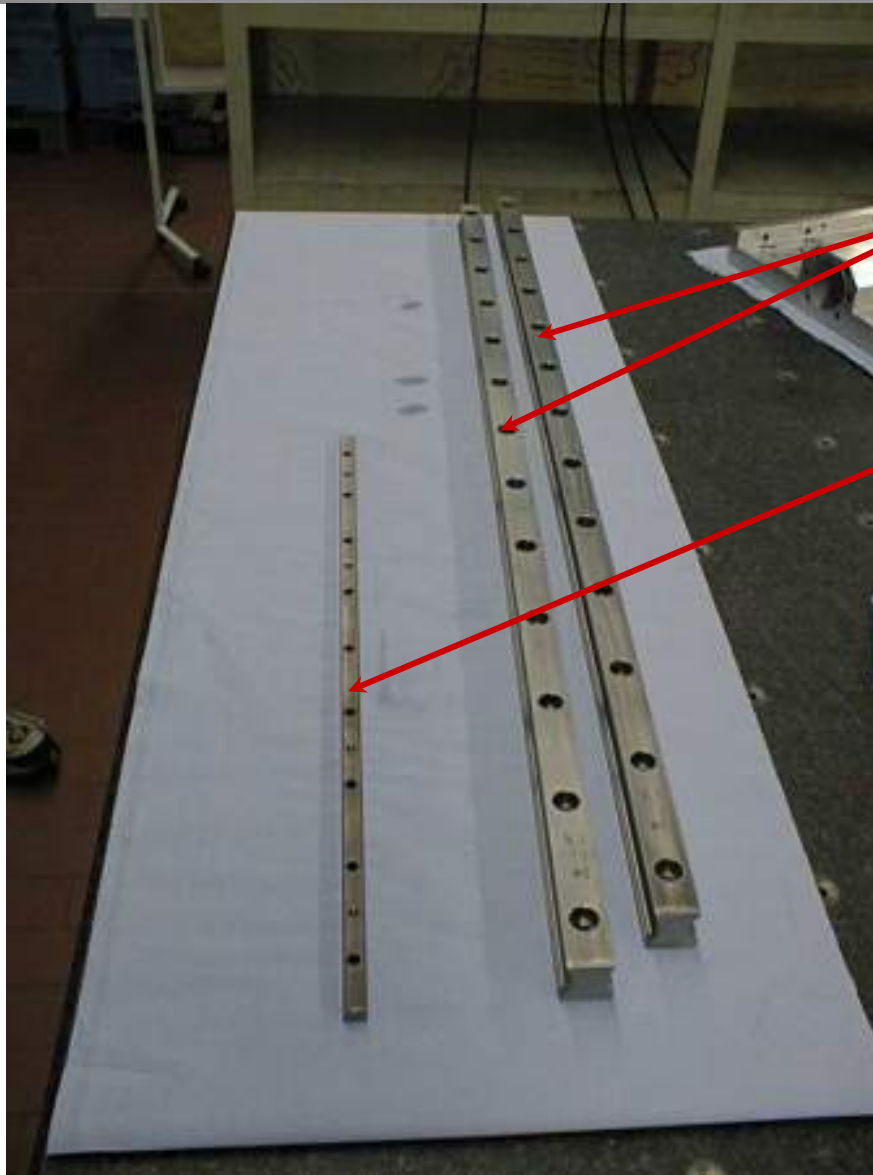
# Verifying the Reference Edge Radius at the TKK - Base Plate



Größe Size Taille Grandezza	$h_1$ min (mm)	$h_1$ max (mm)	$r_1$ max (mm)
15	2,5	3,5	0,4
20	2,5	4,0	0,6
25	3,0	5,0	0,8
30	3,0	5,0	0,8
<b>35</b>	<b>3,5</b>	<b>6,0</b>	<b>0,8</b>
45	4,5	8,0	0,8
55	7,0	10,0	1,2
65	7,0	10,0	1,2

Radius of the base plate  $r_1$  has to be smaller than the radius at the reference edge at the guide rail bottom

# TKK - Guide Rails with a Wedge Profile Retaining Strip



Ball guide rails size 30

Part of wedge profile retaining strip





Guide Rails have be cleaned again  
with Spirit just before mounting

# Insertion of First Guide Rail



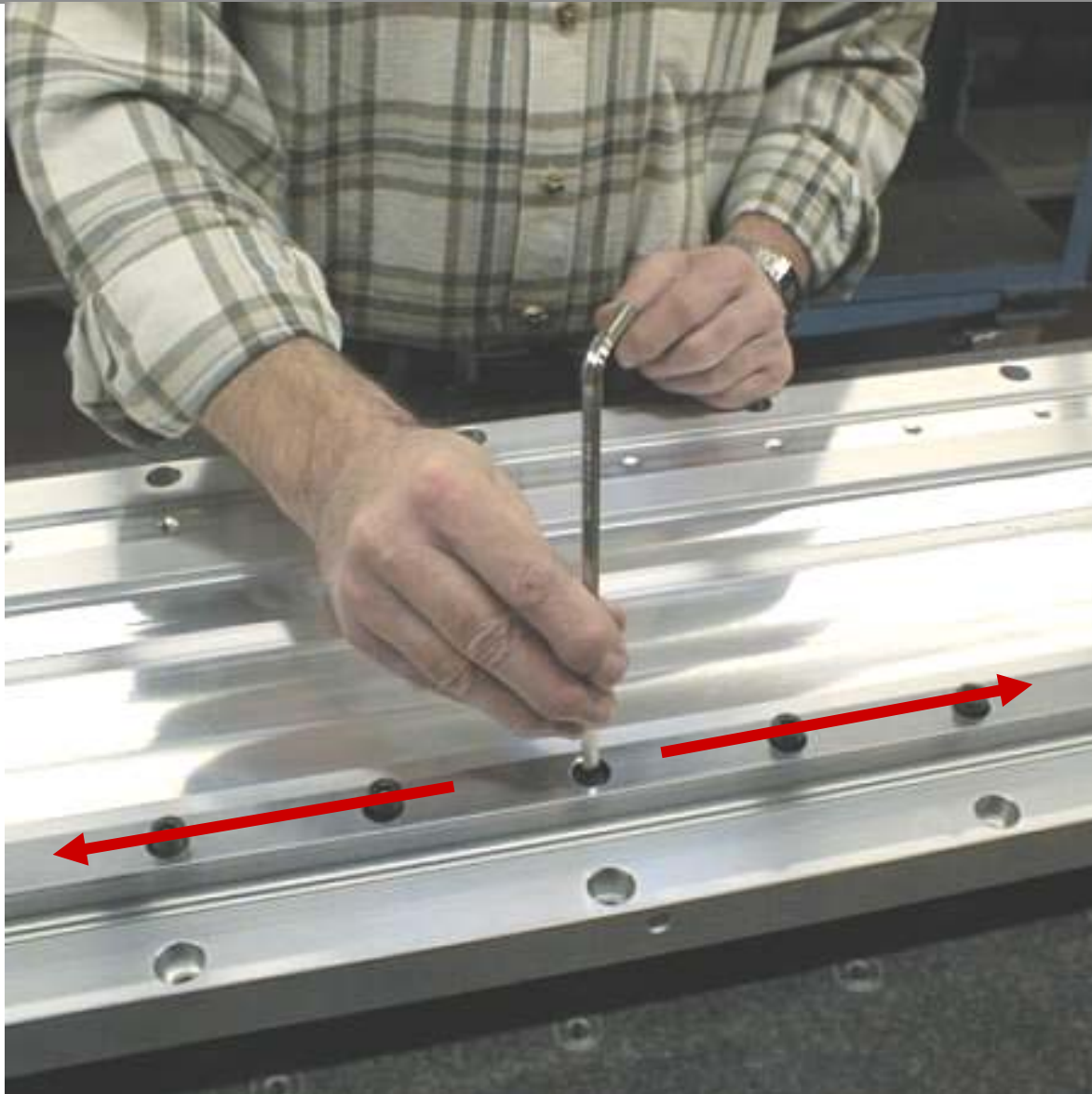
Guide Rail will be  
inserted in collet as  
shown here or like  
described at page 25



Screws for fixing the  
guide rail are inserted



## Screws has to be Tightened Slightly beginning from Middle



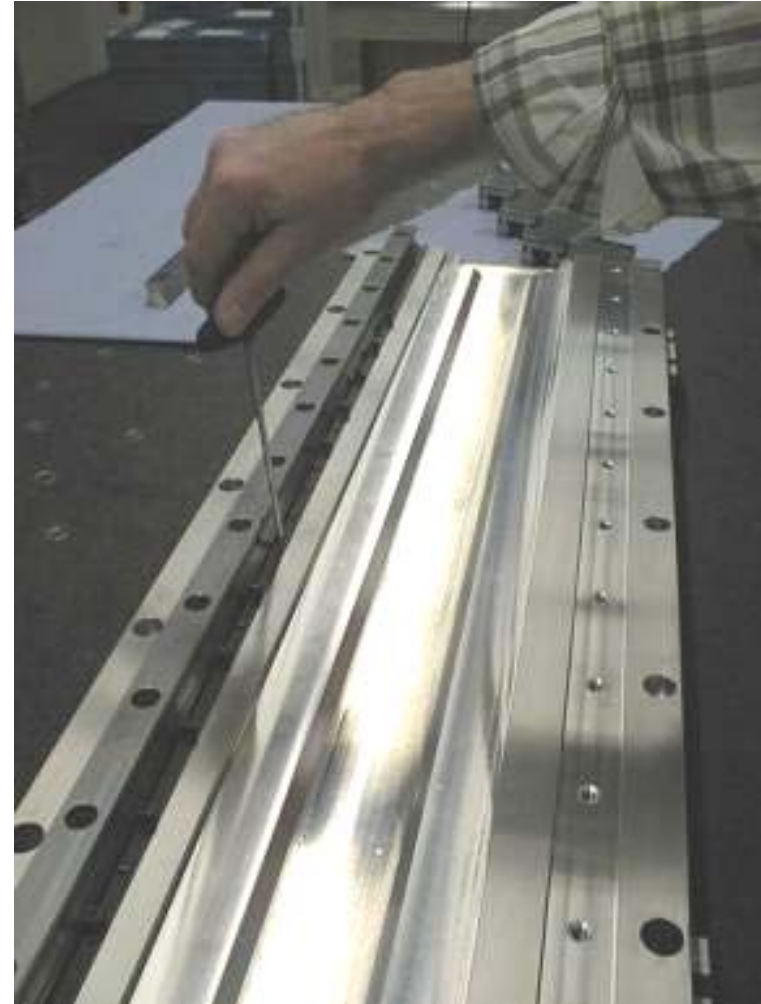
The screws have to be slightly tightened from middle outwards.

# Mounting of Two-Piece Wedge Profile Retaining Strip

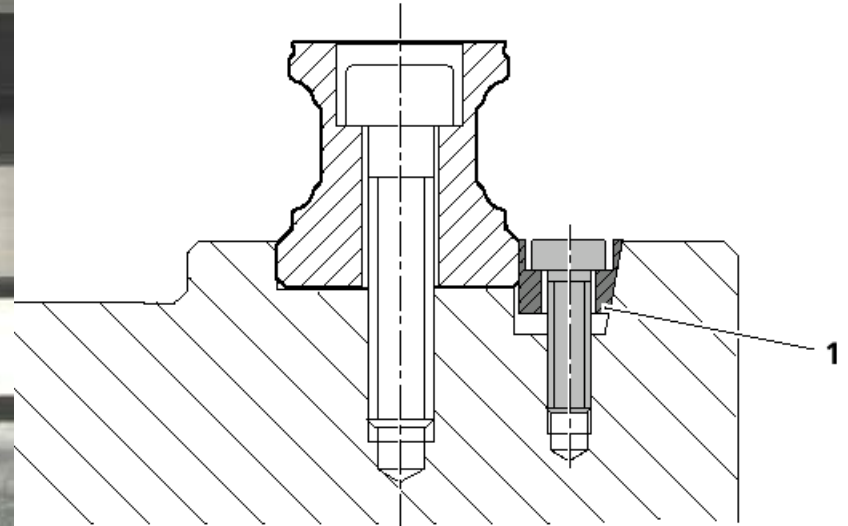
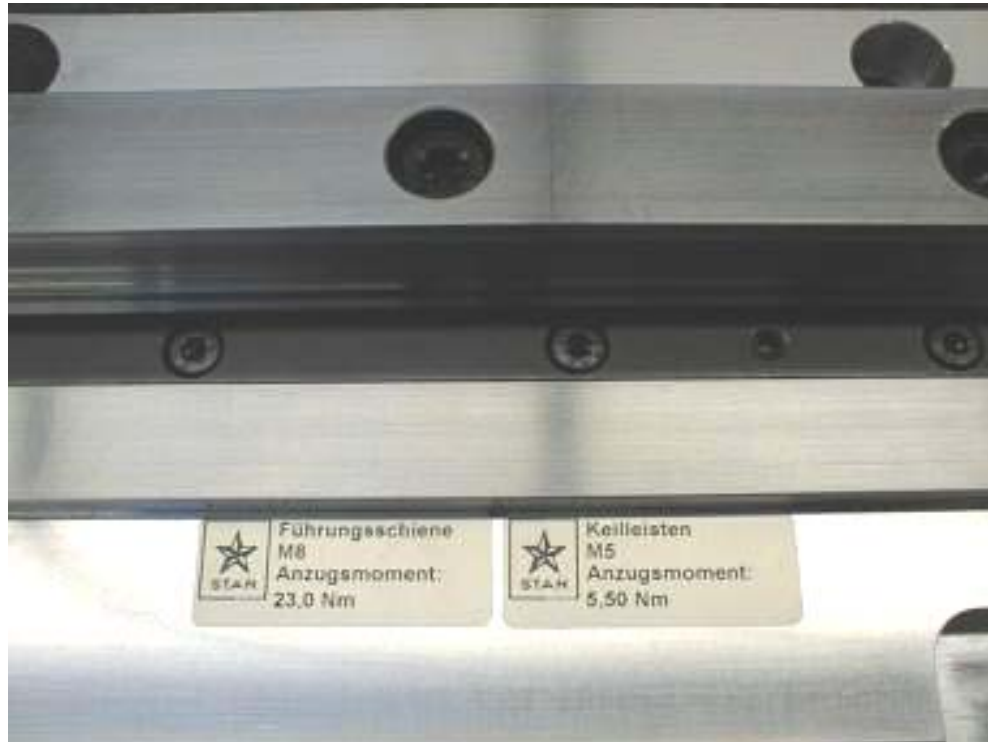


The two-piece wedge profile retaining strip for alignment of the first guide rail has to be inserted.

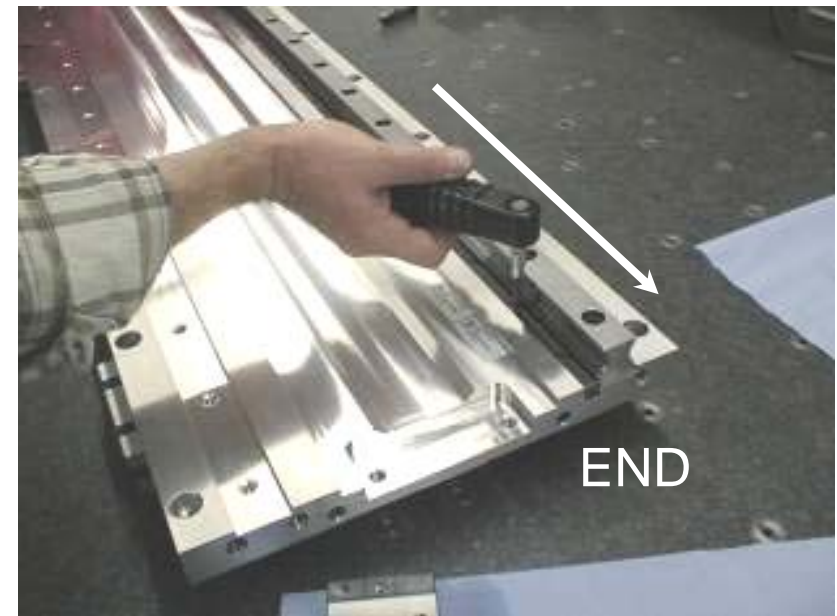
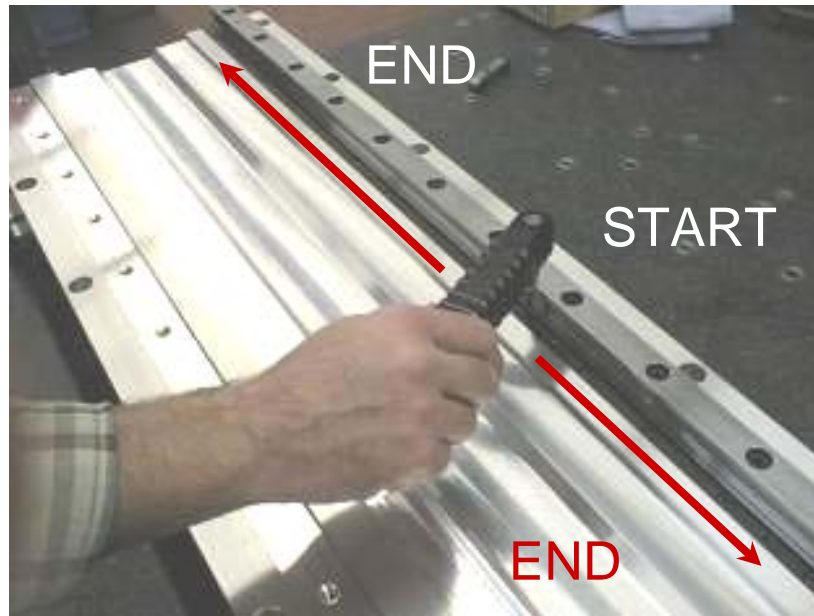
# Slightly Tightening of the Wedge Profile Retaining Strip







# Tightening of Wedge Profile Retaining Strip Screws from Middle



Wedge profile retaining strip has to be tightened outwards using the instructed tightening torque.

# Tightening of the Screws of Guide Rail with Tightening Torque



After tightening of the screws of the wedge profile retaining strips, the screws of the guide rail have to be tightened using a torque spanner. Has to be done from one end of the rail to the other or from middle outwards.



# Insertion of the Second Floating Bedded Guide Rail



The second guide rail has to be inserted after alignment and tightening of the first.

