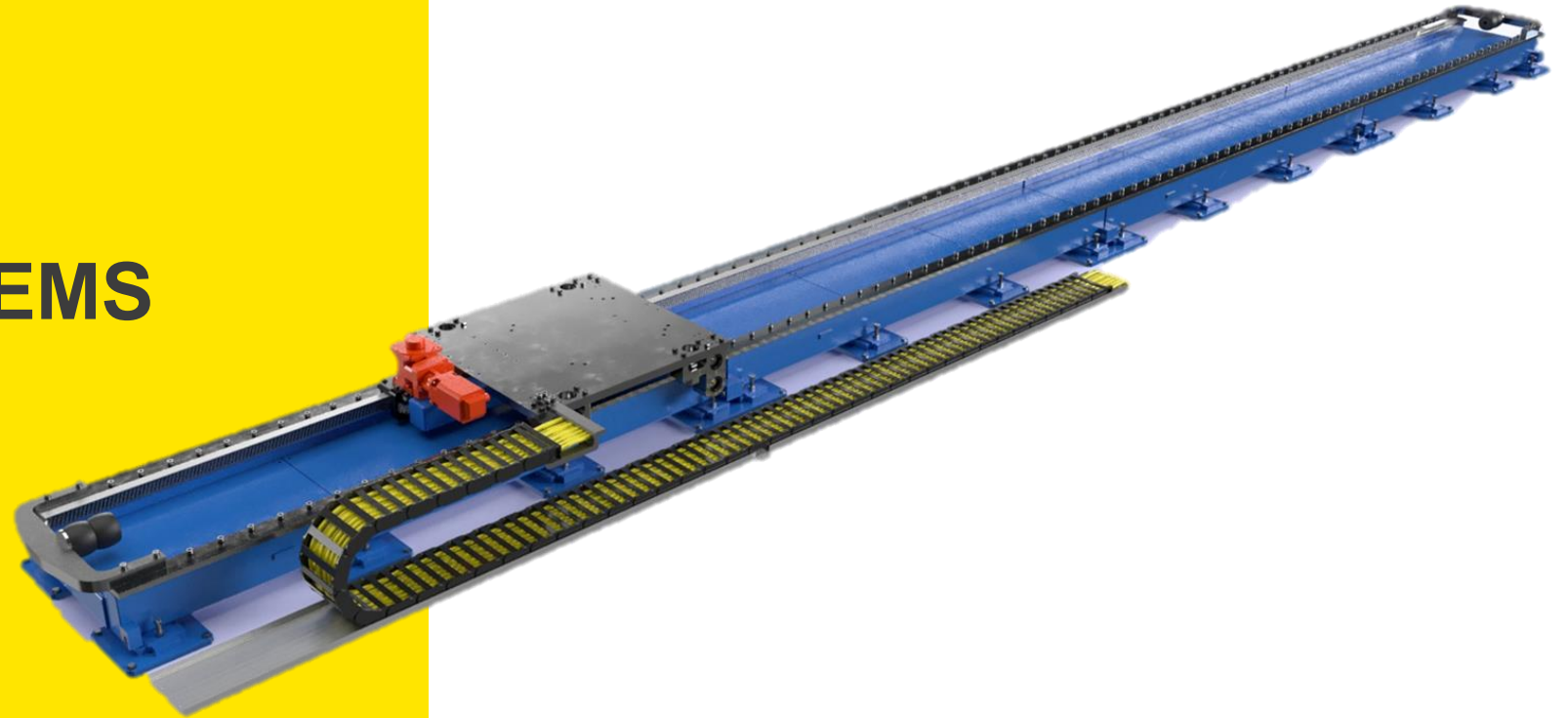


# SEVENTH AXIS FOR ROBOT SYSTEMS

LINEAR - FAST - PRECISE



EFA | FEB 2024

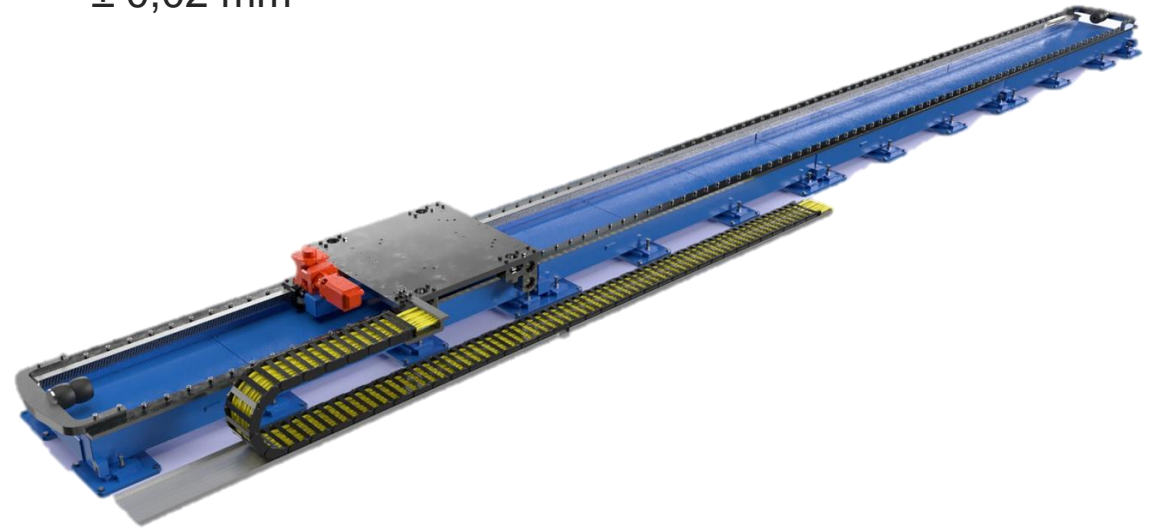
## Applications

- Linear transfer unit for different robot types (ABB, KUKA, Fanuc, COMAU Kawasaki, Yaskawa, etc.) & various special applications (turntables, clamping frames)
- Used as a connection to the conveyor system
- Assembly of different travel devices
- Process axis for path-controlled operations