# Positioning the Guide Rails in Right Distance using a Calliper



Parallel positioning of the second, floating bedded guide rail according the lateral distance measure at runner block using a calliper

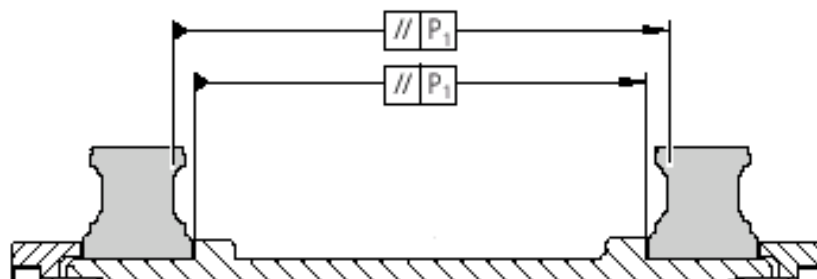
# Floating Bedded Guide Rail: Details




Details:  
Floating bedded  
second guide rail has  
lateral clearance



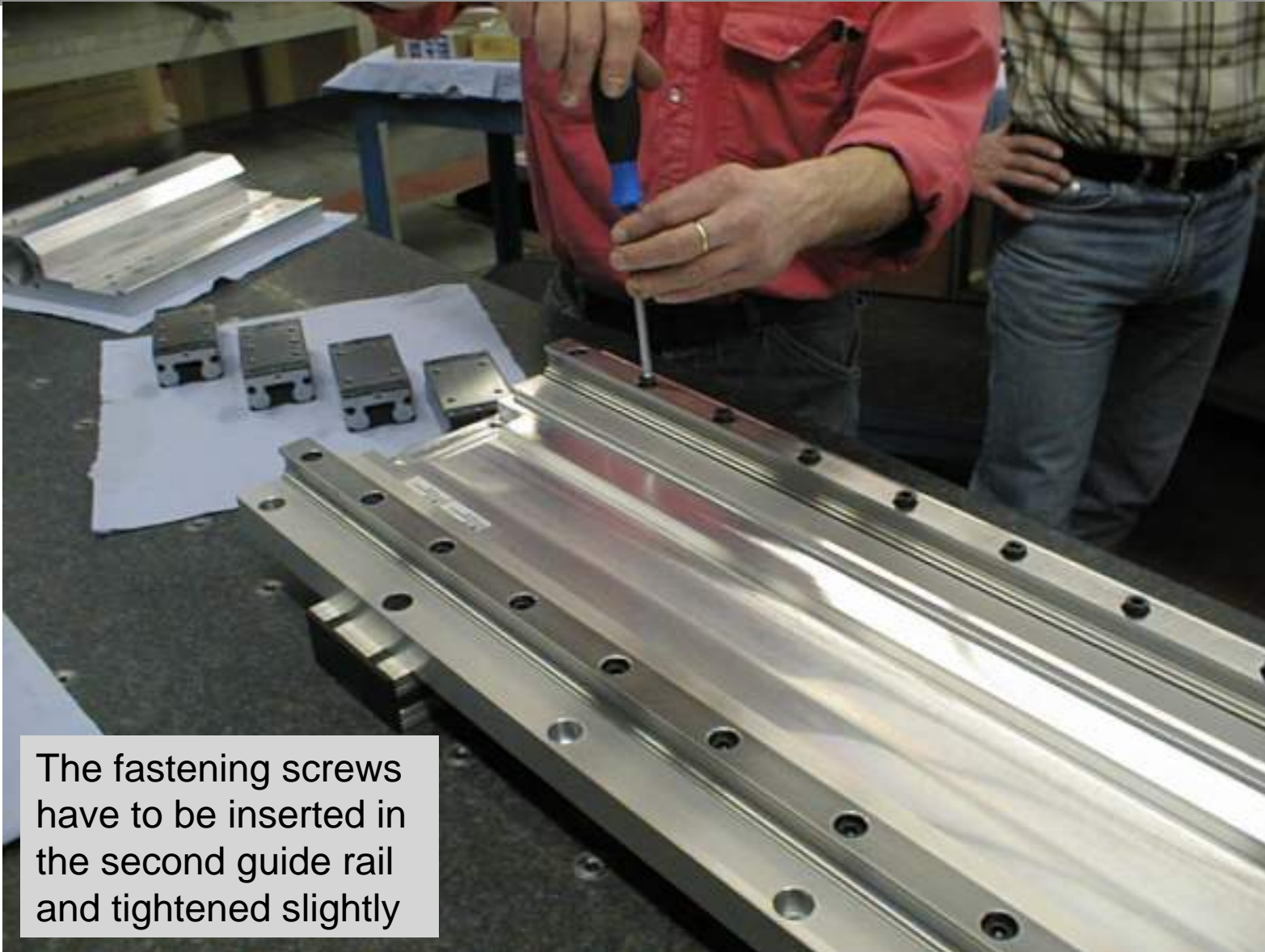


# Parallelism of the Guide Rails which have to be mounted



Größe Size Taille Grandezza	// P <sub>1</sub> (mm)							
	 S		 St				 Al	
	< 10 µm	0,02 C	< 10 µm	0,02 C	0,08 C	0,13 C	< 10 µm	0,02C
15	0,025	0,017	0,015	0,009	0,005	0,004	0,021	0,014
20	0,029	0,021	0,018	0,011	0,006	0,004		
25	0,032	0,023	0,019	0,012	0,007	0,005	0,026	0,017
30	0,035	0,026	0,021	0,014	0,009	0,006	0,029	0,019
35	0,040	0,030	0,023	0,015	0,010	0,007	0,035	0,022
45			0,028	0,019	0,012	0,009		
55			0,035	0,025	0,016	0,011		
65			0,048	0,035	0,022	0,016		

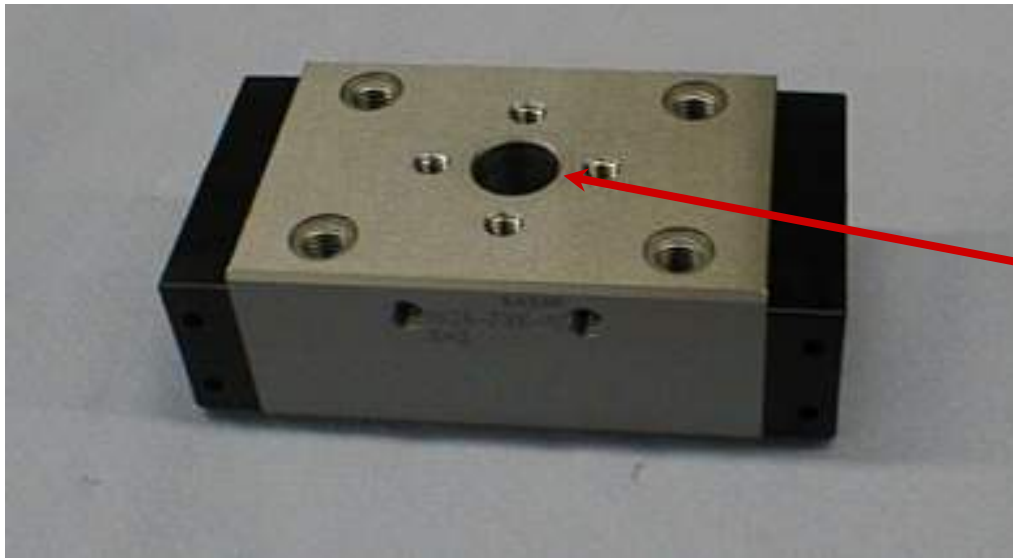
# Slightly Tightening of Screws



The fastening screws have to be inserted in the second guide rail and tightened slightly

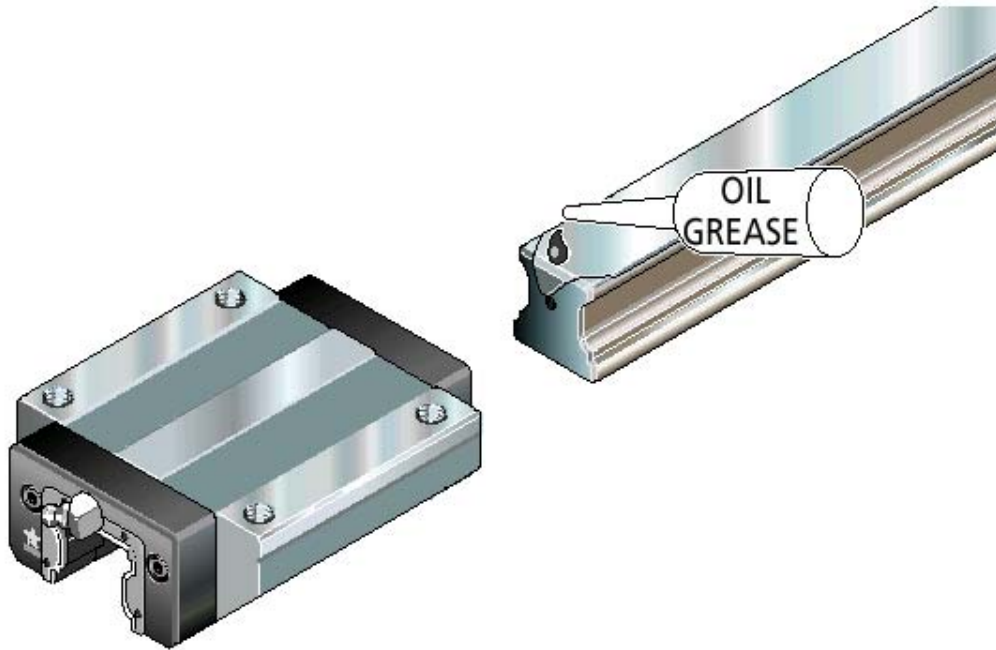
## Option 1:

Positioning of the second guide rails using mounting runner block



Bore hole for fastening  
rails

Screws of the second  
rail have to be tightened  
through this bore hole



- Apply oil or grease to chamfers and Rail Seal on the end face of the guide rail
- Carefully slide the runner block onto the guide rails
- Check parallelism
- Check vertical offset, non-linearity, error in alignment



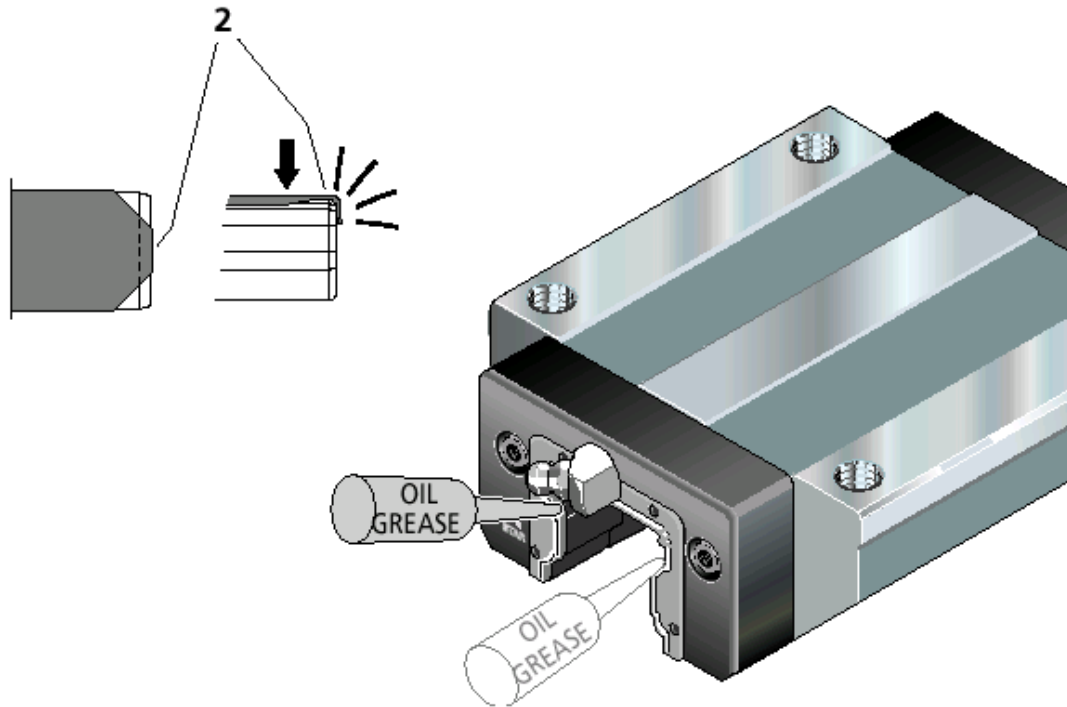
# Preparation of Sliding-On the Runner Block

Edges of face side  
have to be lubricated  
with oil before  
sliding-on the runner  
block



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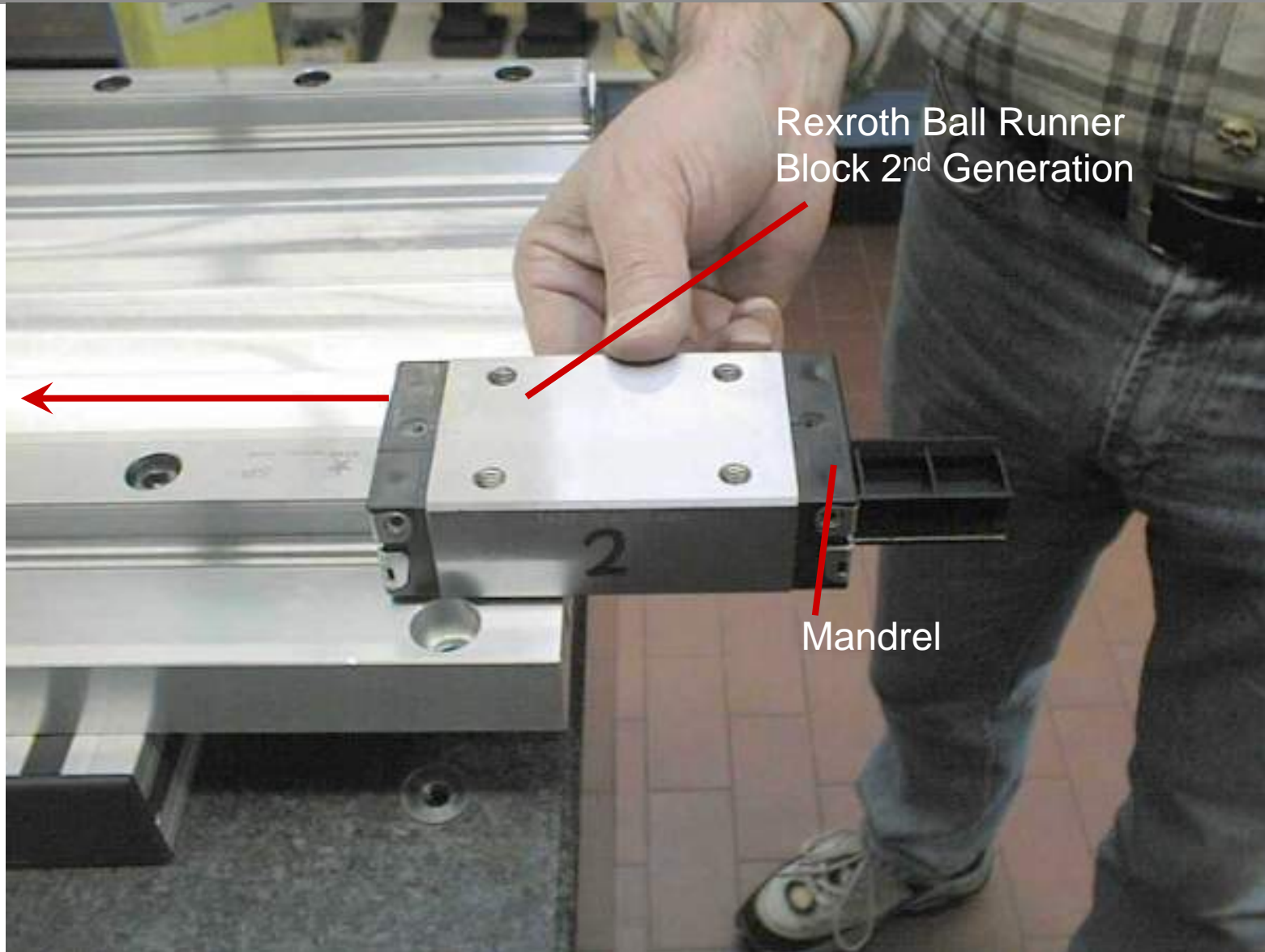
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- Slide on runner blocks only over Rail Seal ends pre-fabricated (2) at the factory, not over ends which you have machined or cut to length yourself
- Check whether the Rail Seals fit snugly at the rail ends and on the end faces
- When using runner blocks with pre-assembled measuring systems, always slide the assembly onto the guide rail with the runner block end first
- Lubricate sealing lips with oil or grease



# Sliding-On of a Runner Block Using a Mandrel



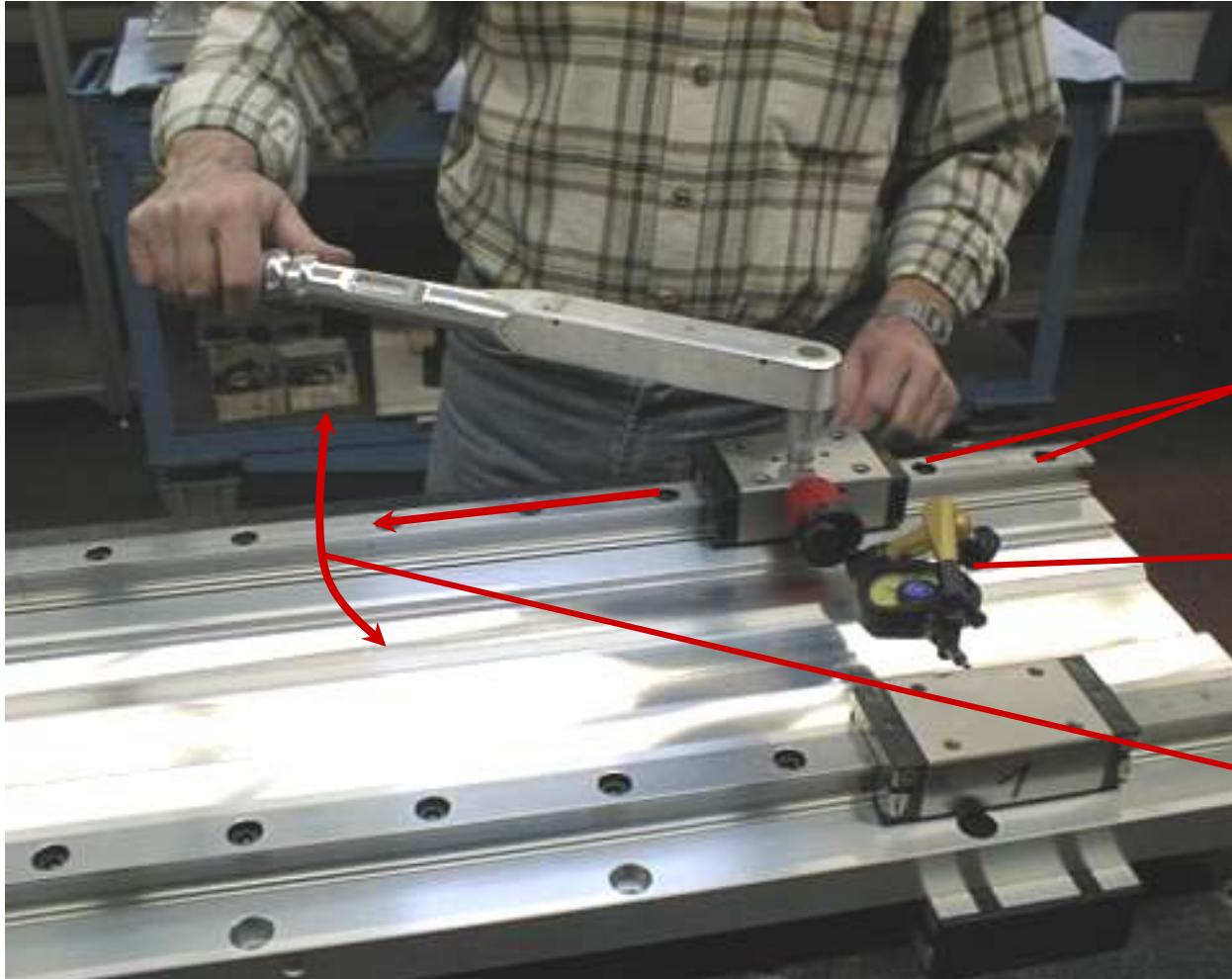
# Alignment of the Second Guide Rail



Variant 1:  
Alignment of the second  
rail using mounting  
runner block

Reference edge of  
runner block no. 1

# Alignment of the Second Guide Rail



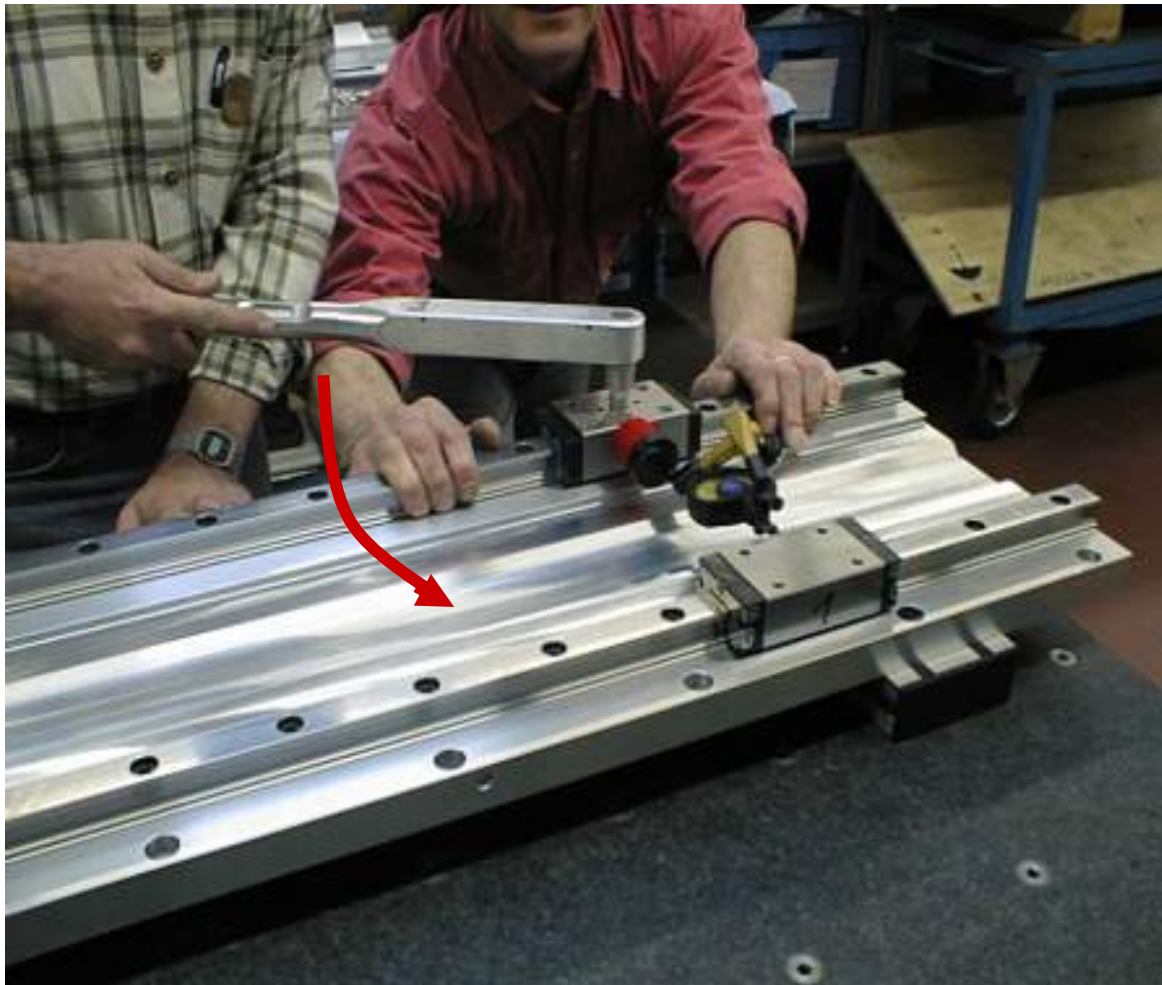
Variant 1:  
Alignment of the second  
guide rail using mounting  
runner block

Screws already tightened  
with tightening torque

μ-sensing device

Lateral pushing by hand of  
the guide rail for alignment  
of the lateral guide distance





**Variant 1:**  
Alignment of the second  
guide rail using mounting  
runner block

Lateral pushing by hand at  
the non fastened end of  
guide rail.