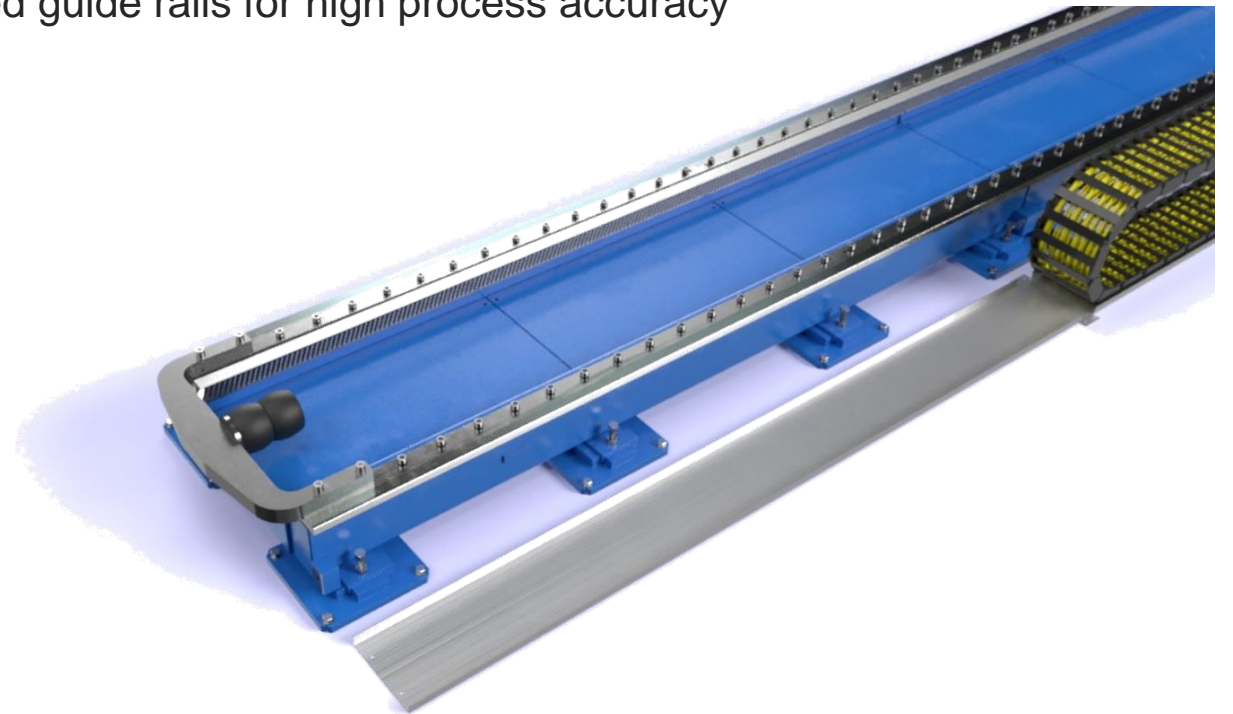
## Technical Details

- Length segmental construction, freely selectable until 30.000 mm
- Speed 1,5 m/s - 2,5 m/s
- Acceleration 1,5 m/s<sup>2</sup> - 3,8 m/s<sup>2</sup>
- Transport load 1.500 – 4.000 kg  
(Robot, welding gun, handling device)
- Repeatability ± 0,02 mm



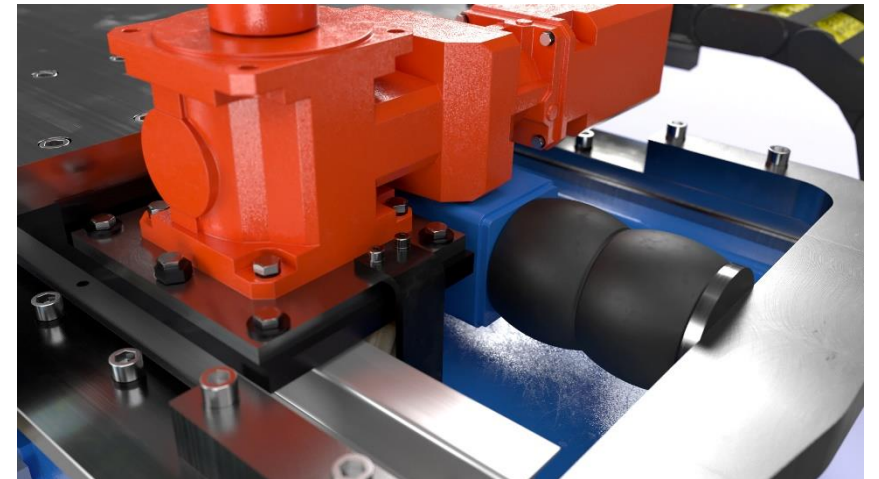
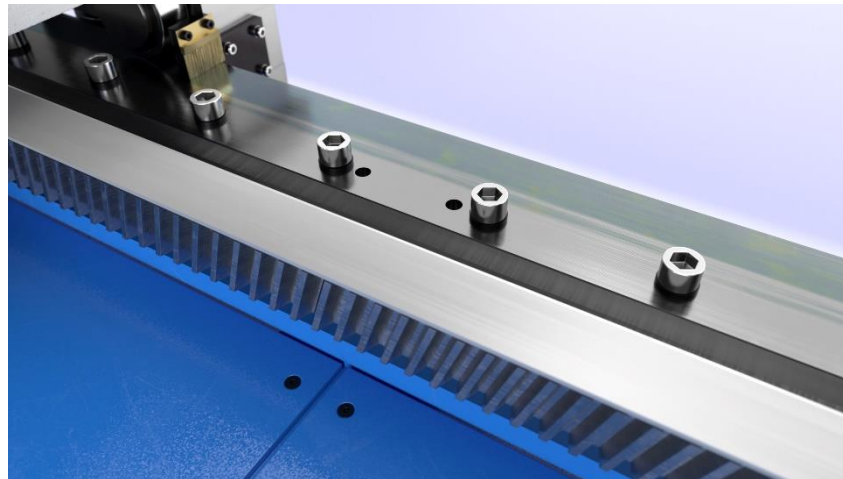
## The Base Frame

- 2 square tubes form the foundation frame
- Evenly spaced cross members provide the required stability
- Fine adjustment of the flatness by means of adjusting screws
- Ground and hardened guide rails for high process accuracy



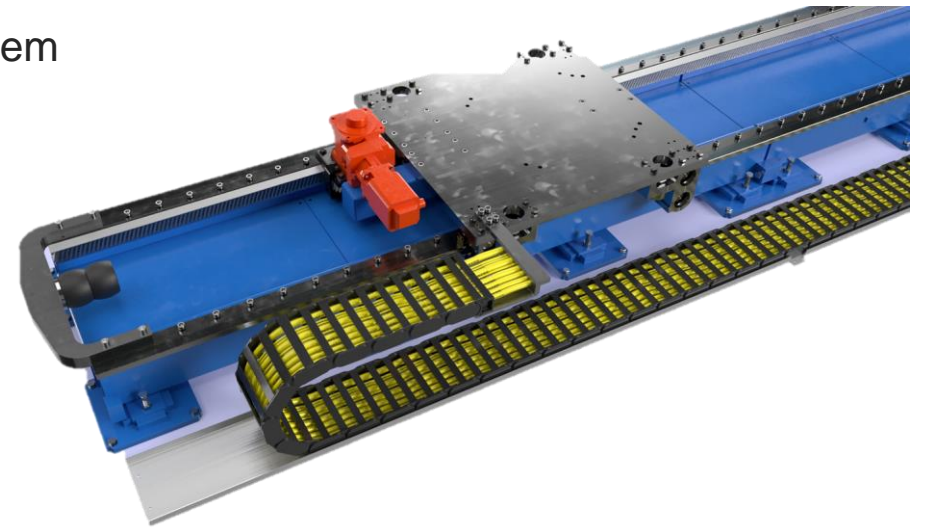
## Pinion - Rack System

- Rack and pinion drive
- Helical toothing for smoother running and higher power transmission
- Hardened flanks for long life
- Low-backlash version available as an option
- Manual lubrication system
- Automatic lubrication system optionally available



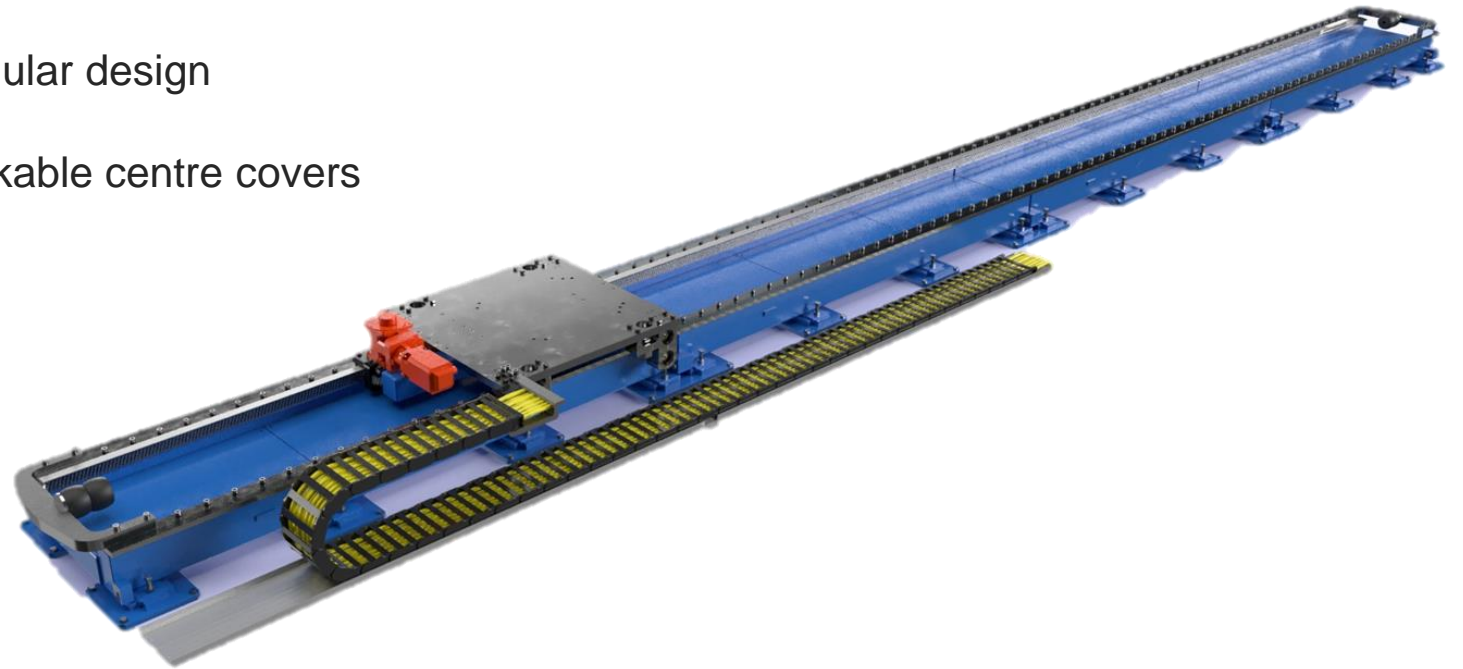
## The Track Carriage

- Connection for welding robots and other applications – customized hole pattern
- Integrated low backlash gearbox
- Flat (carriage height only 440 mm)
- Roller carriage
  - Automatic bearing lubrication system
  - Height adjustment by means of eccentric bolts
  - 4 guided double rollers for high repeatability

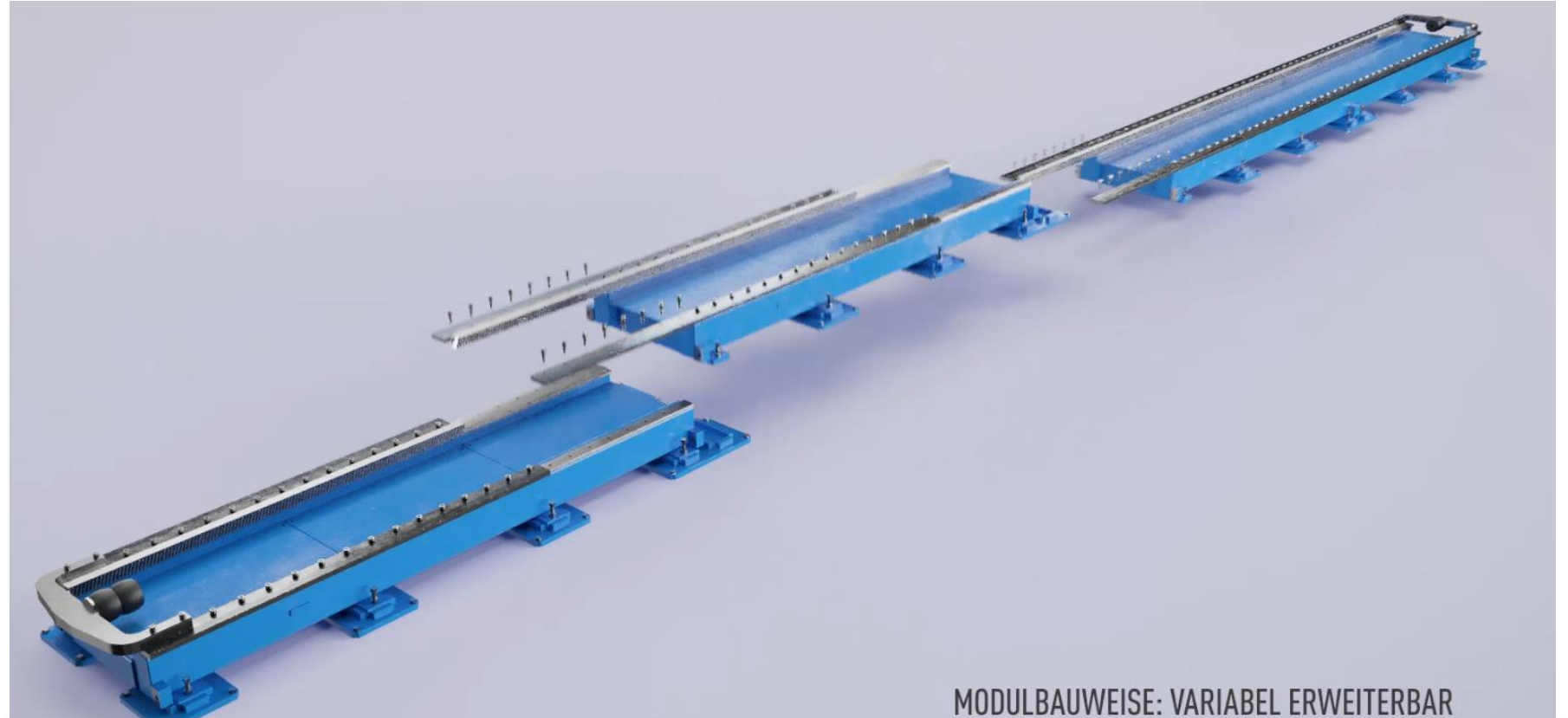


## Salient Features

- Delivery of the drive motor according to customer demands
- All-round protection against weld spatter
- Cable duct
- Modular design
- Walkable centre covers