Variant 1:  
Alignment of the  
second guide rail  
using mounting runner  
block

At shorter free end of  
guide rail higher push  
loads are necessary

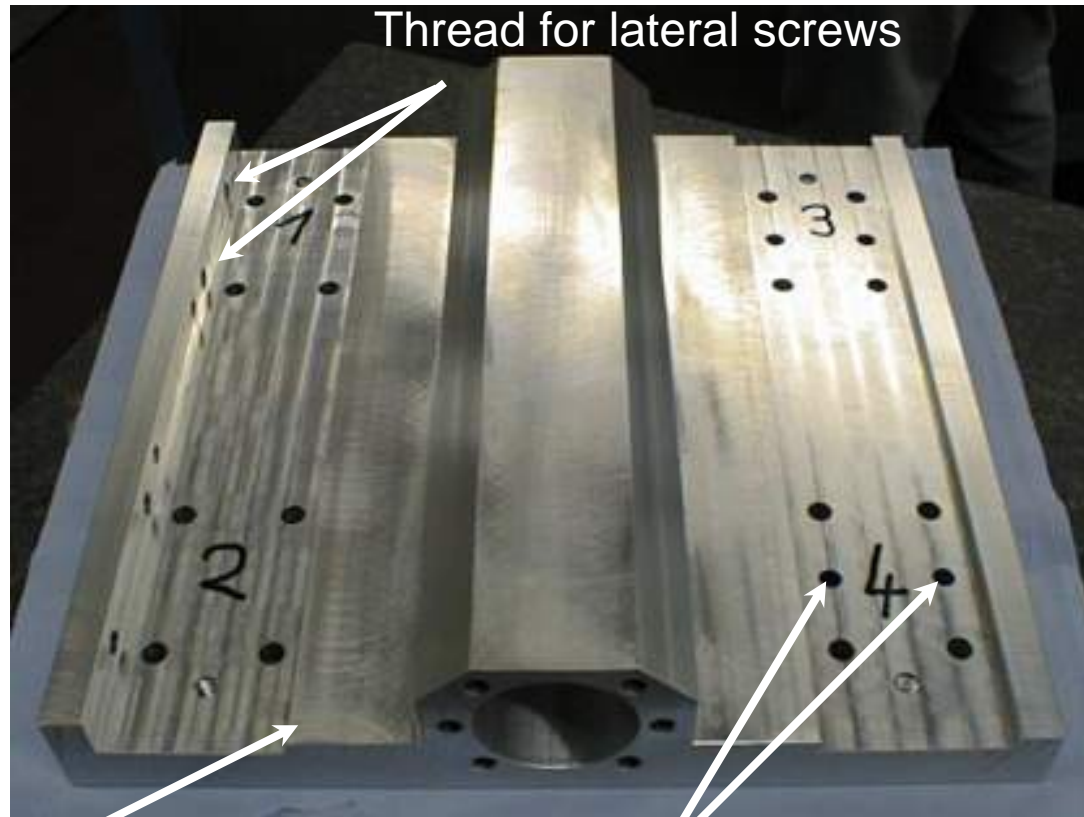
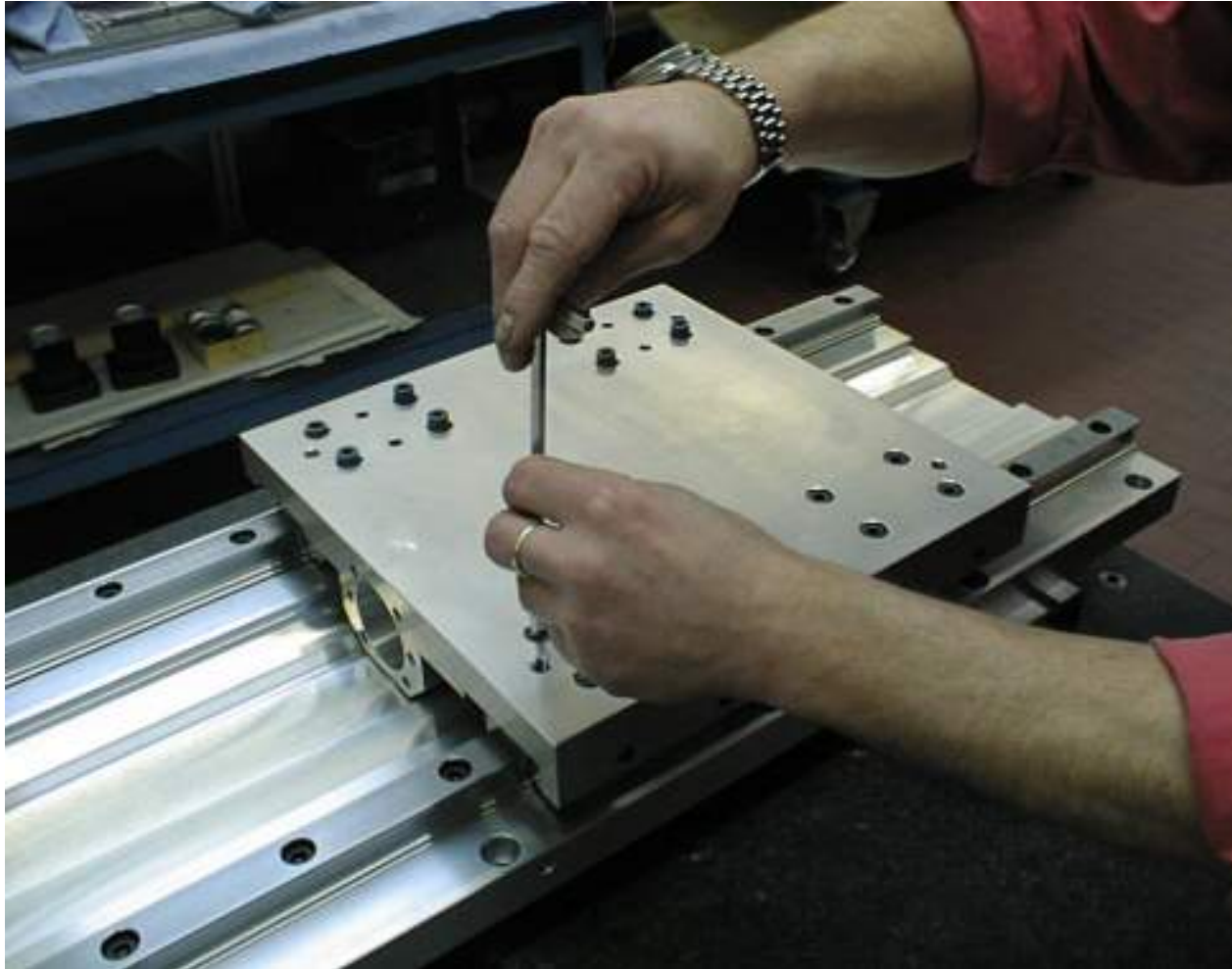


Table reference edge

Bore holes for  
parallel pins

## Two Variants for mounting of runner blocks

- Position 1 and 2  
runner blocks have to be  
pressed against table  
reference edge using lateral  
screws
- Position 3 and 4
  - **Variant 1**  
floated bedded runner  
blocks
  - **Variant 2**  
Alignment of runner blocks  
using parallel pins

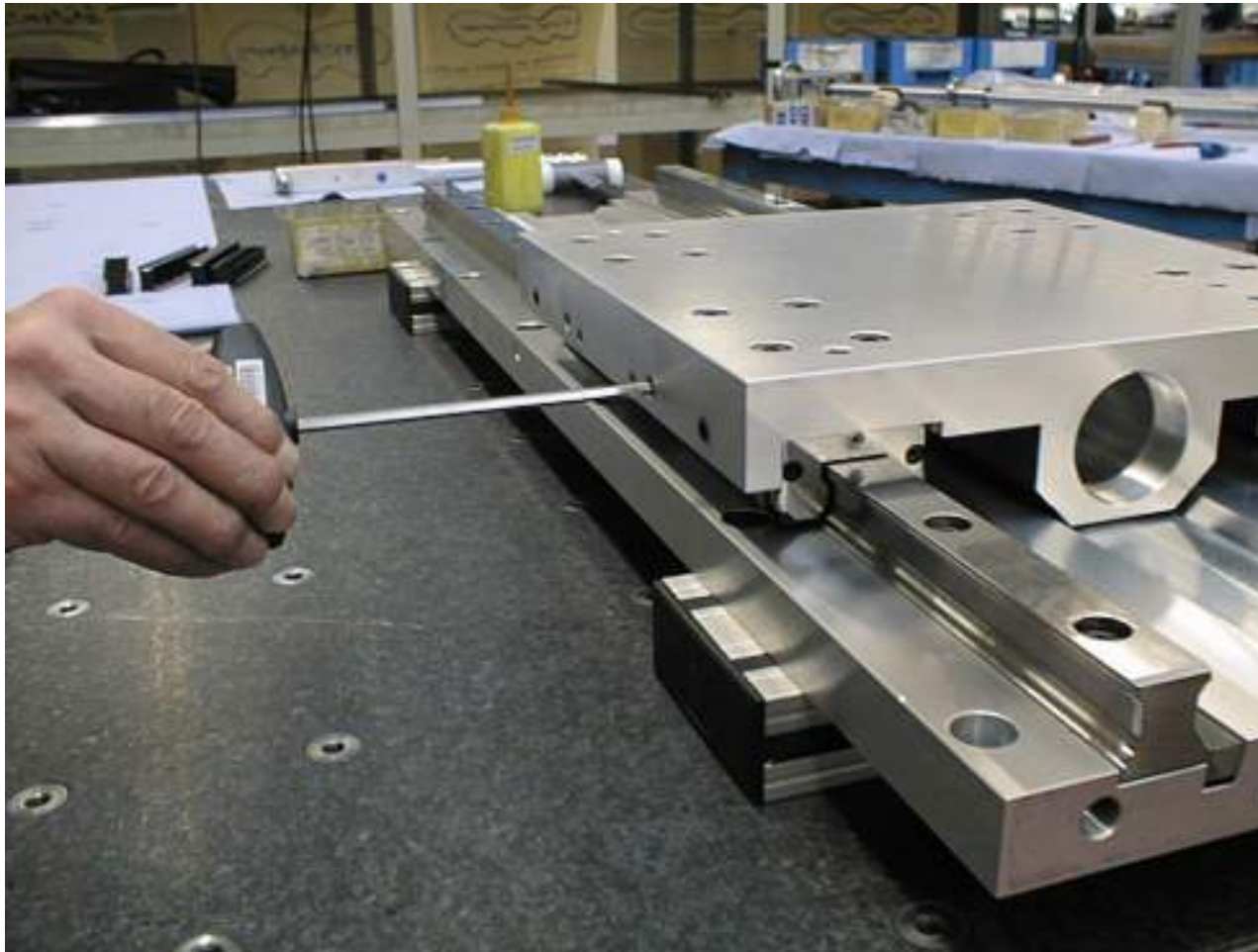


## Variant 1:

Bolt together of applied  
TKK-table part:

Bolt together of runner  
block 1 & 2 after press-  
on with lateral screws.  
Afterwards screw down  
of runner block 3 & 4

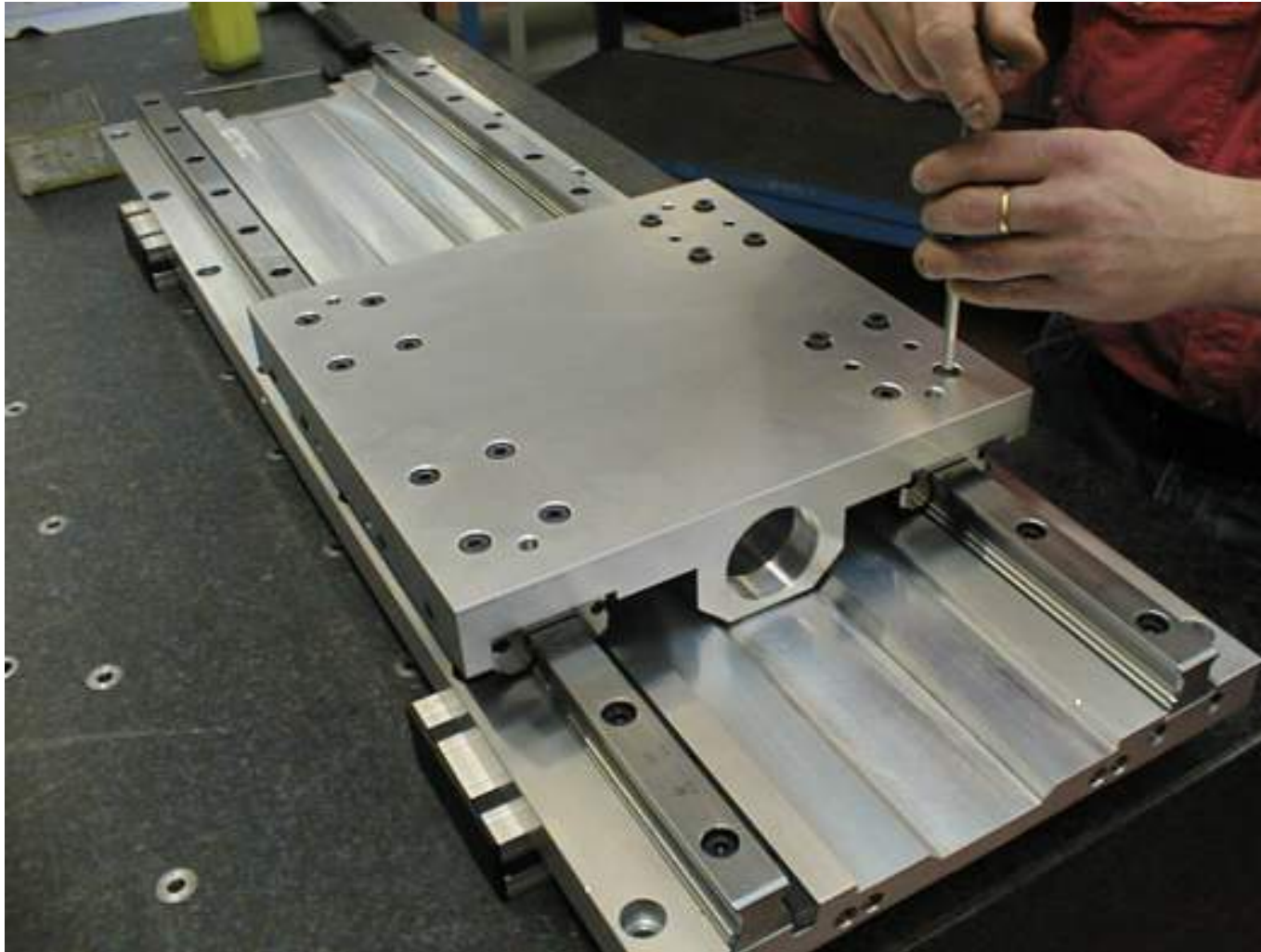




## Variant 1:

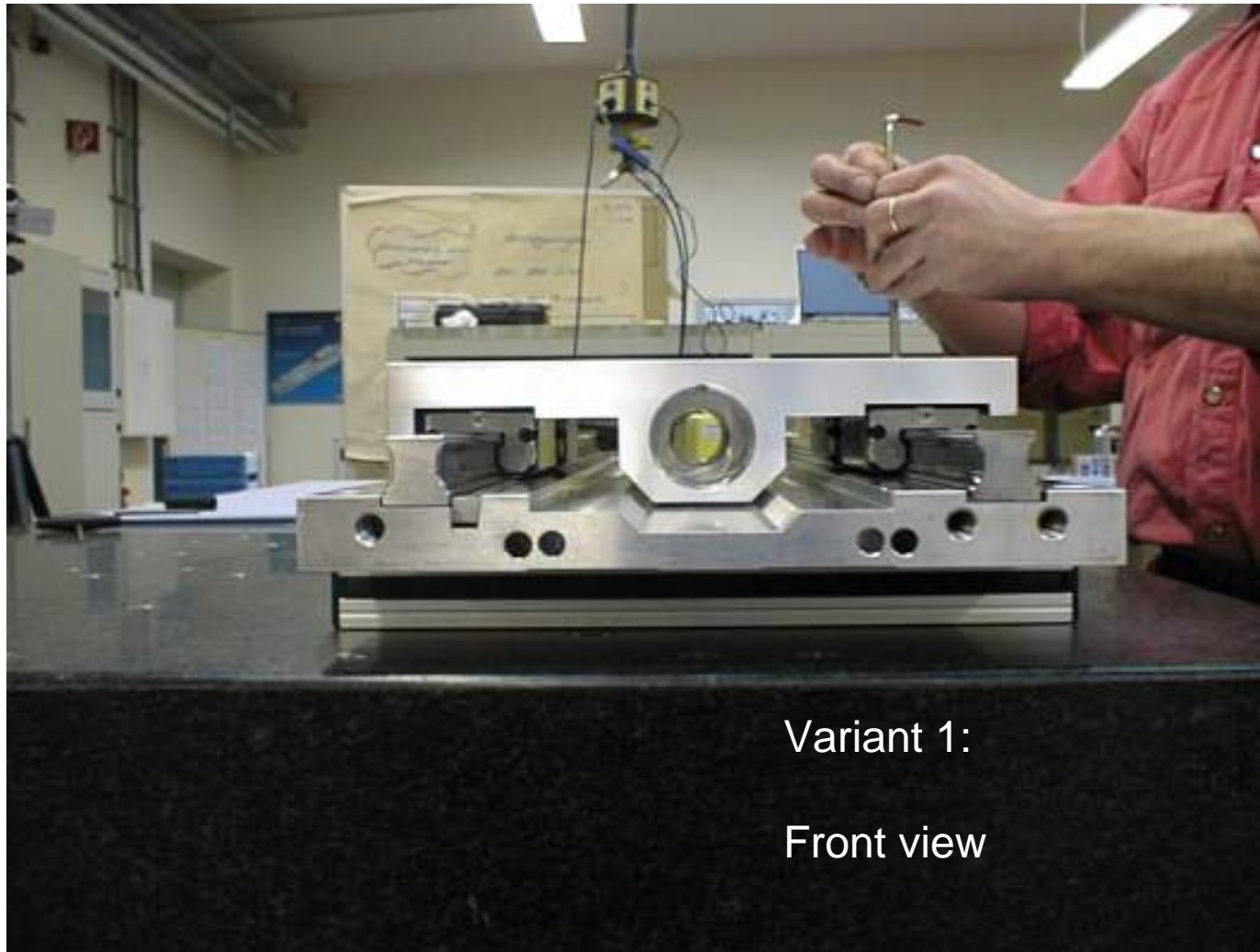
Slightly tightening of  
lateral press-on screws





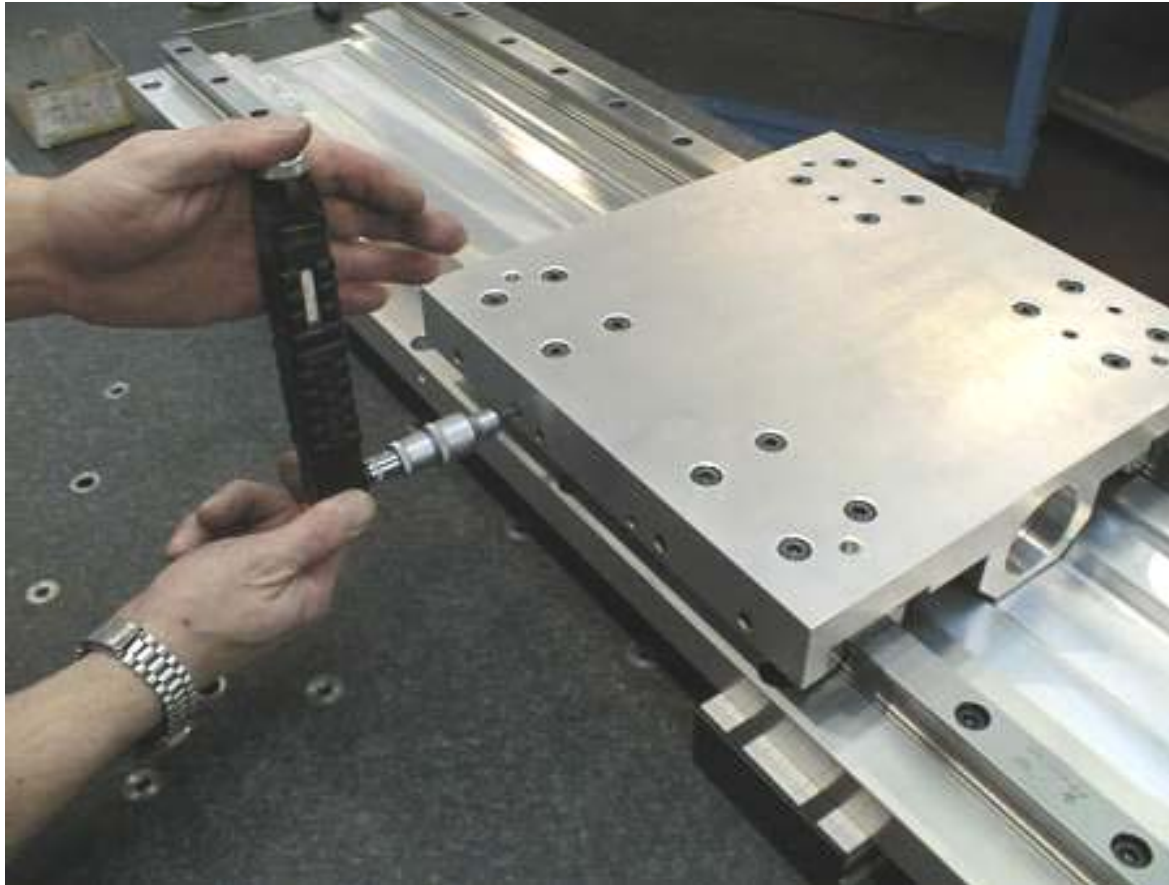
**Variant 1:**

Slightly tightening  
of screws



Variant 1:

Front view



## Variant 1:

Tightening of lateral press-on screws using torque spanner



## Variant 1:

Tightening of the fastening screws using torque spanner

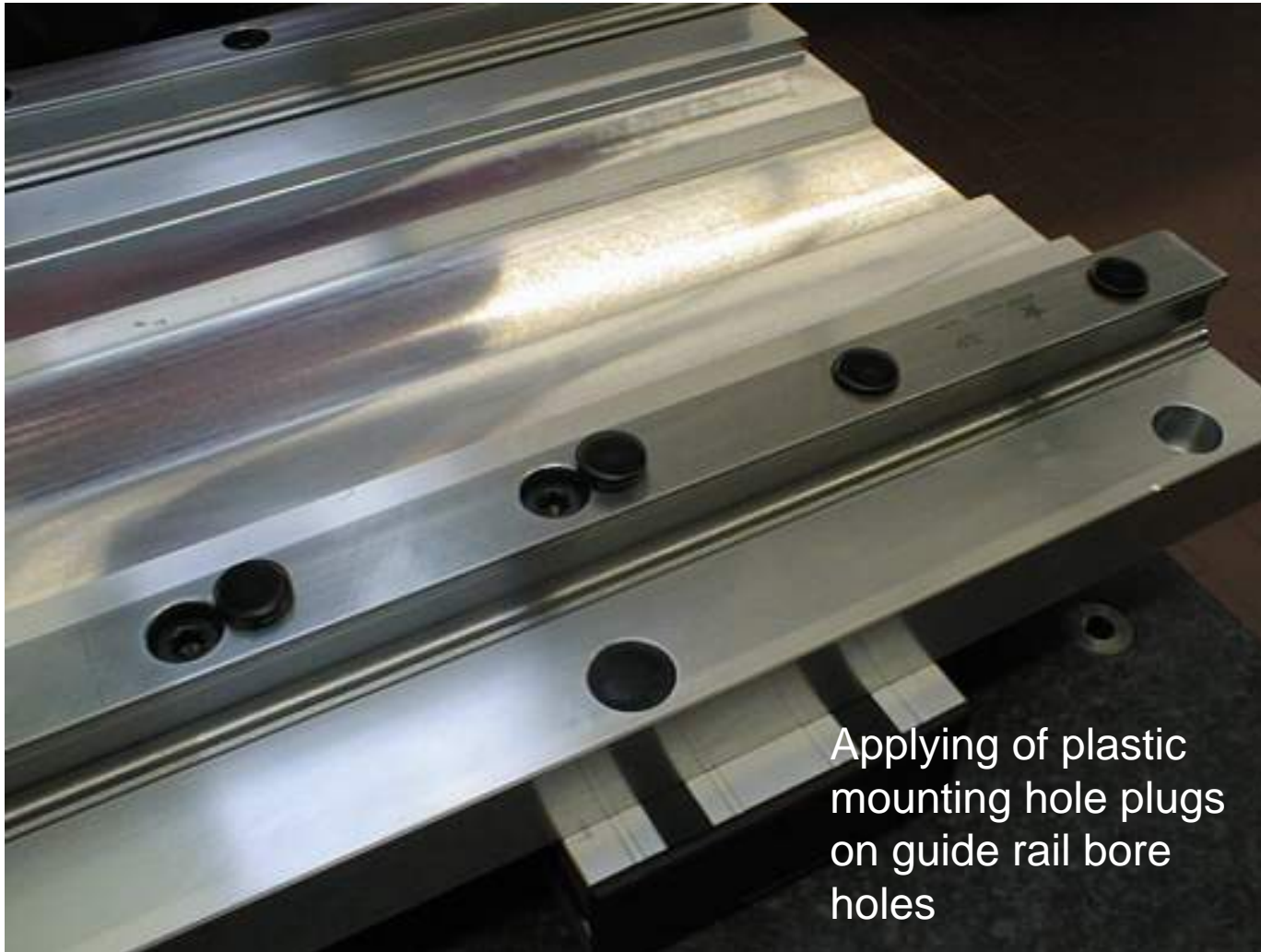




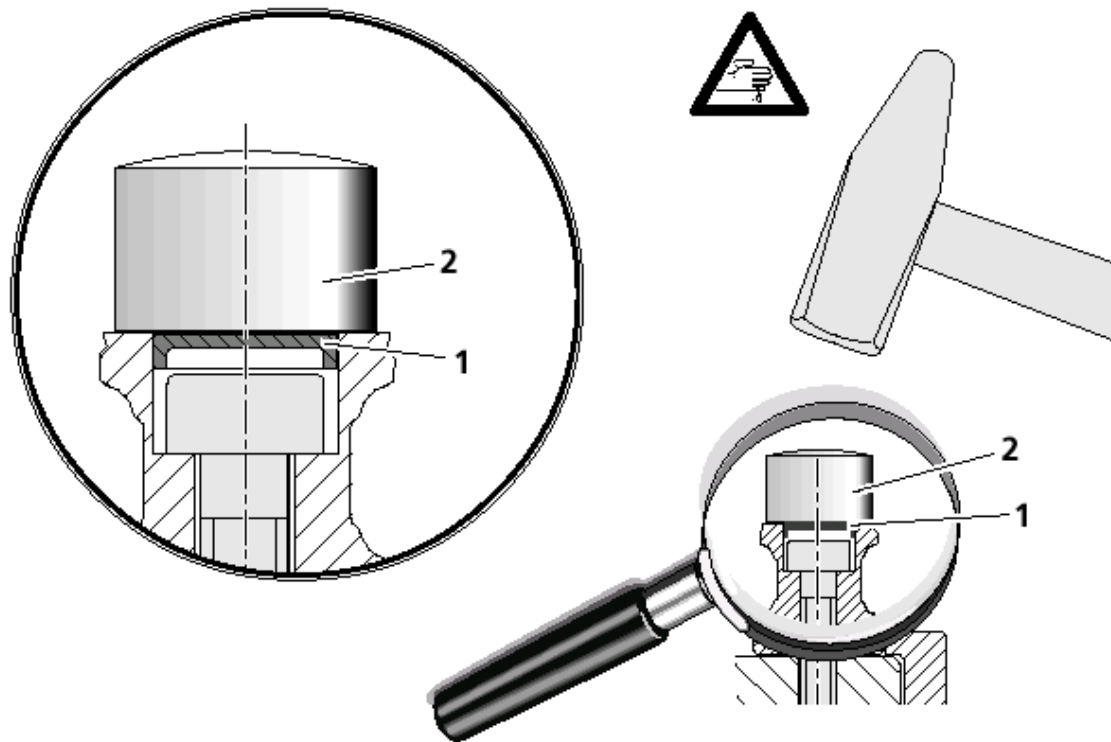
Variant 1:

Runner block 3 & 4 see  
of page backwards

# Mounting the Plastic Mounting Hole Plugs



Applying of plastic  
mounting hole plugs  
on guide rail bore  
holes



- Plastic mounting hole plugs are supplied with the guide rail
- Fit plastic mounting hole plugs (1) flush with the rail surface with the aid of a plastic pad (2)



Fit of plastic mounting hole plugs:

The plugs have to flush with the top of guide rail



# Mounting the Plastic Mounting Hole Plugs

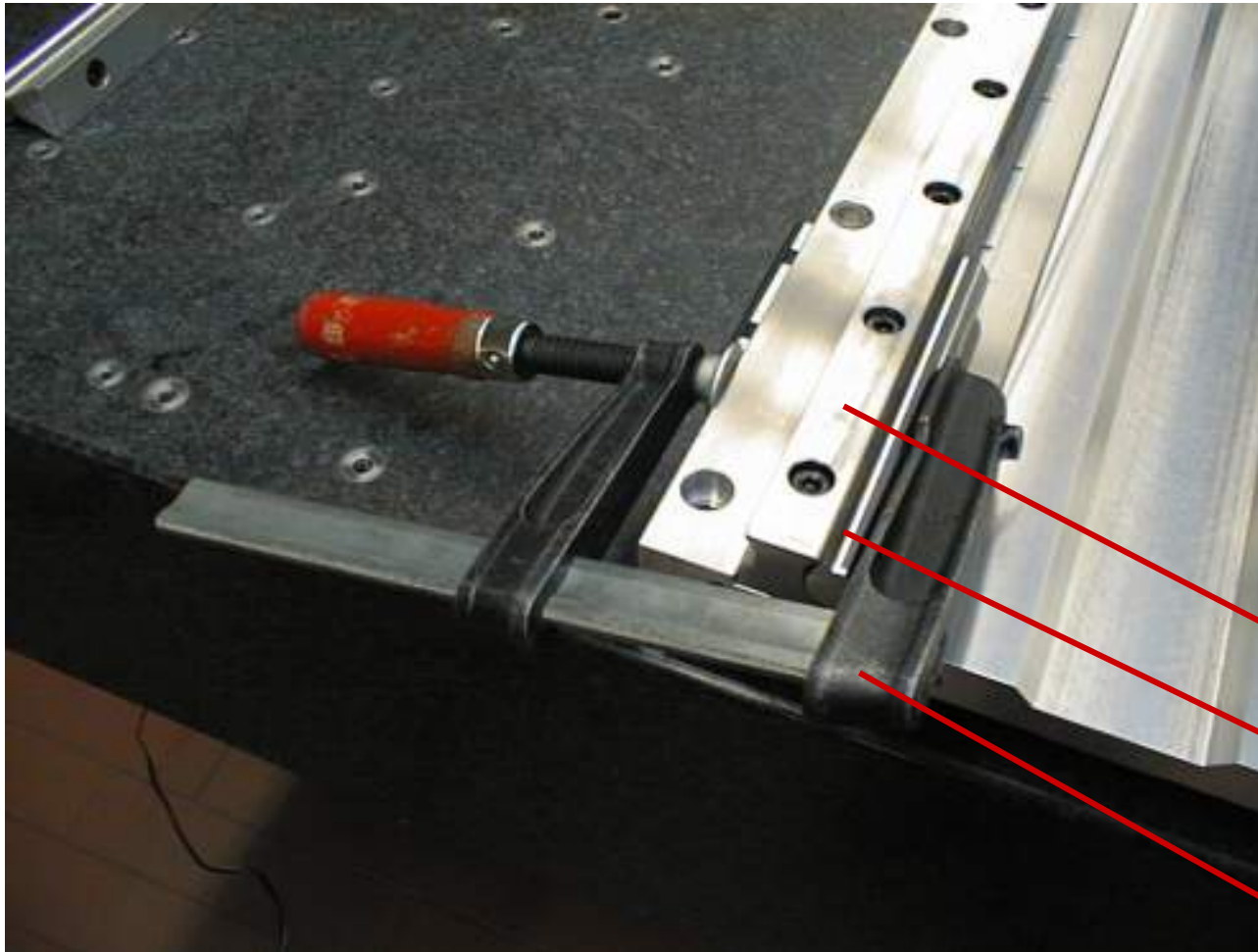


Fit of plastic mounting  
hole plugs



The plastic mounting hole plugs can only be removed and destroyed by using a screw driver and hammer

# Mounting of Guide Rails Without Using Wedge Profile Retaining Strip



The first guide rail can be pressed on table reference edge by using a shaft and a vice alternatively

Guide rail

Shaft

Vice



## Variant 2: Alignment and Mounting of All Runner Blocks at TKK-Table



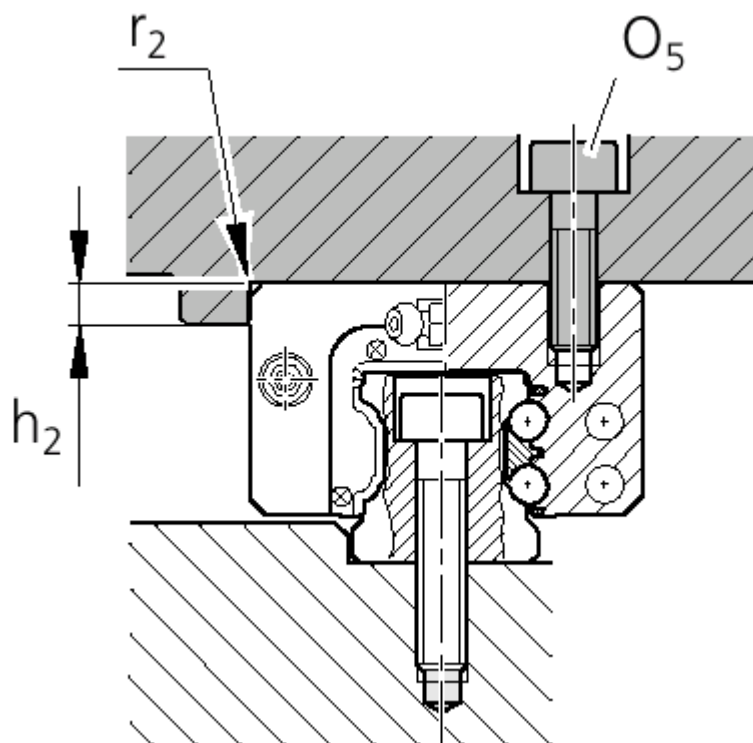
### Variant 2:

- Positioning of runner block 1 & 2 at TKK-table reference edge like variant 1
- Positioning of runner block 3 & 4 using parallel pins at TKK-table
- Afterwards alignment of the second floating bedded guide rail



# Mounting of Runner Blocks at TKK-table

## Tolerances and Torque Moments



The runner blocks are treated with an oil-based preservative before leaving the factory.

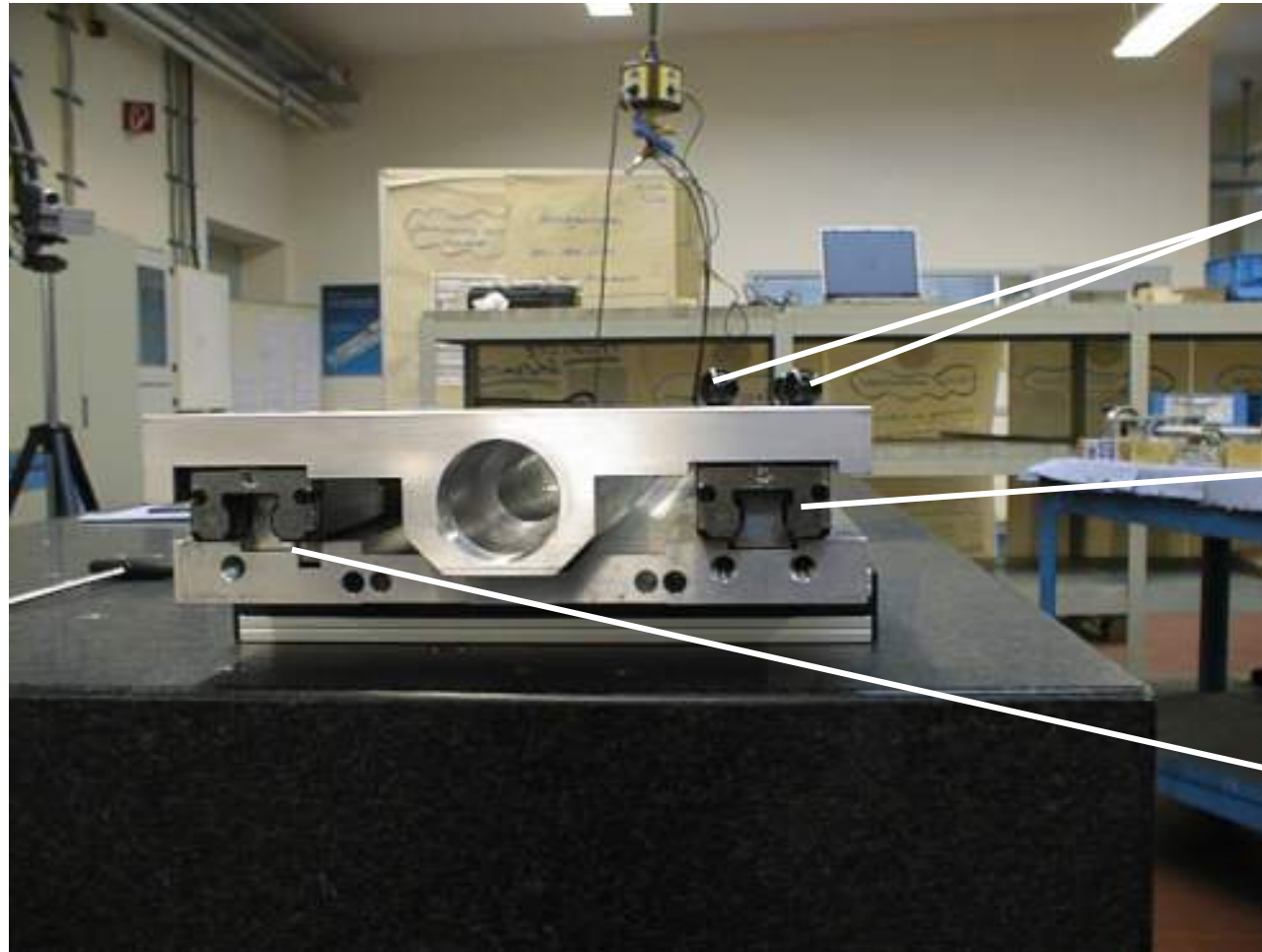
- Tap holes in the guided load for runner block mounting.
- Thoroughly clean mating surfaces for the runner blocks.