## Other Features

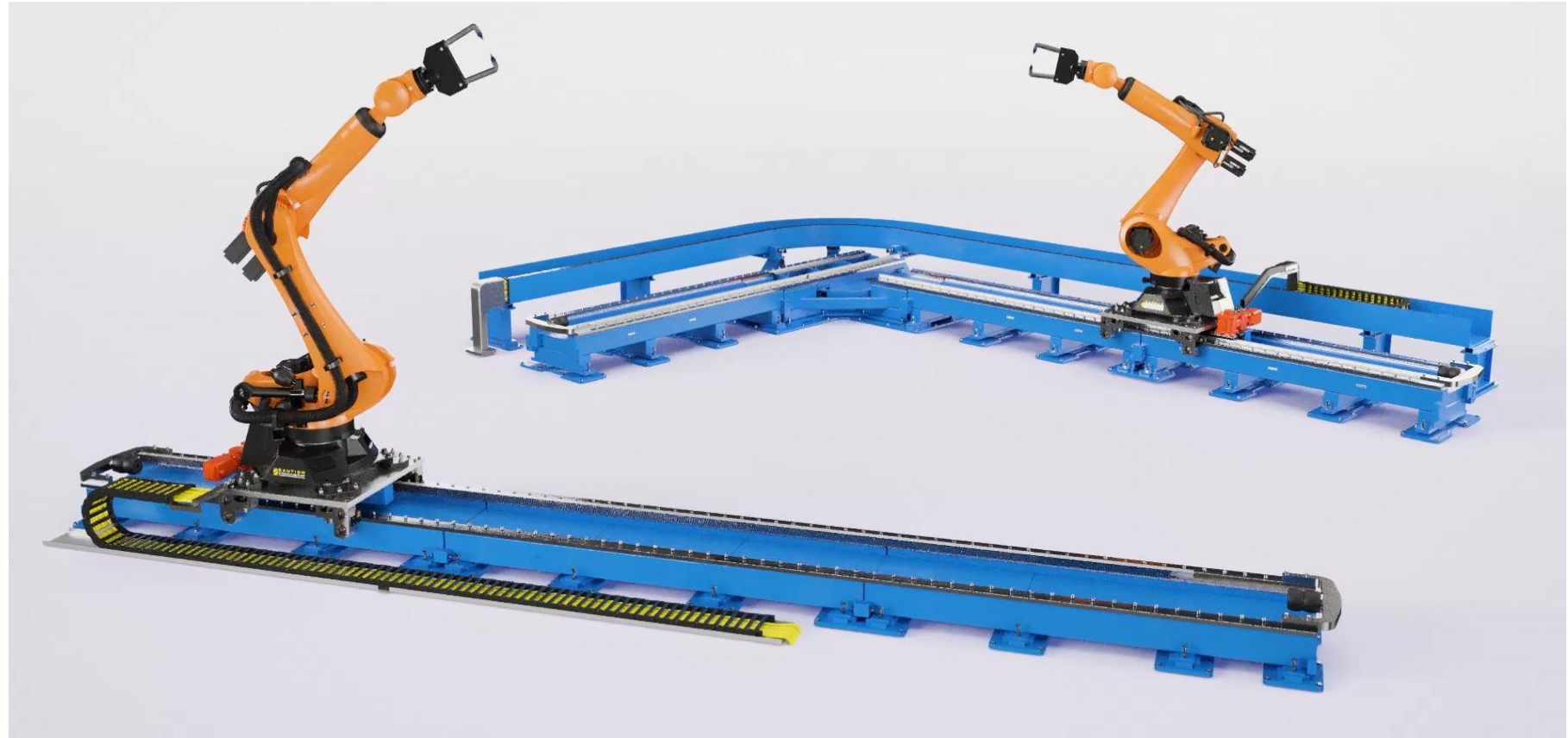


**MODULBAUWEISE: VARIABEL ERWEITERBAR**

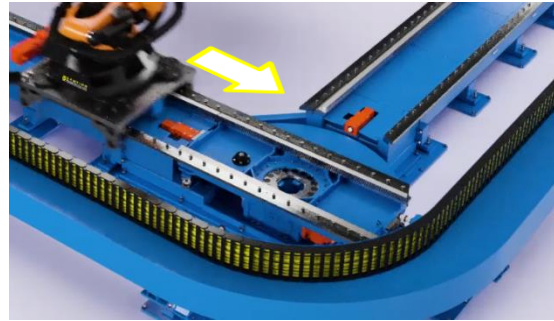
MODULAR DESIGN – VARIABLY EXPANDABLE



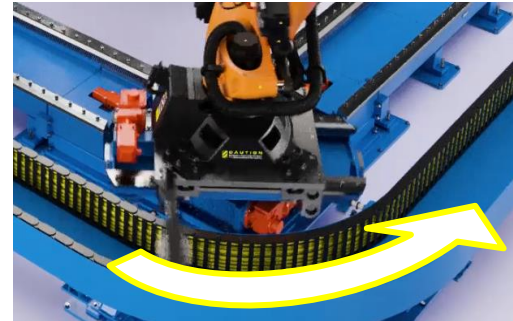
## Seventh Axis with Indexing Table



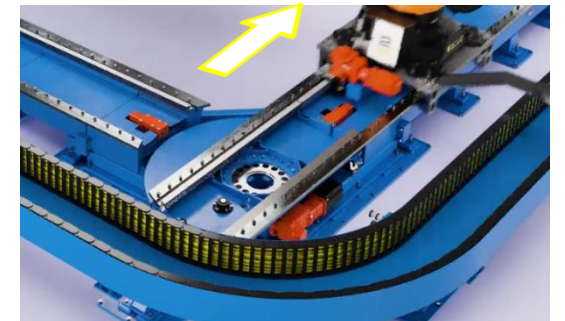
## Detail – Index Station



Step 1 – Robot slides into the Indexing Station and is locked with shot pins.

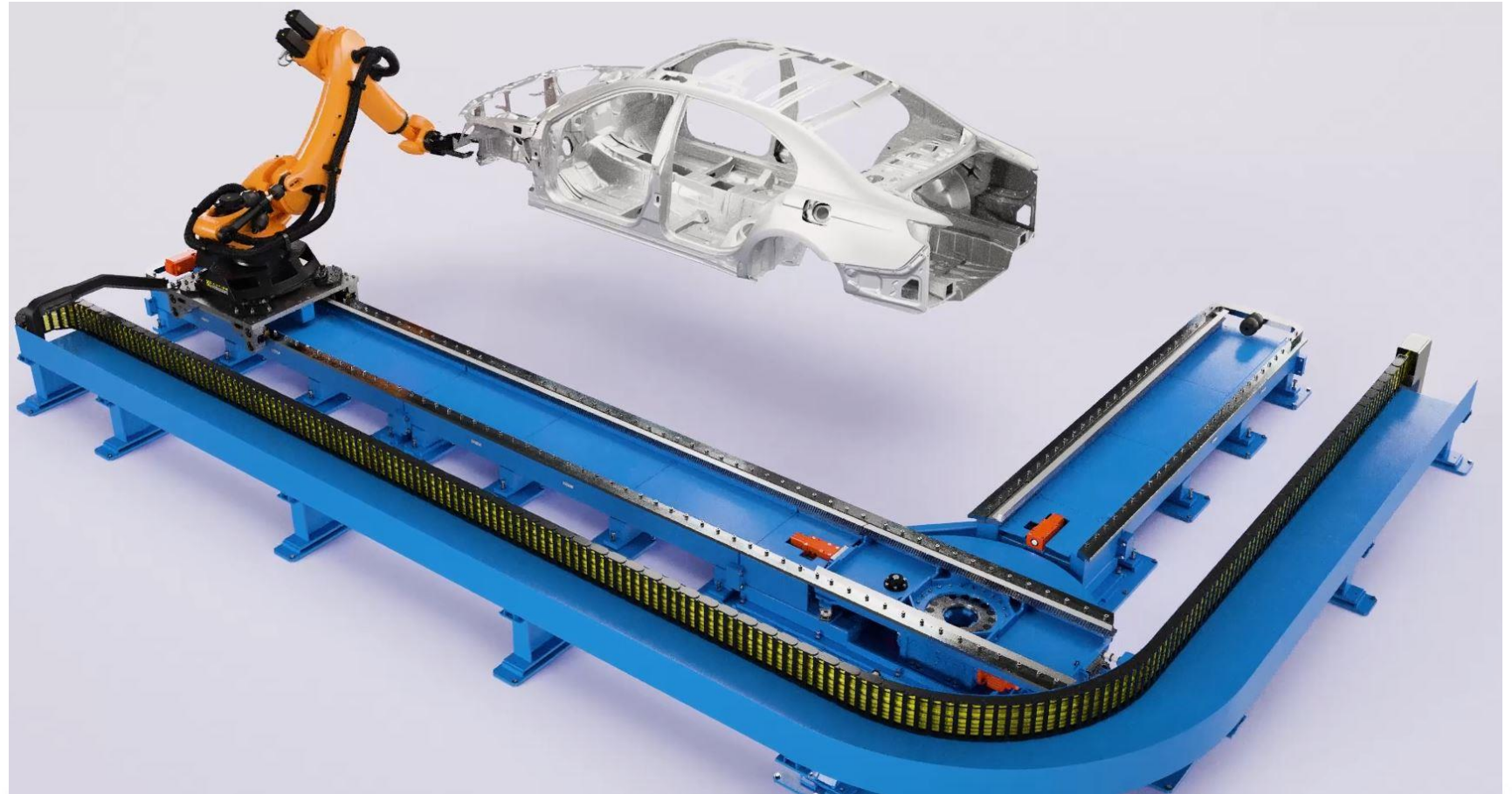


Step 2 – Turntable Indexes the Robot up to 90°

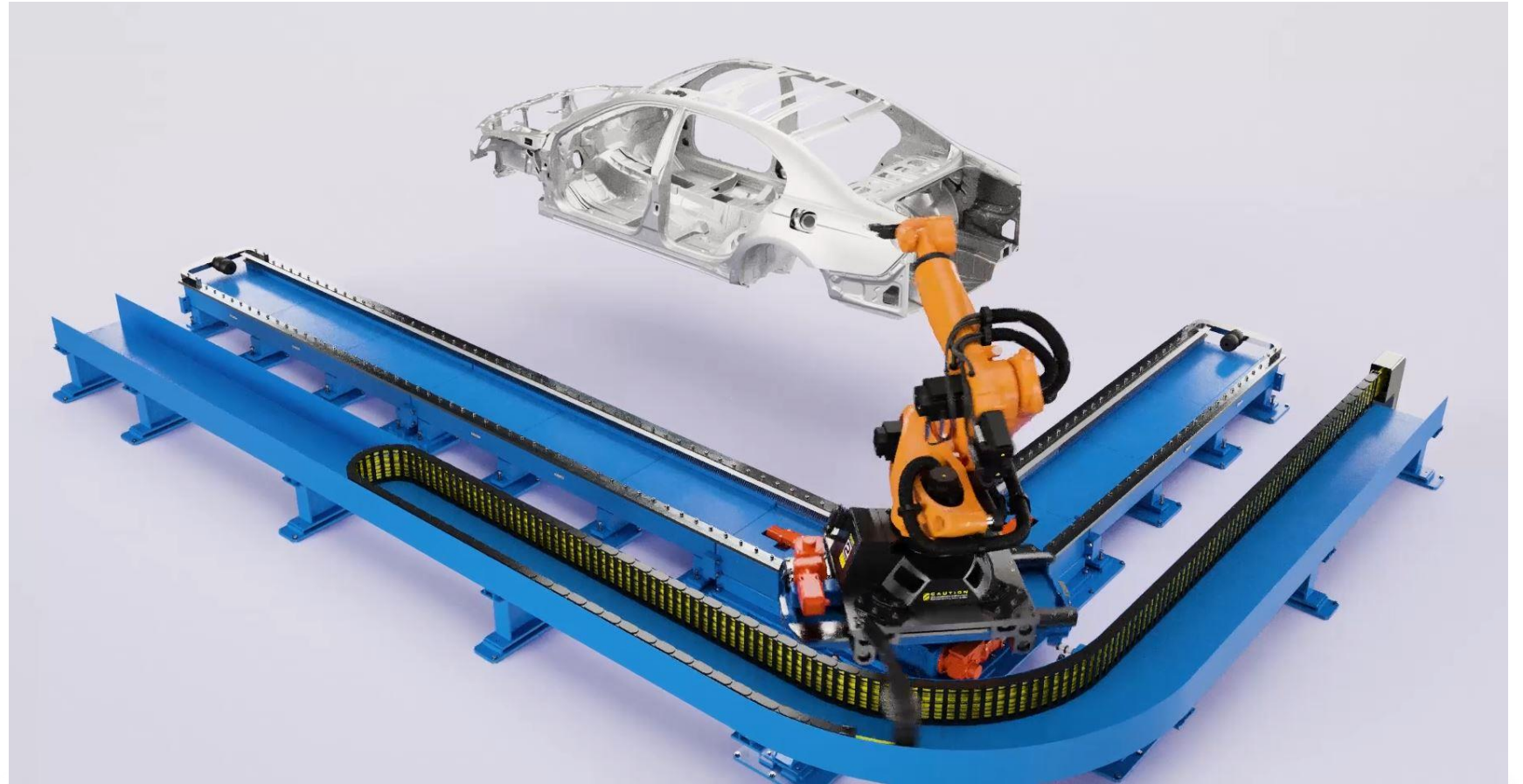


Step 3 – Robot slides into the second axis.