- Check heights of fitting edges  $h_2$ , corner radii  $r_2$ , and supporting and reference surfaces.
- Select and line up screws ready for mounting the runner blocks onto the guided load.

The mounting combinations shown opposite are only examples.

Größe Size Taille Grandezza	O <sub>1</sub> ISO 4762 [DIN 912]	O <sub>2</sub> DIN 6912	O <sub>4</sub> ISO 4762 [DIN 912]	O <sub>5</sub> ISO 4762 [DIN 912]	h <sub>2</sub> (mm)	r <sub>2</sub> max (mm)
15	M4x12	M4x10	M5x12	M4x12	4	0,6
20	M5x16	M5x12	M6x16	M5x16	5	0,6
25	M6x20	M6x16	M8x20	M6x18	5	0,8
30	M8x25	M8x16	M10x20	M8x20	6	0,8
35	M8x25	M8x20	M10x25	M8x25	6	0,8
45	M10x30	M10x25	M12x30	M10x30	8	0,8
55	M12x40	M12x30	M14x40	M12x35	10	1,0
65	M14x45	M14x35	M16x45	M16x40	14	1,0

# Sliding-On of Table with Tightened Runner Blocks



## Variant 2:

Parallel pins with pull outs

not tightened rail

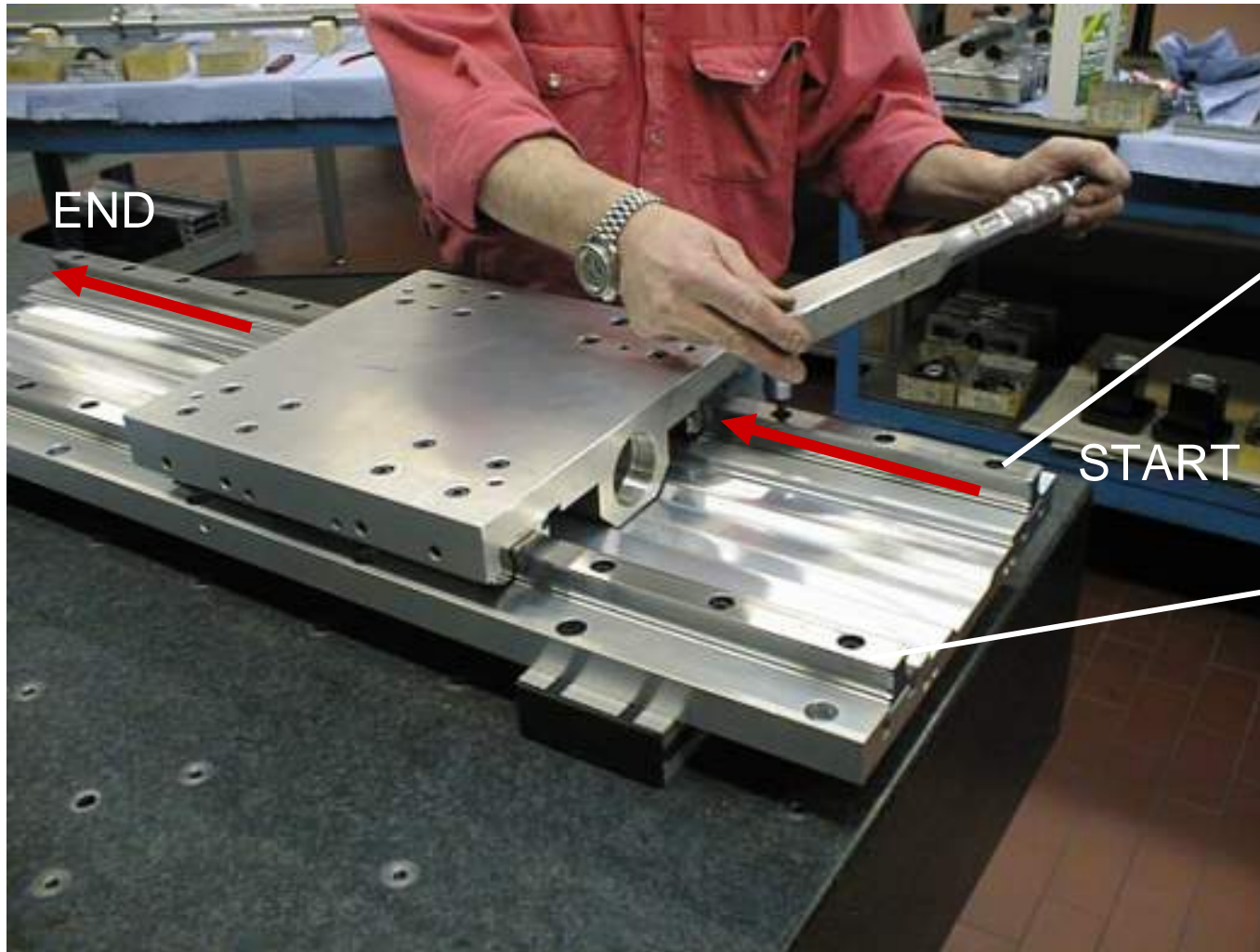
already tightened rail aligned with wedge profile retaining strips



## Variant 2:

- Tightening the screws of the second floating bedded rail using torque spanner
- The second rail aligns parallel to the first. Alignment supported by measurement is always better

# Alignment and Tightening of Second Guide Rail



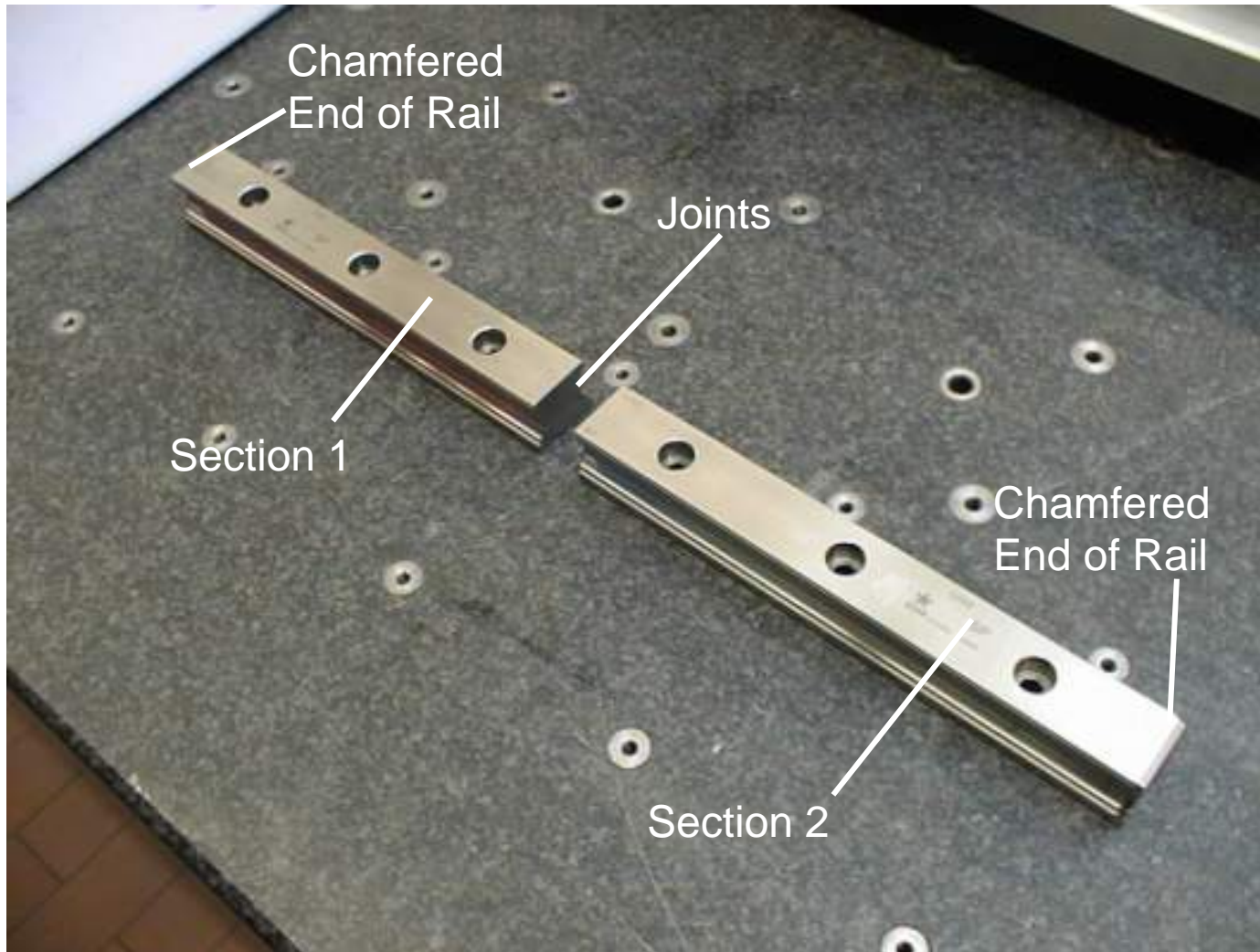
## Variant 2

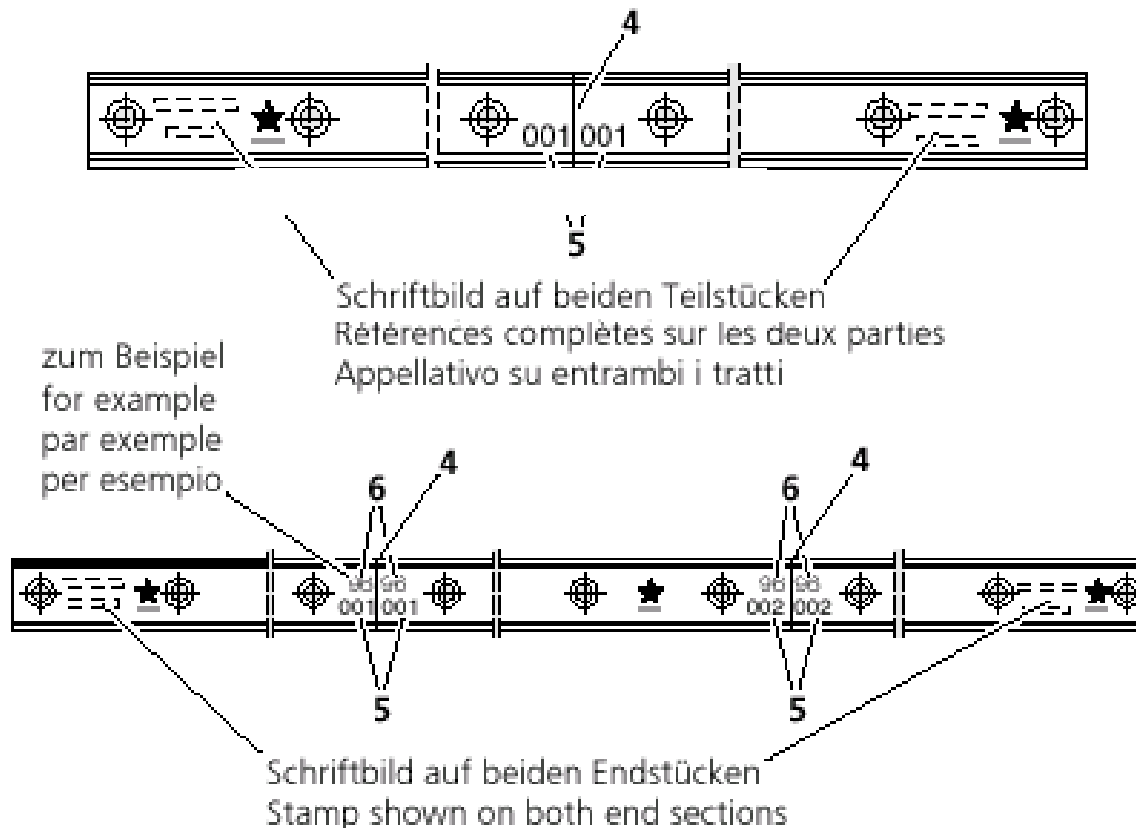
Second rail which has to be aligned and tightened

First rail, aligned using a wedge profile retaining strip

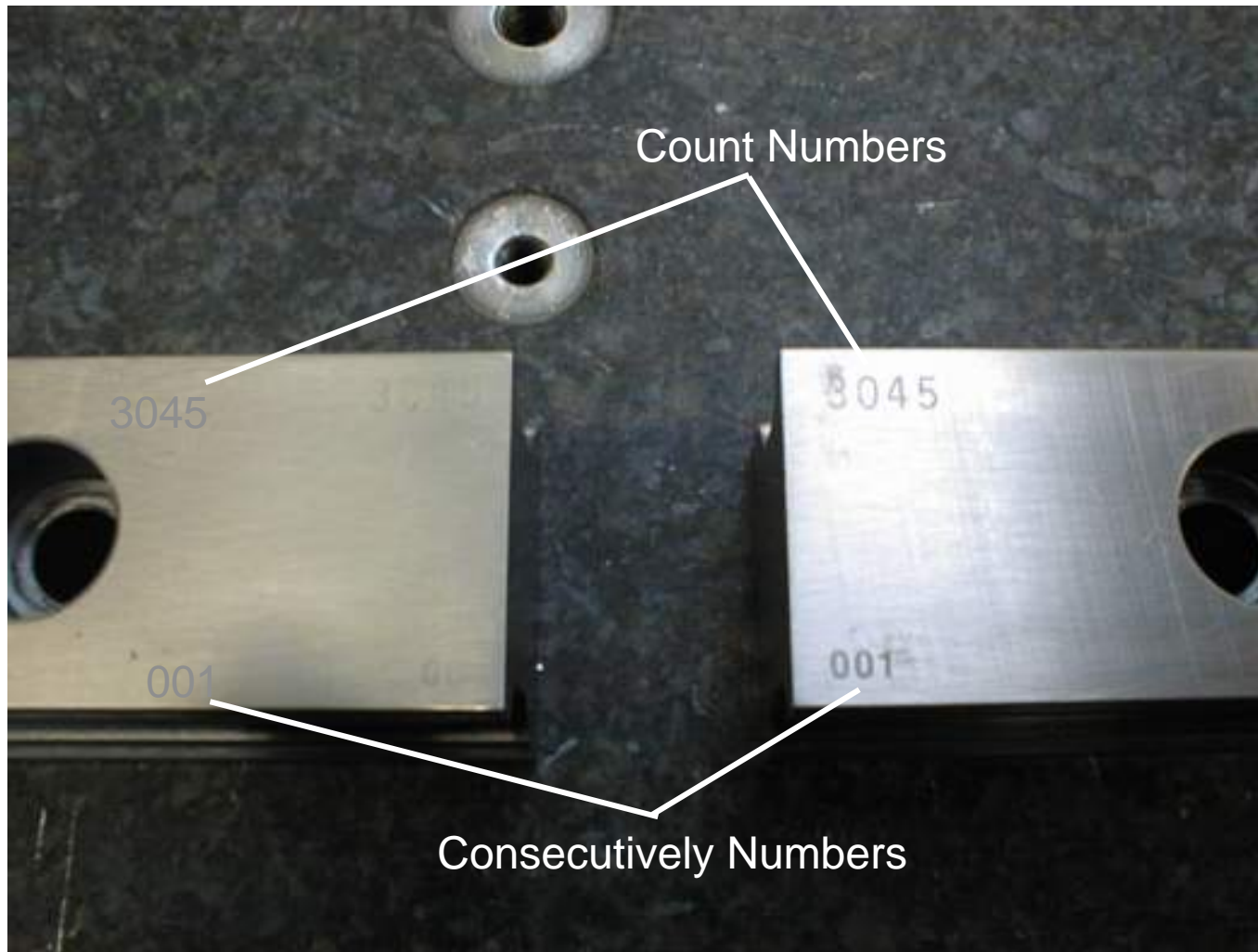


# Mounting of Two-Piece (Composite) Guide Rails





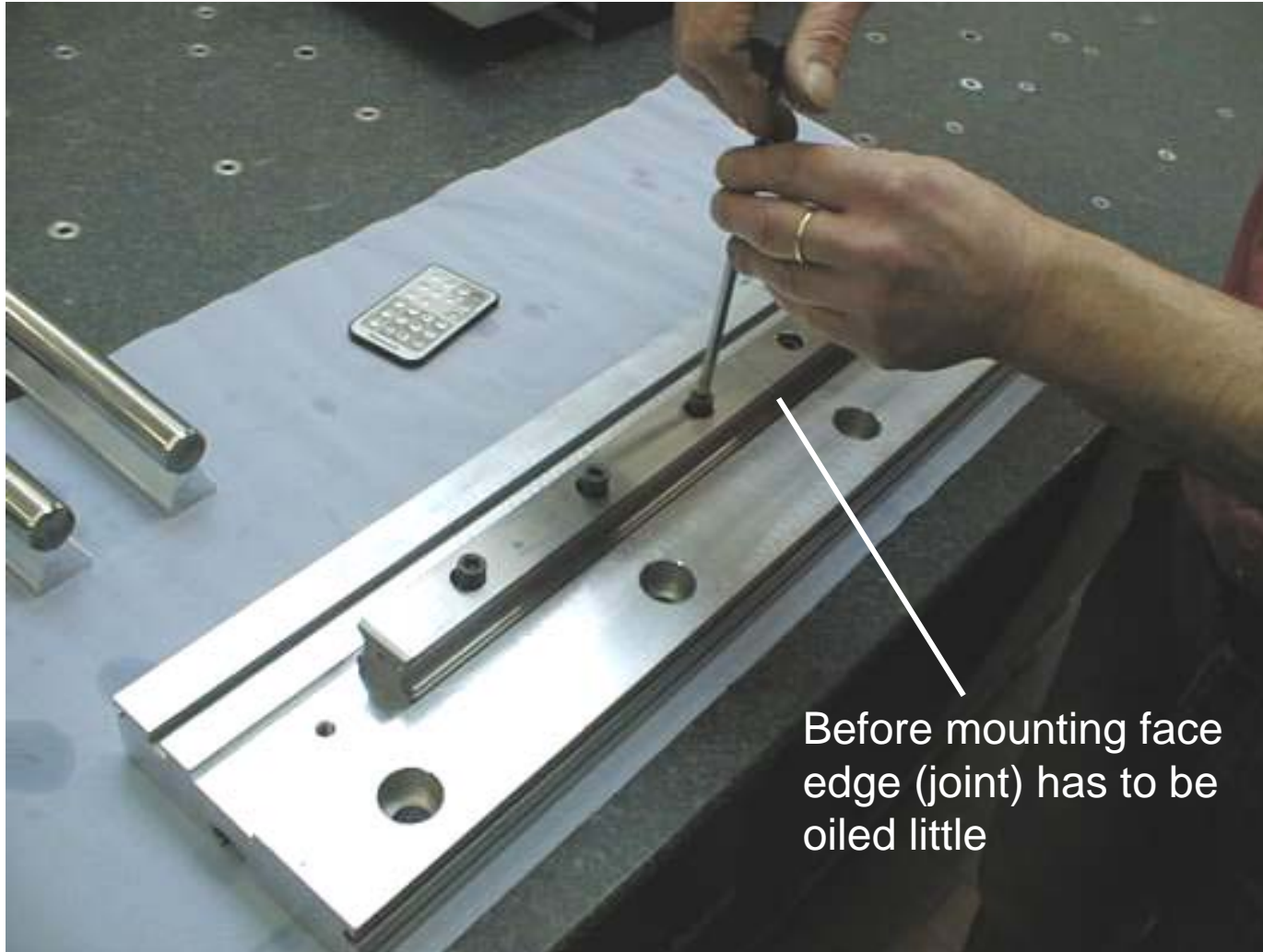
- The joints (4) are numbered consecutively (5)
- All sections of a guide rail comprising three or more sections have the same number (6)
- Sort sections **Mounting of Rail Seal Cover Strip**