## Seventh Axis with Indexing Table



## Seventh Axis with Indexing Table



## Seventh Axis with Indexing Table



## Features

### **Seventh Axis for Robot Applications**

Can be freely positioned over the entire travel path

Modular expandable

Various motor types possible

Automatic lubrication

Completely covered rack

Wipers on the running surface

Guide rollers are easy to change

## The Seven Axis series

We have extended the range of our product and created the EFA-Series 1 - 4 for an improved modularity and standardisation. This allows us to supply our customers, cope with the application demand and adapt to the multitude of robot series and sizes.

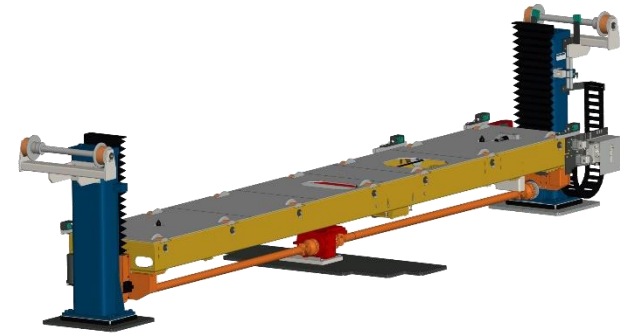
Type	As 7th axis robot weight*	Recommended load*	As a linear carriage tool weight*
EFA 1	1.000 kg	100 kg	2.000 kg
<u>EFA 2</u>	2.000 kg	300 kg	4.000 kg
EFA 2.5	2.500 kg	400 kg	5.000 kg
<u>EFA 3</u>	4.500 kg	700 kg	6.000 kg
EFA 4	> 5.000 kg	1.000 kg	> 7.000 kg

\*) approximated values

## Do you know our conveyor systems?

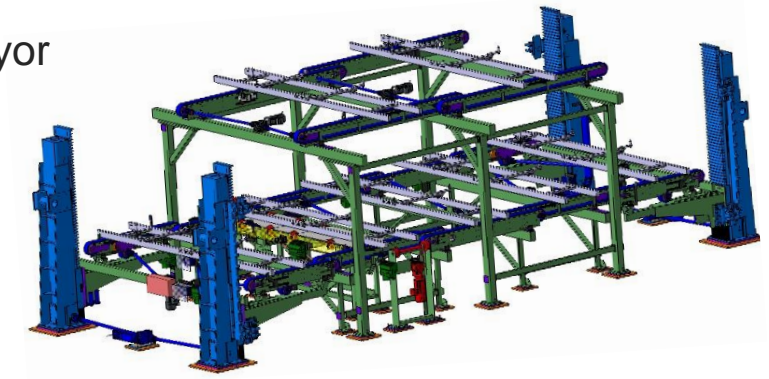
- Lift Powered Lowerbed

<https://www.youtube.com/watch?v=BhrtRsA3-Ow>



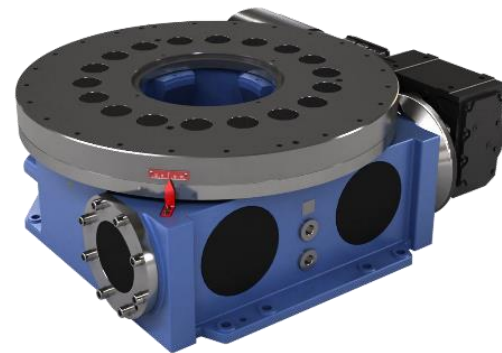
- Skid-Cross-Conveyor & Skid-Ring-Conveyor

<https://www.youtube.com/watch?v=ysaWoWKtUEY>



- Flexible Rotary Tables

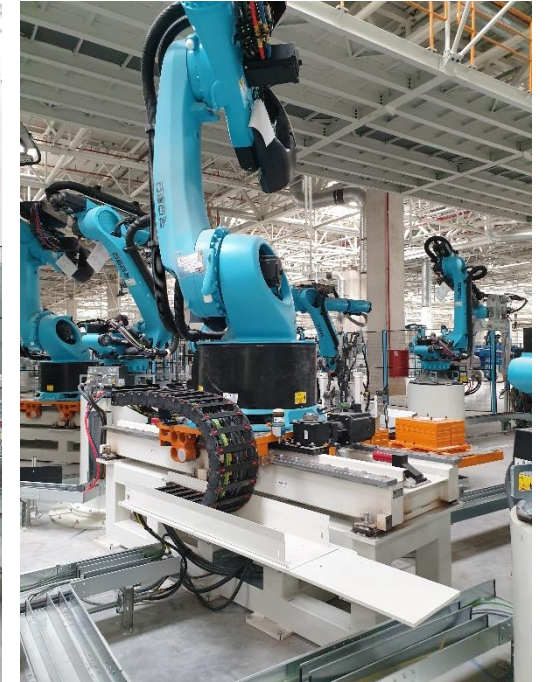
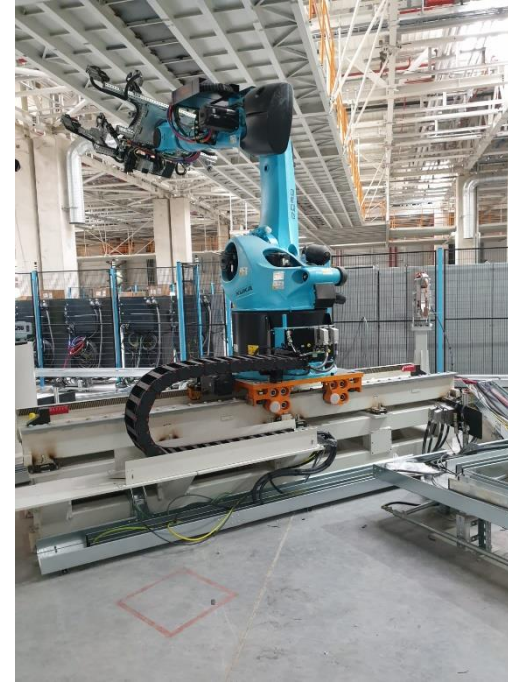
<https://www.youtube.com/watch?v=mft1s-4l3aw>