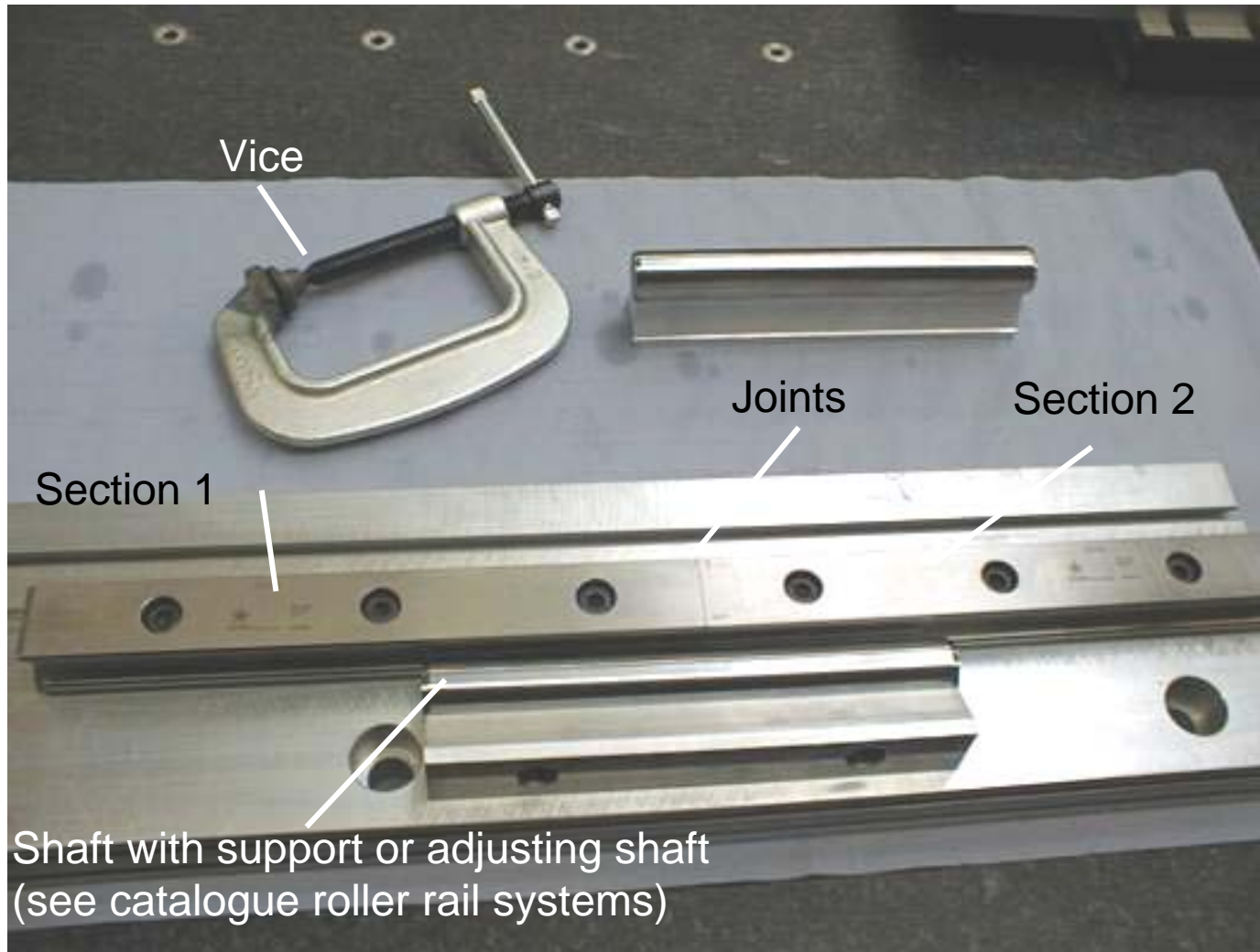


Carefully smooth down of the ground ends of guide rail sections using an oil stone

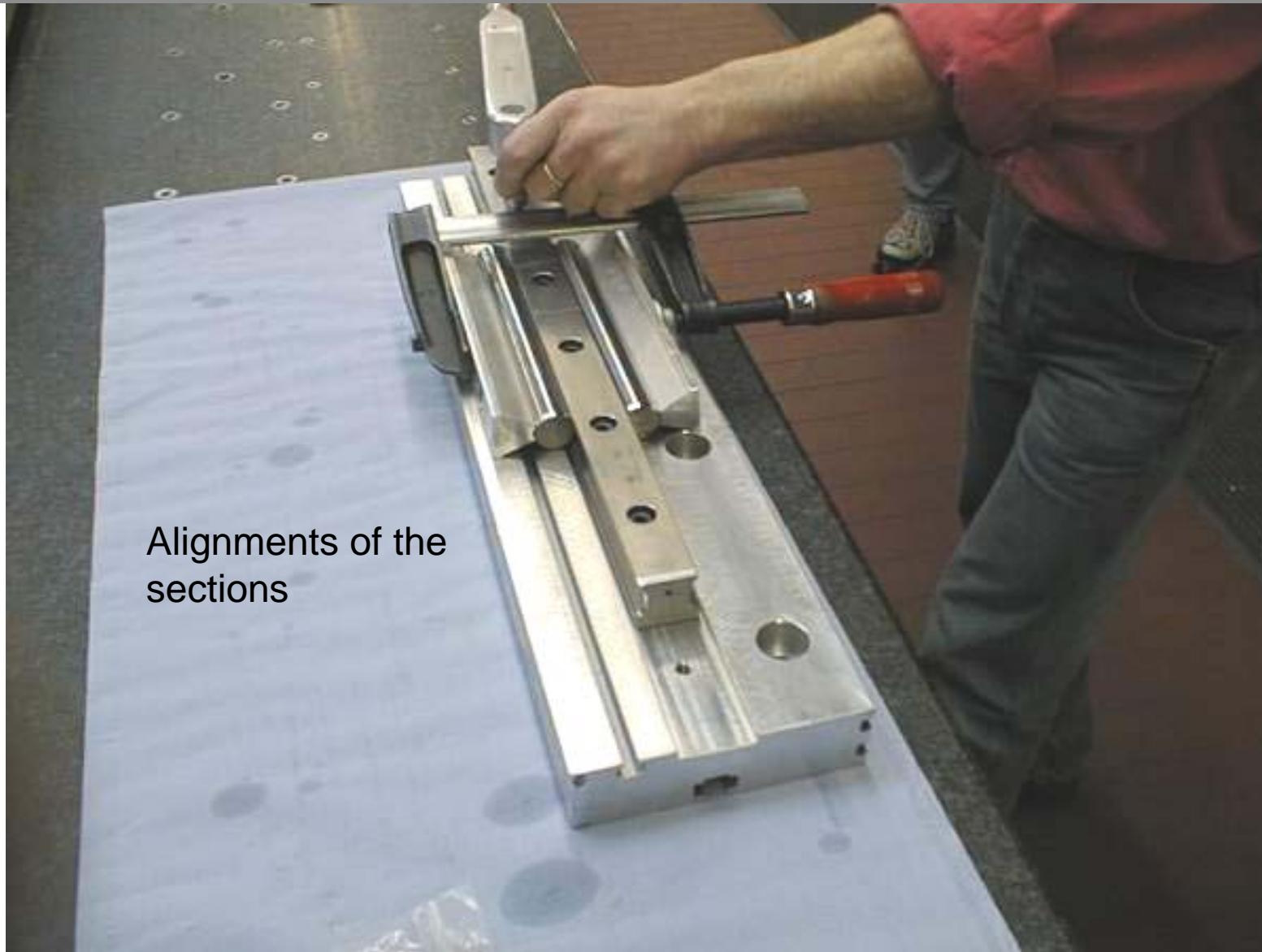




# Mounting of Composite Guide Rail with Adjusting Shafts No Reference Edge at Machine Part

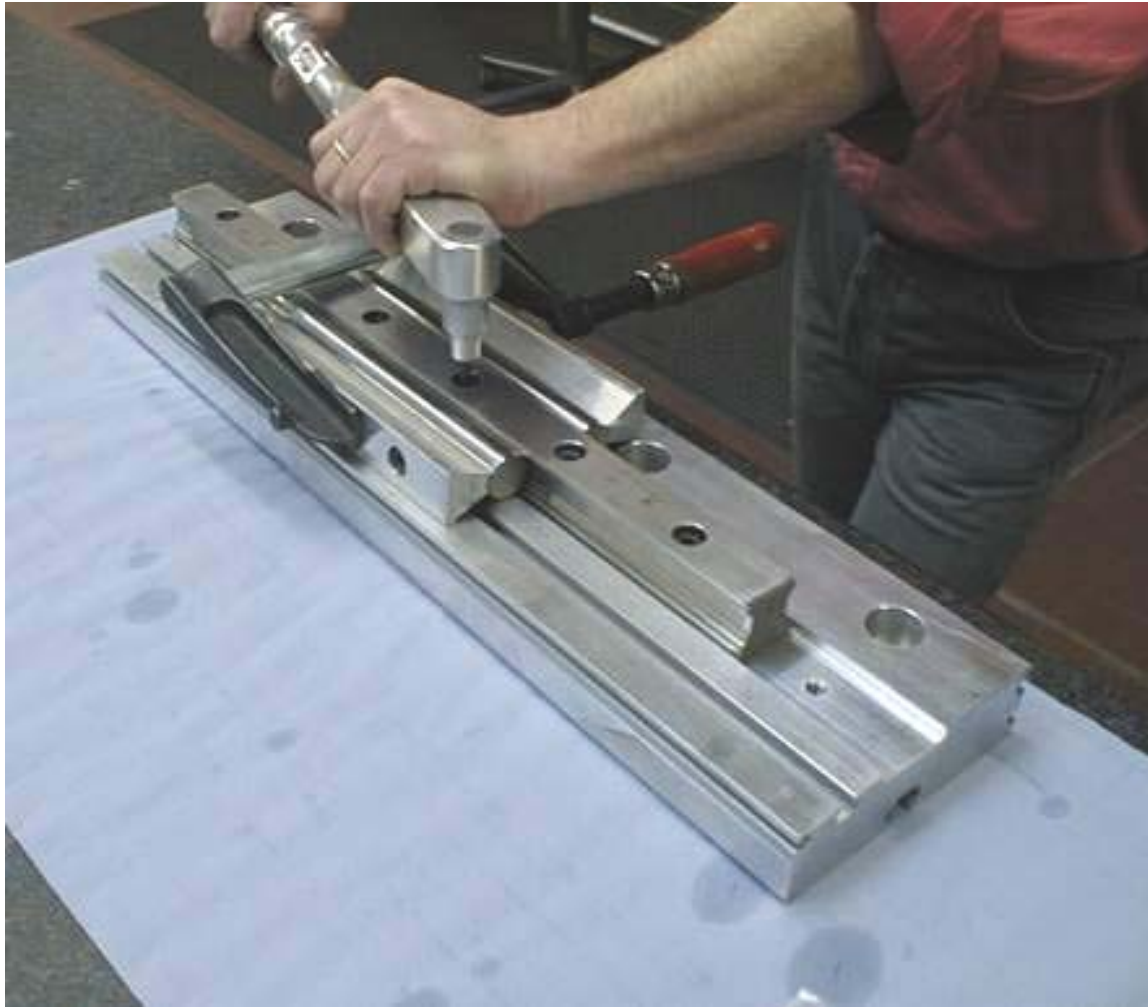


# Mounting of Composite Guide Rail with Adjusting Shafts No Reference Edge at Machine Part



Alignments of the  
sections

# Mounting of Composite Guide Rail with Adjusting Shafts No Reference Edge at Machine Part



Tightening of the rail  
fastening screws using  
torque spanner



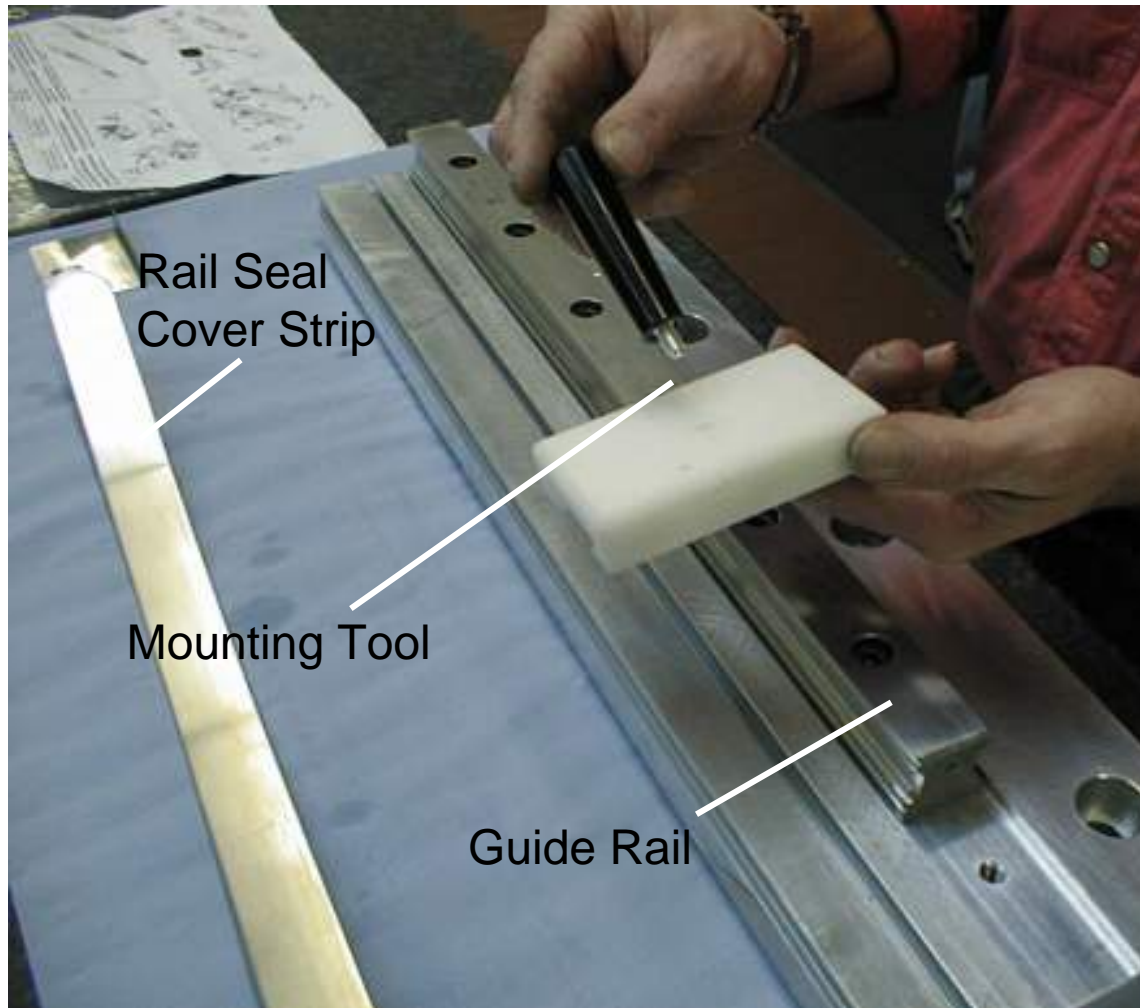


Using an angled lifted plate (see catalogue) the rail seal cover strip will be lifted after dismounting the protective caps



The rail seal cover strip  
will be pull of with both  
hands from guide rail

# Mounting of Rail Seal Cover Strip



For clipping on the rail seal cover strip the shown mounting tool has to be used

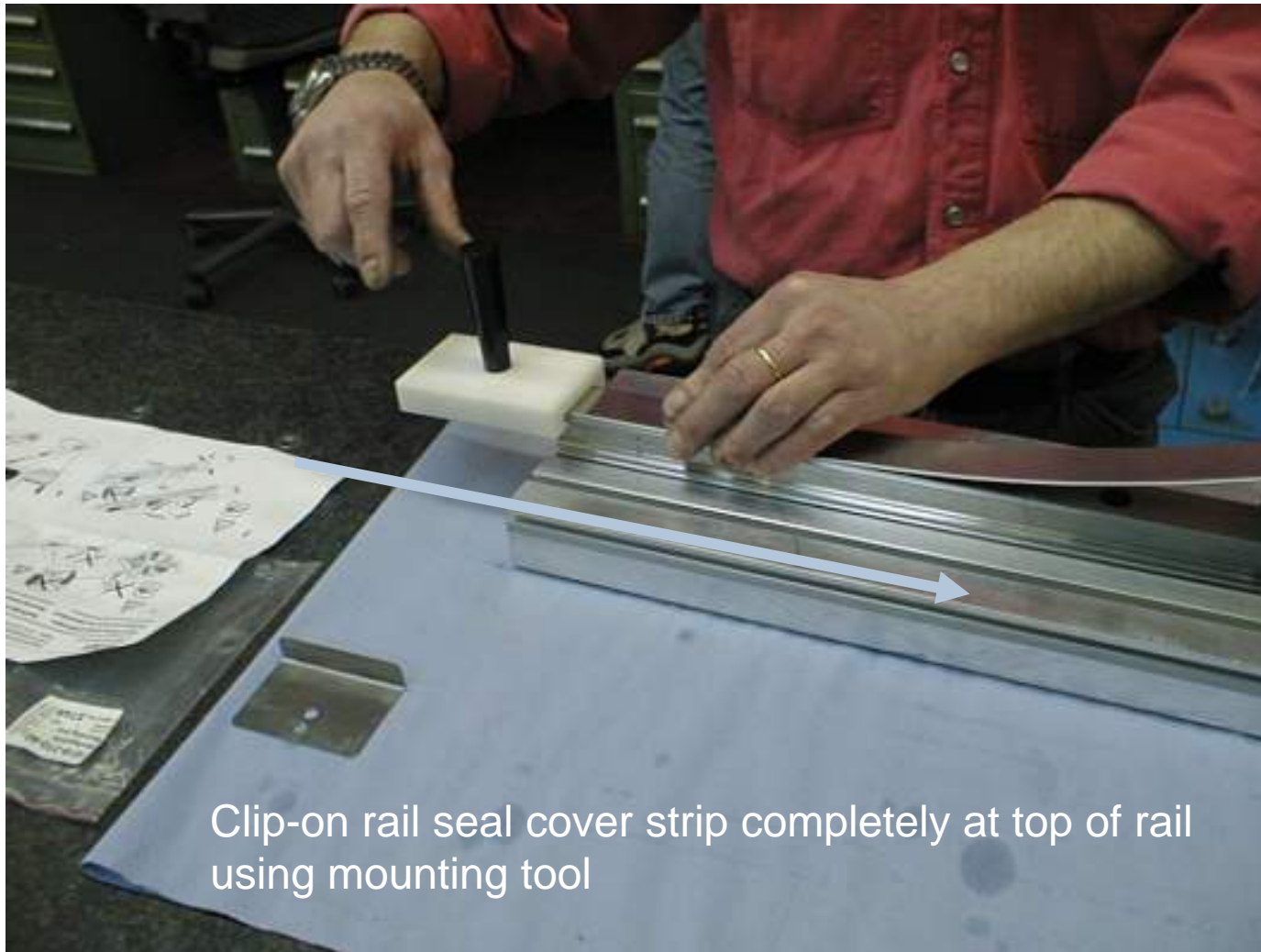
Start of rail seal cover strip:  
Position seal tongue at  
one end of the rail and  
clip-on for ~ 15 mm



Before mounting rail seal cover  
strip: Top of guide rail has to be  
oiled little