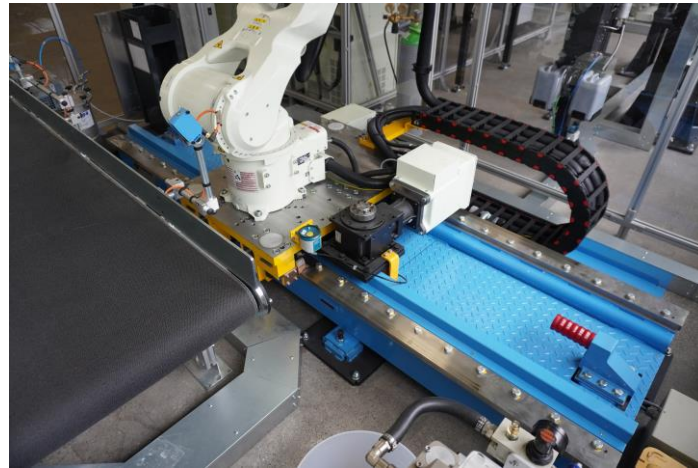
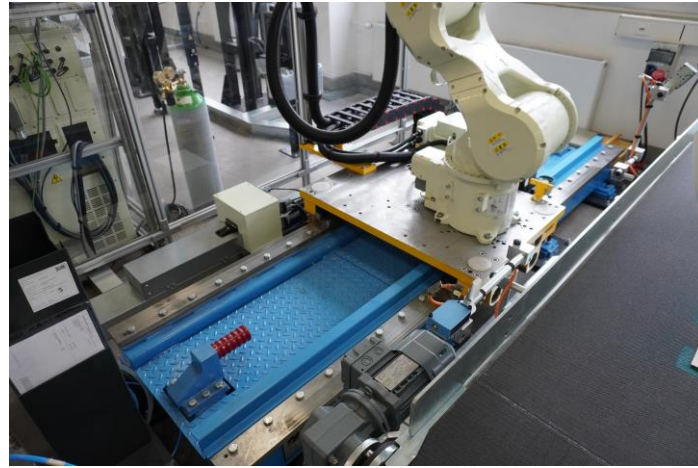
## Application

Bodyshop for EV / TOGG Bursa, Turkey (large project about 27 pieces)



## Application

Paint cell at Kawasaki Robotics EMA Showroom / Neuss, Germany



## Application

### Bodyshop Daimler S-Klasse / BR 223 in Sindelfingen, Germany



## Application

Production in Lorsch, Germany



## References

<b>Customer</b>	<b>Project</b>
Daimler Sindelfingen	S-Klasse / BR223
Hirotec US	G6X, 7X
Jiangsu Hesheng New Energy Auto Parts	H001
Shanghai Tongzhou Auto Parts	NEO
Beijing Foton Daimler Automotive Co., Ltd.	S1
Beijing Foton Daimler Automotive Co., Ltd.	M4
GM Kamtec USA	BEV3-Doors
NIMAK	Vollmann / Elterlein
Kawasaki	Showroom
ROBO Turkey	TOGG EV

## Robots

(#e.g. cable management/cables/pneumatics)

Roboter Robot	Bezeichnung Type	Reichweite Range	Last				Empfohlene Grösse Recommended Size
			Eigenlast Net weight	Versorgungslast Supply load	Traglast/ Nutzlast Payload	Summe Sum	
			mm	kg	kg	kg	
ABB	IRB 6700-150/3,20	3200	1300	50	150	1500	2
ABB	IRB 6700-155	2850	1300	50	155	1505	2
ABB	IRB 6700-175	3050	1300	50	175	1525	2
ABB	IRB 6700-200	2600	1300	50	200	1550	2
ABB	IRB 6700-205	2800	1300	50	205	1555	2
ABB	IRB 6700-235	2650	1300	50	235	1585	2
ABB	IRB 6700-245	3000	1300	50	245	1595	2
ABB	IRB 6700-300	2700	1300	50	300	1650	2
ABB	IRB 6650S-90/3,9	3900	2275	50	90	2415	2,5
ABB	IRB 6650S-125/3,5	3500	2250	50	125	2425	2,5
ABB	IRB 6650S-200/3,0	3000	2250	50	200	2500	2,5
ABB	IRB6600	2550	1525	50	175	1750	2
ABB	IRB6600	2550	1555	50	225	1830	2
ABB	IRB6600	2800	1605	50	175	1830	2
ABB	IRB6650	3200	1655	50	125	1830	2
ABB	IRB6650	2750	1580	50	200	1830	2
ABB	IRB6650S	3500	2125	50	125	2300	2,5
ABB	IRB6650S	3000	2050	50	200	2300	2,5
ABB	IRB6600ID	2550	1695	50	185	1930	2
ABB	IRB6650ID	2750	1710	50	170	1930	2
ABB	IRB 7600-400/2,55	2550	2400	50	400	2850	3
ABB	IRB 7600-340/2,80	2800	2425	50	340	2815	3
ABB	IRB 7600-325/3,10	3100	2440	50	325	2815	3
ABB	IRB 7600-150/3,50	3500	2450	50	150	2650	3
ABB	IRB 4400-60/1,96	1960	1040	50	60	1150	1
ABB	IRB 4400L-10/2,53	2530	1040	50	10	1100	1
COMAU	NJ4 170 -2,5	2500	1100	50	170	1320	2
COMAU	NJ4 170 -2,9	2900	1290	25	170	1485	2

## Robots

Roboter Robot	Bezeichnung Type	Reichweite Range	Last				Empfohlene Grösse Recommended Size
			Eigenlast Net weight	Versorgungslast Supply load	Traglast/ Nutzlast Payload	Summe Sum	
			mm	kg	kg	kg	
COMAU	NJ4 175 - 2,2	2200	1080	50	175	1305	1
COMAU	NJ4 220 - 2,4	2400	1260	25	220	1505	2
COMAU	NJ4 220 - 2,7	2700	1290	25	220	1535	2
COMAU	NJ4 220 - 3,0	3000	2005	25	220	2250	3
COMAU	NJ4 270 - 2,7	2700	1975	25	270	2270	2
COMAU	NJ130 - 2,6	2600		50		50	?
COMAU	NJ130 - 2,0	2000		50		50	?
COMAU	NJ 165 - 3,0	3000		50		50	?
COMAU	NJ 220 - 2,7	2700		50		50	?
FANUC	M-410iC/110	2403	1030	30	110	1170	1
FANUC	M-410iC/185	3143	1600	30	185	1815	2
FANUC	M-410iC/315	3143	1600	20	315	1935	2,5
FANUC	M-410iC/500	3143	2410	30	500	2940	3
FANUC	M-710iC/50	2050	560		50	610	1
FANUC	M-710iC/50H	2003	540		50	590	1
FANUC	M-710iC/50S	1359	545		50	595	1
FANUC	M-710iC/50E	2050	560		50	610	1
FANUC	M-710iC/45M	2606	570		45	615	1
FANUC	M-710iC/70	2050	560		70	630	1
FANUC	M 900iA/600L	2832	2800	25	600	3425	3
FANUC	M 900iA/400L	3625	3150	25	400	3575	3
FANUC	M 900ib/700	2832	2800	25	700	3525	3
FANUC	M 900ib/400L	3704	3150	25	400	3575	3
FANUC	M 900ib/280	2655	1700	50	280	2030	2,5
FANUC	M 900ib/360	2655	1540	50	360	1950	2,5
FANUC	M 900ib/280L	3103	1600	50	280	1930	2,5
FANUC	M 900ib/330L	3203	1780	50	330	2160	2,5
FANUC	R2000iC/125L	3100	1090	50	125	1265	2