# Mounting of Rail Seal Cover Strip



Clip-on rail seal cover strip completely at top of rail  
using mounting tool

# Mounting of Rail Seal Cover Strip

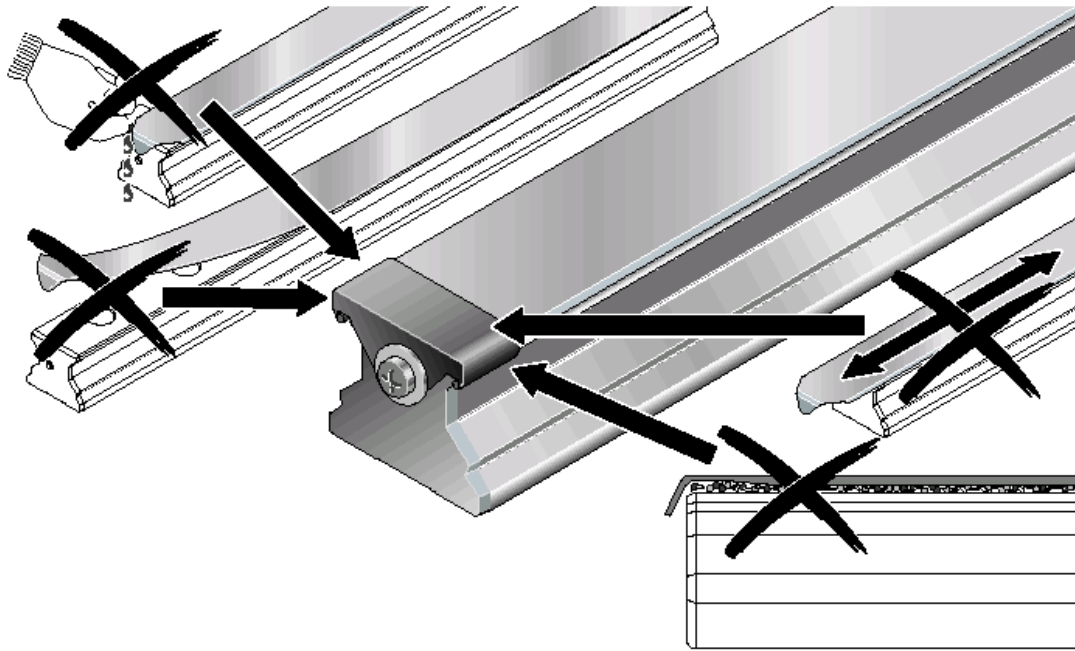


Mounting of rail seal cover strip is quite easy and quick



Replace or sliding-fit rail seals:

The second cover tongue bend with a plastic mallet to flush with the end face

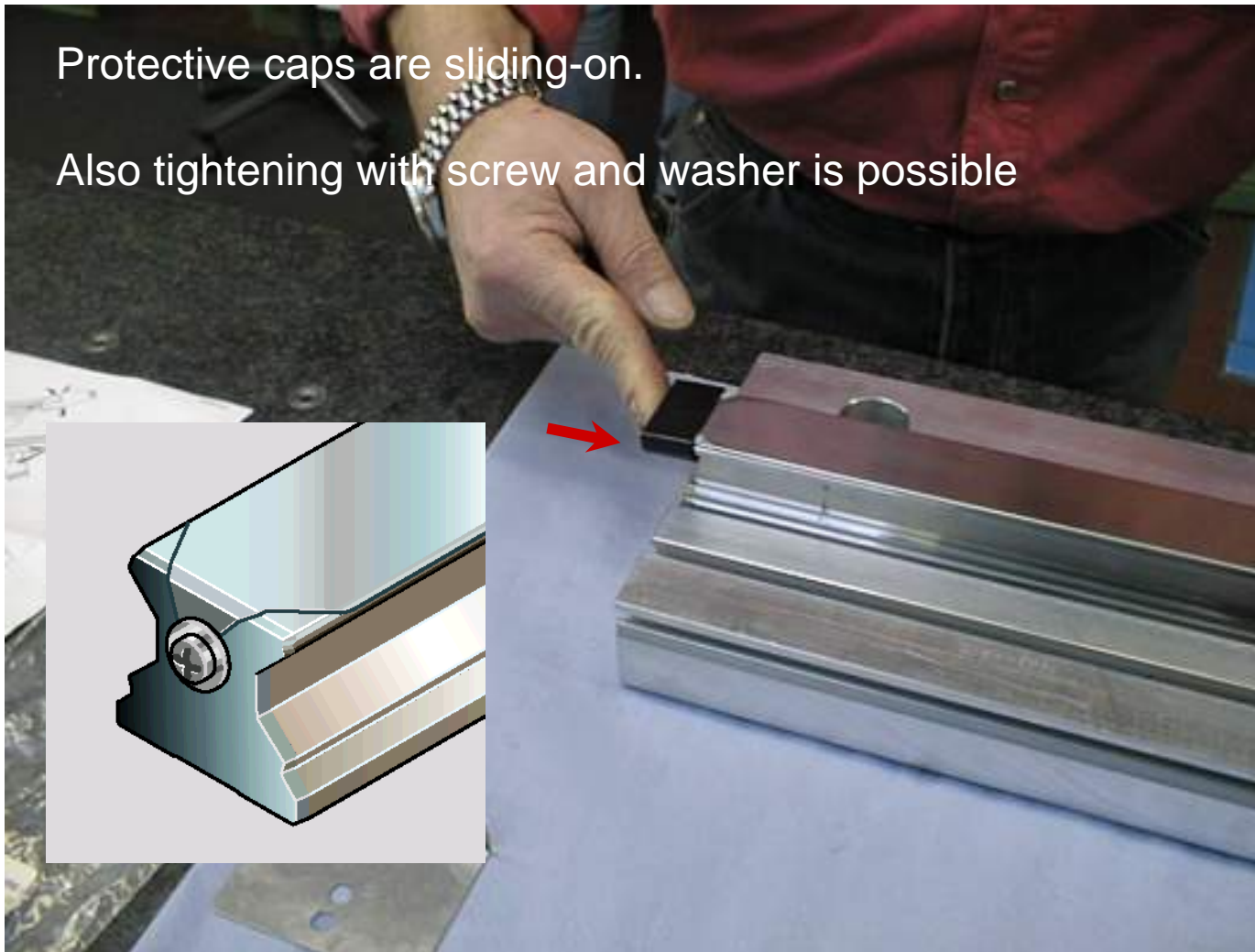


- Rexroth uses protective caps to secure the rail seal
- Protective caps can
  - prevent injuries
  - prevent involuntary lifting of the rail seal and related ingress of dirt
  - fix the rail seal in place
- If protective caps cannot be mounted, secure the rail seal by other means



Protective caps are sliding-on.

Also tightening with screw and washer is possible





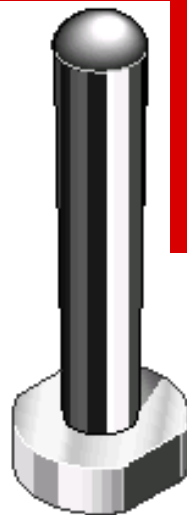
## Mounting of Second Protective Cap



Second protective cap will  
be tightened

Linear Motion

## Preparing the Sliding-Fit of the Rail Seal



Aufweitdorn, Expanding tool,



Festsitz



Schiebbar = mit  
Aufweitdorn geweitet

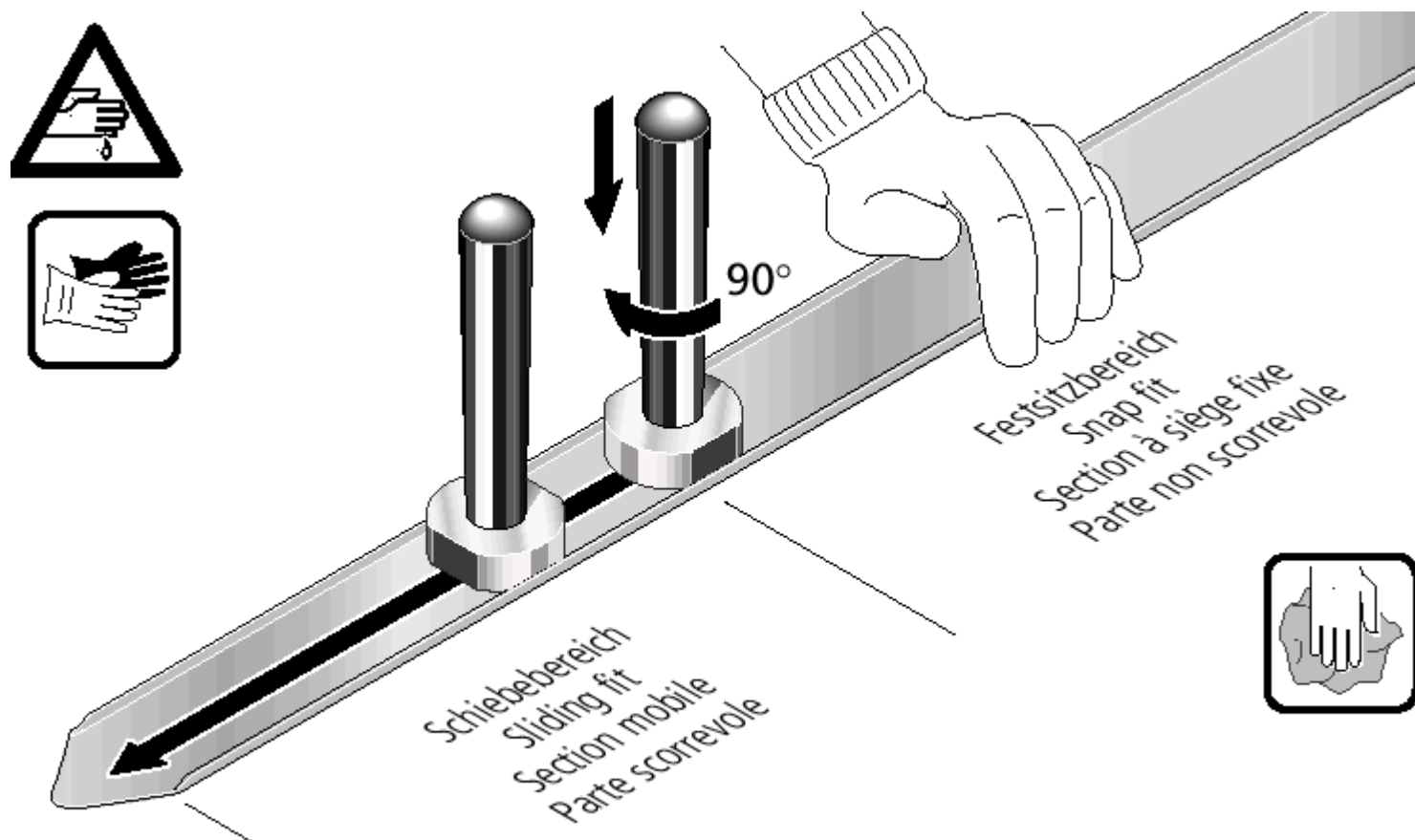
0,15

0,3

15	1619-115-10
20	1619-815-10
25	1619-215-10
30	1619-715-10
35 <sup>1)</sup>	1619-315-30
45 <sup>1)</sup>	1619-415-30
55 <sup>1)</sup>	1619-515-30
65 <sup>1)</sup>	1619-615-30



## Preparing the Sliding-Fit of the Rail Seal



## Mounting of Sliding-Fit Rail Seals



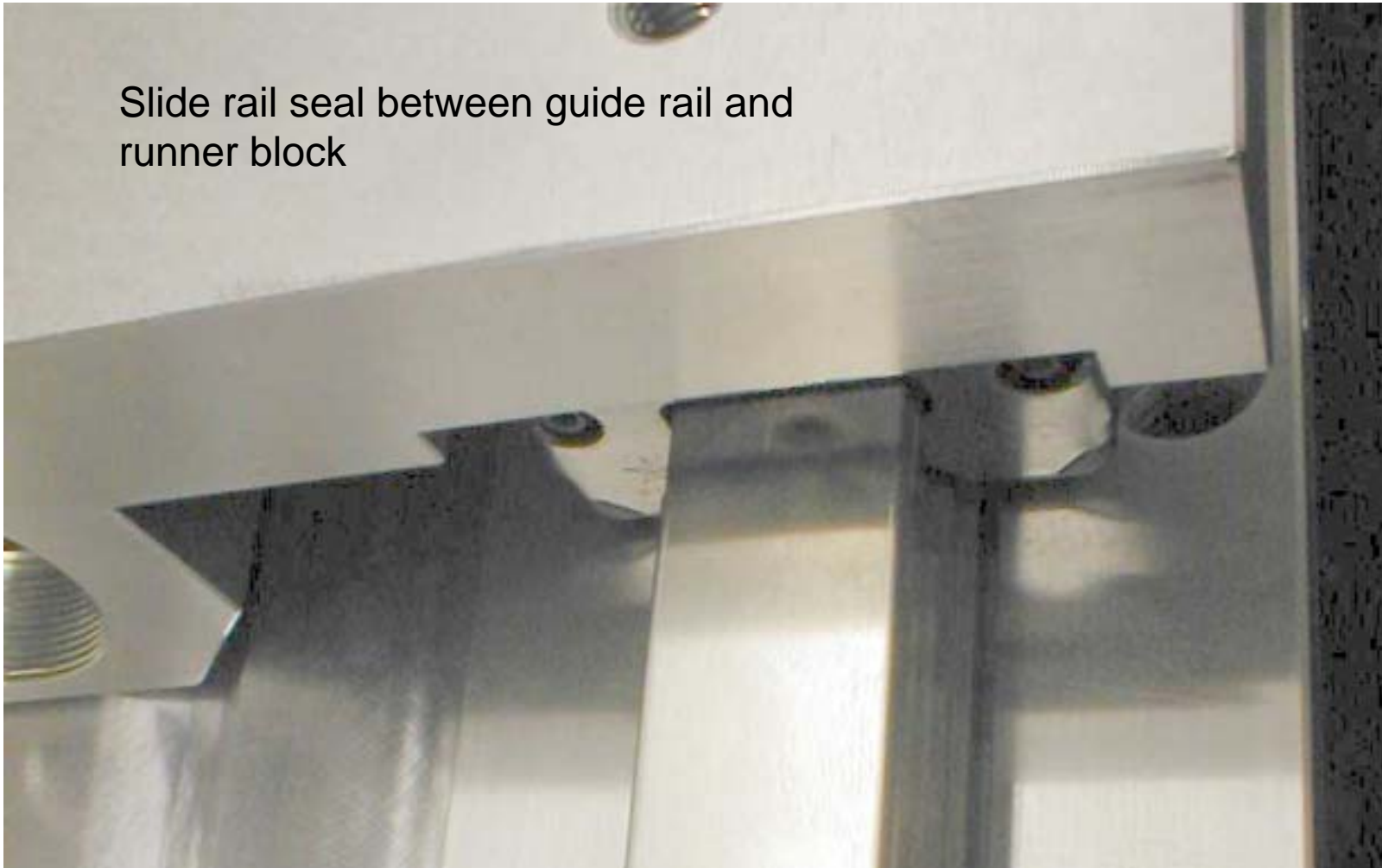
Right:

- Gummed gloves have to be used for mounting
- The not bended cover strip tongue will be slide through the runner block by half coverage of a rail bore hole

Bild neu

## Mounting of Sliding-Fit Rail Seals

Slide rail seal between guide rail and runner block



## Mounting of Sliding-Fit Rail Seals

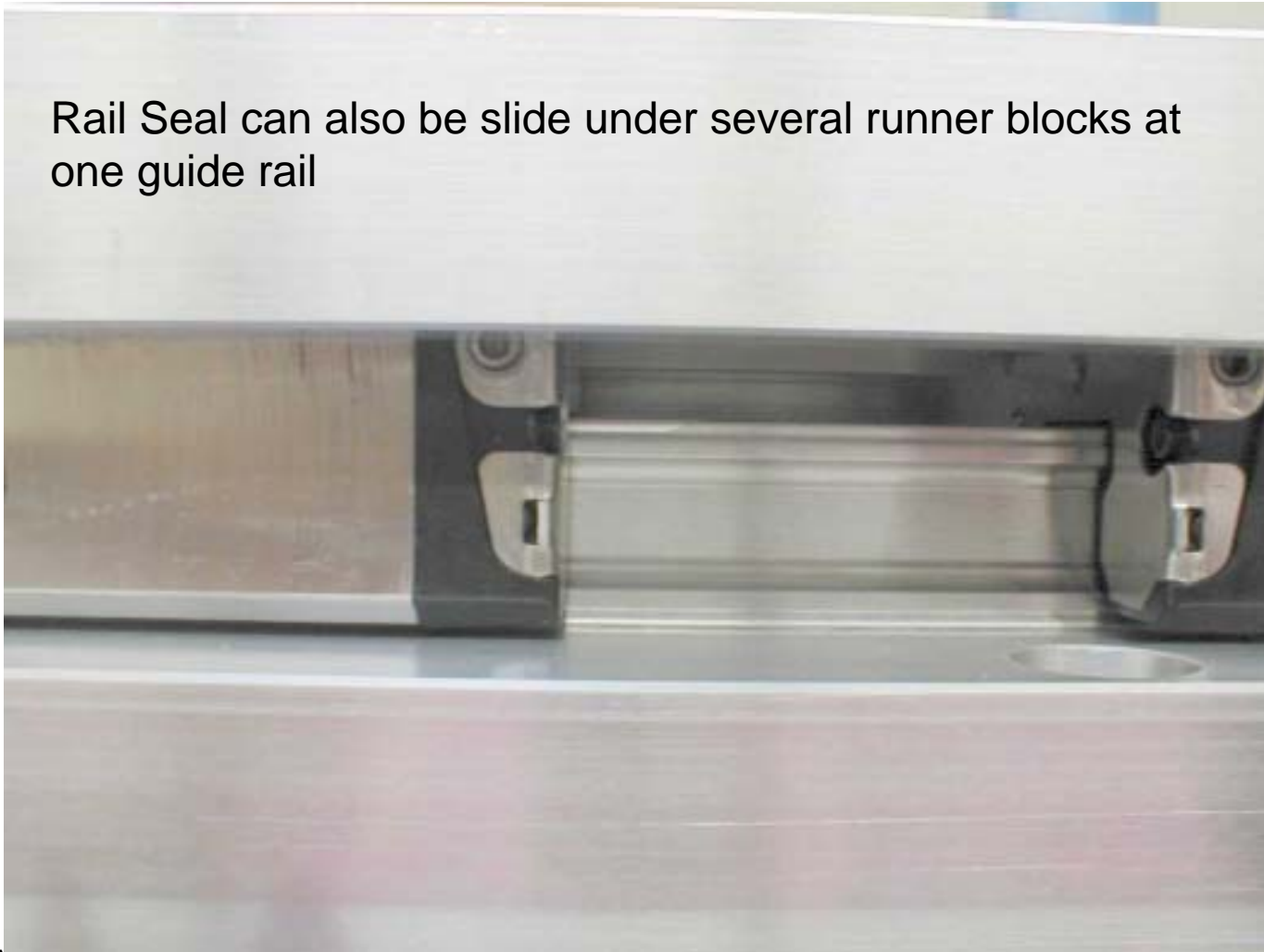


View in rail direction

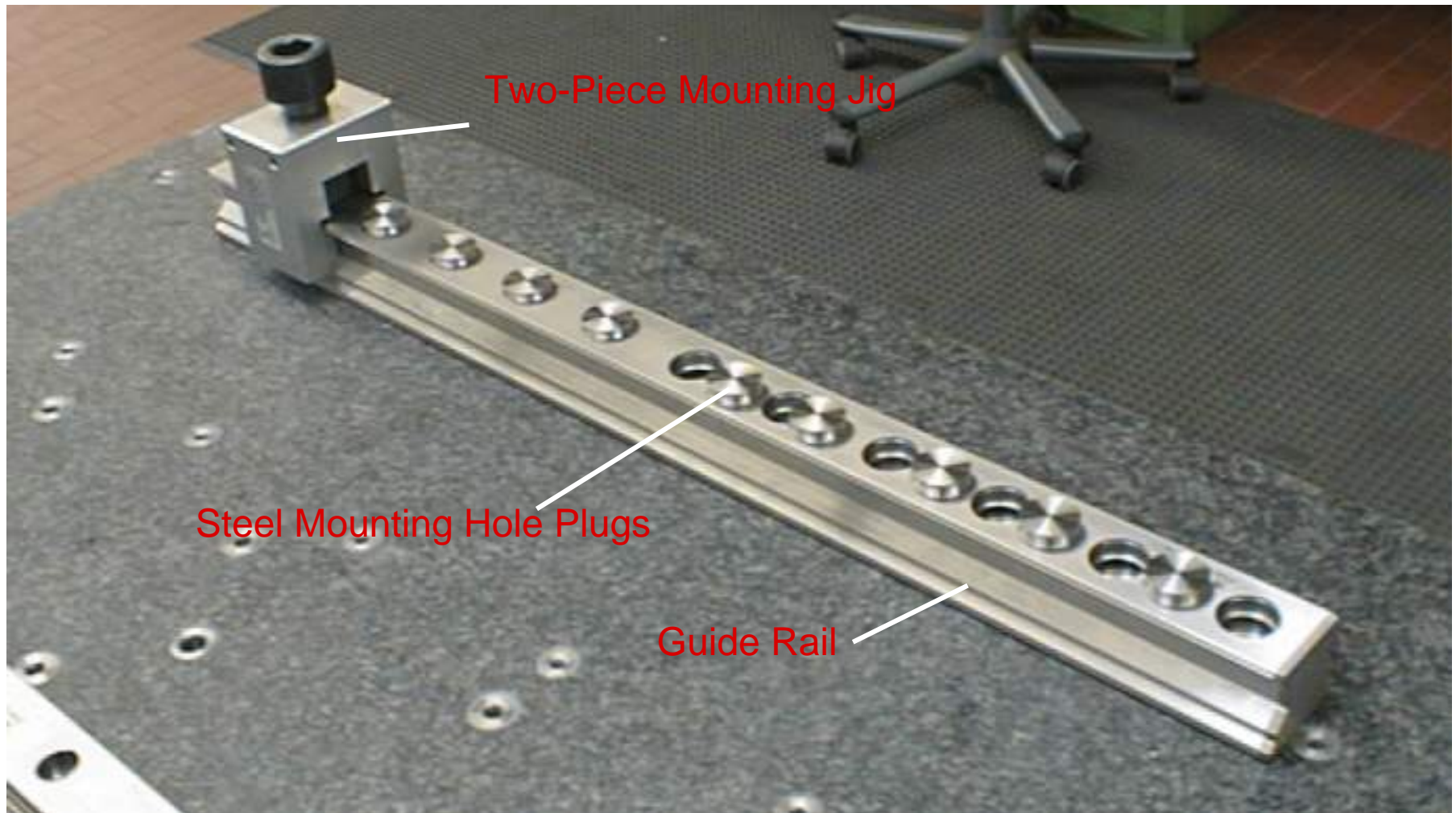


## Mounting of Sliding-Fit Rail Seals

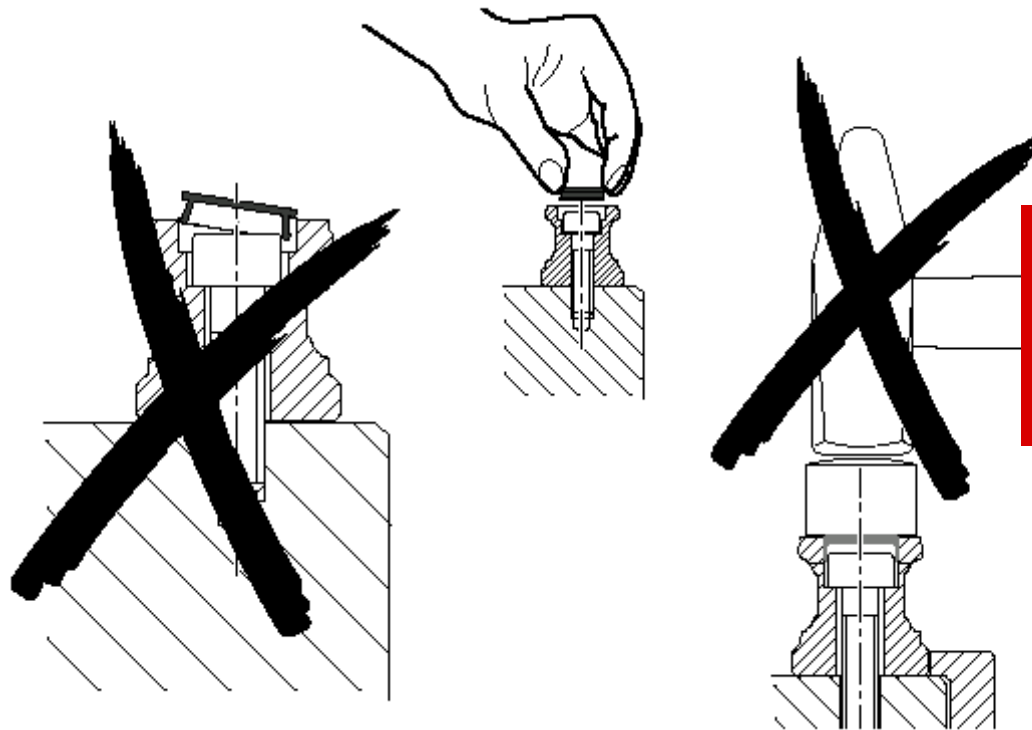
Rail Seal can also be slide under several runner blocks at one guide rail



## Mounting of Steel Mounting Hole Plugs



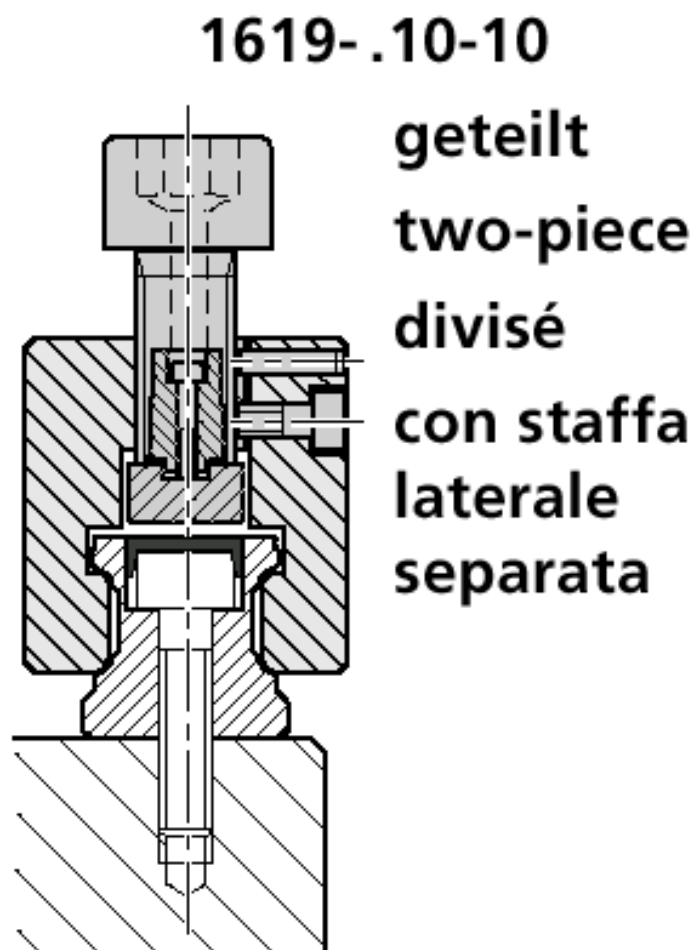
## Mounting of Steel Mounting Hole Plugs



■ Fit steel mounting hole plugs on straight

Do not hammer the steel mounting hole plugs in, but use mounting jig

## Mounting of Steel Mounting Hole Plugs



Steel mounting hole plugs are not included in the scope of supply for the guide rails. They must be ordered separately. See Roller Rail Systems catalog.

### Mounting jigs

Part number e.g. 1619-**210-20**

Size 25: code no. 2

" 35: " " 3

" 45: " " 4

" 55: " " 5

" 65: " " 6

one-piece jig:

two-piece jig:

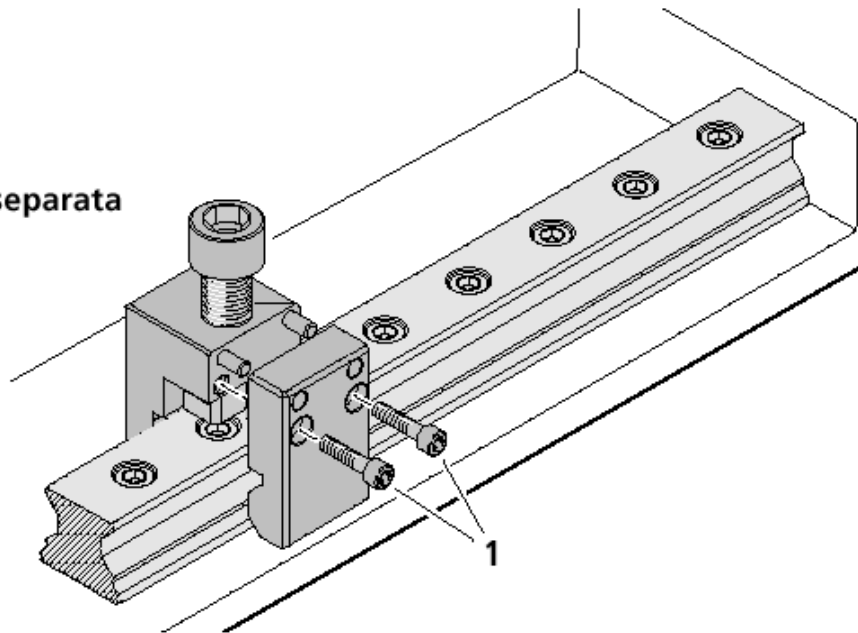
suffix ...-20

suffix ...-30



## Two-Piece Mounting Jig for Steel Mounting Hole Plugs

geteilt  
two-piece  
divisé  
con staffa  
laterale separata

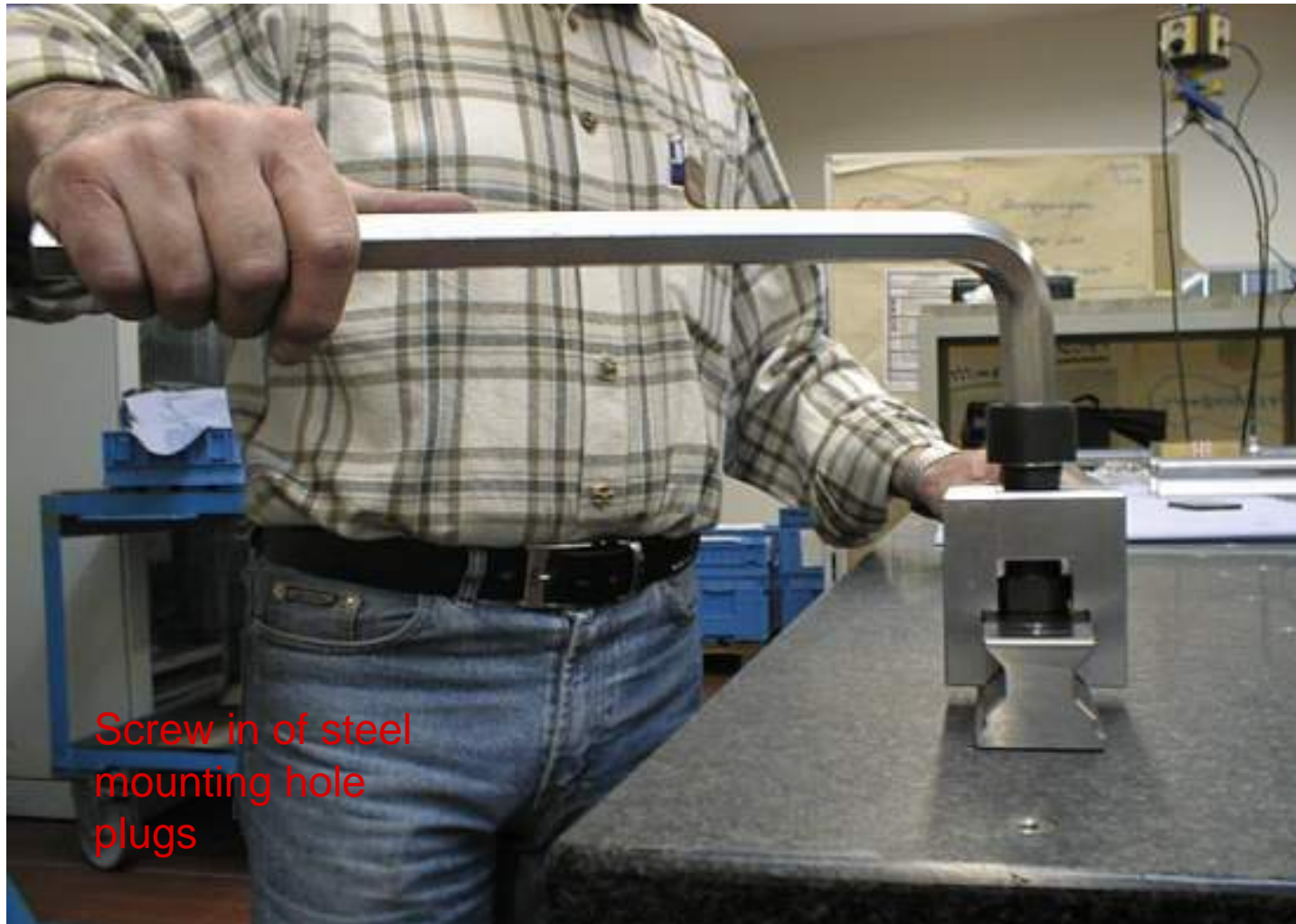


### Application of the two-piece mounting jig

If the mounting jig cannot be slid onto one end of the guide rail:

- Loosen mounting screws (1).
- Pull mounting jig apart.
- Fit mounting jig over guide rail.
- Tighten mounting screws (1).

## Mounting of Steel Mounting Hole Plugs



Screw in of steel  
mounting hole  
plugs

Linear Motion and Assembly Technologies

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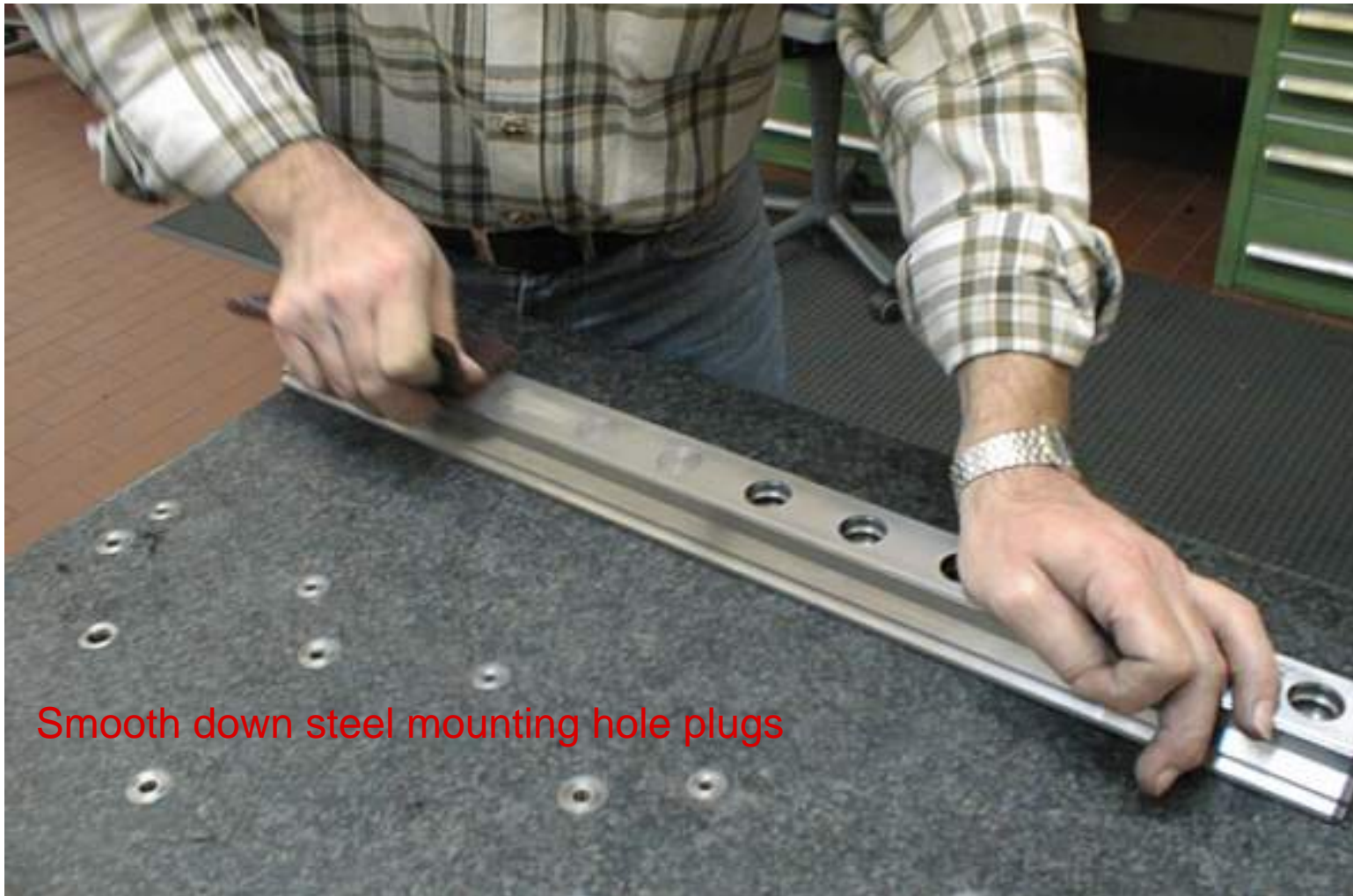
## Mounting of Steel Mounting Hole Plugs



Smooth down the top of guide rail with emery cloth



## Mounting of Steel Mounting Hole Plugs



Smooth down steel mounting hole plugs

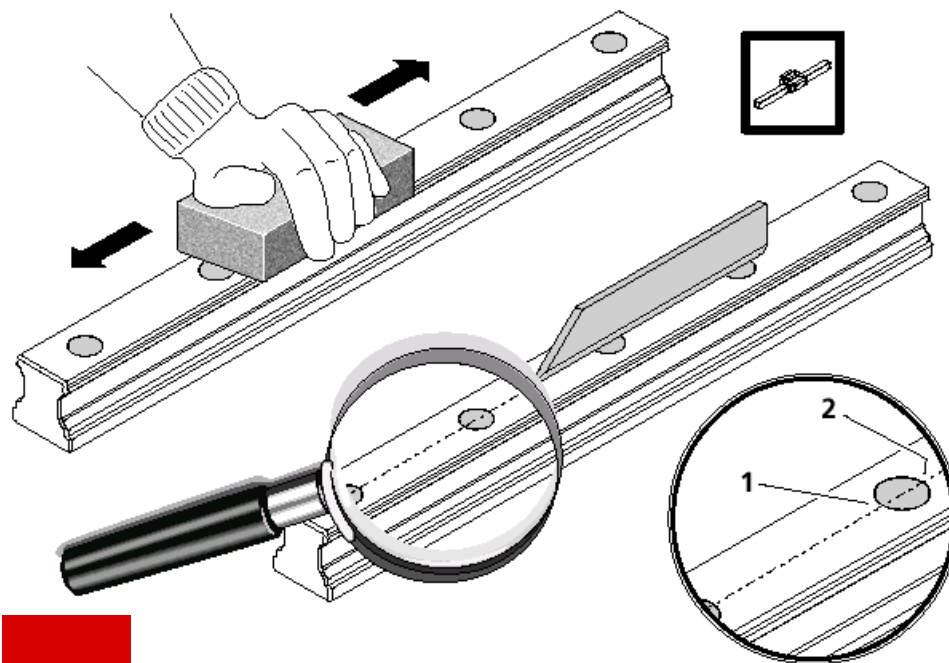


## Mounting of Steel Mounting Hole Plugs



Final cleaning of top of rail

## Mounting of Steel Mounting Hole Plugs



- Remove mounting jig.
- Smooth down steel mounting hole plugs until flush with the guide rails. Do not exceed the center line average roughness value of the guide rails ( $R_a$  0.4  $\mu\text{m}$ )!
- Using a straightedge, check vertical offset of the steel mounting hole plugs in relation to the guide rail. Each steel mounting hole plug must be flush with the guide rail at points (1) and (2).