(#e.g. cable  
management/cables/  
pneumatics)

## Robots

(#e.g. cable management/cables/pneumatics)

Roboter Robot	Bezeichnung Type	Reichweite Range	Last				Empfohlene Grösse Recommended Size
			Eigenlast Net weight	Versorgungslast Supply load	Traglast/ Nutzlast Payload	Summe Sum	
			mm	kg	kg	kg	
FANUC	R2000iC/165F	2655	1115	50	165	1330	2
FANUC	R2000iC/210F	2655	1090	50	210	1350	2
FANUC	R2000iC/240F	2555	1090	50	240	1380	2
FANUC	R2000iC/270F	2655	1320	50	270	1640	2
FANUC	R2000iC/100P	3540	1470	50	100	1620	2
FANUC	R2000iC/165R	3095	1370	50	165	1585	2
FANUC	R2000iC/210WE	2450	1180	50	210	1440	2
FANUC	R2000iC/220U	2518		50	220	270	2
FANUC	R2000iC/210L	3060	1350	50	210	1610	2
FANUC	R2000iC/210R	3095	1370	50	210	1630	2
FANUC	R2000iC/270R	3095	1590	50	270	1910	2
FANUC	R2000iD/165FH	2605		50	165	215	2
FANUC	R2000iD/210FH	2605		50	210	260	2
FANUC	M20iA R30ia	1813	250	0	20	270	1
KAWASAKI	BT200LFE52	3430	1100	50	200	1350	2
KAWASAKI	BX130XFE52	2991	970	50	130	1150	1
KAWASAKI	BX200LFE52	2597	930	50	200	1180	1
KAWASAKI	BX200XFE52	3412	1450	50	200	1700	2
KAWASAKI	BX300LFE52	2812	1460	50	300	1810	2
KAWASAKI	MX350LFE54*	3018	2800	50	350	3200	2
KAWASAKI	MX500NFE54*	2540	2750	50	500	3300	3
KAWASAKI	RS07L	930	36	0	7	43	1
KAWASAKI	RS10L	1925	230	0	10	240	1
KAWASAKI	RS15X	3150	545	0	15	560	1
KAWASAKI	KJ155	1545	195	10	8	213	2
KAWASAKI	KJ125	1299	190	10	8	208	2
KAWASAKI	KJ264	2640	540	25	15	580	2
KAWASAKI	KJ194	1940	530	25	15	570	2



## Robots

(#e.g. cable management/cables/pneumatics)

Roboter Robot	Bezeichnung Type	Reichweite Range	Last				Empfohlene Größe Recommended Size
			Eigenlast Net weight	Versorgungslast Supply load	Traglast/ Nutzlast Payload	Summe Sum	
			mm	kg	kg	kg	
KUKA	KR 30 L16-2	0	665	35	16	716	1
KUKA	KR30	0	665	35	30	730	1
KUKA	KR 60 L30-3	0	665	35	30	730	1
KUKA	KR 60 L45-3	0	665	35	45	745	1
KUKA	KR60-30	0	665	35	60	760	1
KUKA	KUKA KR70 R2100	2100	536	35	70	641	1
KUKA	KR120	2100	963	30	120	1113	1
KUKA	KR180	2100	988	30	180	1198	1
KUKA	KR210	3100	1154	50	210	1414	2
KUKA	KR240	2900	1145	50	240	1435	2
KUKA	KR 120 R3900K ultra	3900	1221	50	120	1391	2
KUKA	KR 150 R3700K ultra	3700	1215	50	150	1415	2
KUKA	KR 180 R3500K ultra	3500	1201	50	180	1431	2
KUKA	KR 210 R3300 K ultra	3300	1214	50	210	1474	2
KUKA	KR 240 R3100 K ultra	3100	1198	50	240	1488	2
KUKA	KR 270 R2900 K ultra	2900	1189	50	270	1509	2
KUKA	KR270	2700	1129	50	270	1449	2
KUKA	KR270 ULTRA K	3100	1129	50	270	1449	2
KUKA	KR270 ULTRA 2K	3100	1129	50	270	1449	2
KUKA	KR300	2500	1120	50	300	1470	2
KUKA	KR340 R3330 Fortec	3330	2421	50	340	2811	2,5
KUKA	KR360 R2830 Fortec	2830	2385	50	360	2795	2,5
KUKA	KR420 R3080 Fortec	3080	2415	50	420	2885	2,5
KUKA	KR420 R3330 Fortec	3300	2686	50	420	3156	2,5
KUKA	KR 500 R2830 Fortec	2830	2385	50	500	2935	3
KUKA	KR 600 R2830	2826	2650	129	600	3379	3
KUKA	KR 600 R2830 F	2826	2650	129	600	3379	3
KUKA	KR 510 R3080	3076	2680	125	510	3315	3

## Robots

Roboter Robot	Bezeichnung Type	Reichweite Range	Last				Empfohlene Grösse Recommended Size
			Eigenlast Net weight	Versorgungslast Supply load	Traglast/ Nutzlast Payload	Summe Sum	
			mm	kg	kg	kg	
<b>KUKA</b>	KR 510 R3080 F	3076	2680	125	510	3315	3
<b>KUKA</b>	KR 420 R3330	3326	2686	95	420	3201	2,5
<b>KUKA</b>	KR 420 R3330 F	3326	2686	95	420	3201	2,5
<b>KUKA</b>	KR 1000 950 titan	3829	4690	50	900	5640	4
<b>KUKA</b>	KR 1000 1300 titan	3430	4740	50	1300	6090	4
<b>YASKAWA</b>	GP250	2710	1345	50	250	1645	2
<b>YASKAWA</b>	SP210 GP225	2702	1080	30	225	1335	2
<b>YASKAWA</b>	GP235	2710	1345	50	235	1630	2
<b>YASKAWA</b>	GP280	2446	1300	50	280	1630	2
<b>YASKAWA</b>	GP215	2912	1340	50	215	1605	2
<b>YASKAWA</b>	GP160	3143	1760	50	160	1970	2
<b>YASKAWA</b>	GP180	2702	1020	50	160	1230	2
<b>YASKAWA</b>	GP165R	3143	1760	50	165	1975	2
<b>YASKAWA</b>	GP400R	2702	3560	25	400	3985	3

Errors excepted, subject to technical changes. List will be updated.

(#e.g. cable  
management/cables/  
pneumatics)

Thank you for your  
attention.

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