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A decorative graphic consisting of a grid of white dots on the left side of the page.

roller hemming technology

2020/21

A close-up photograph of several industrial robotic hemming heads. The heads are cylindrical and made of polished metal, likely stainless steel. Each head features a central circular opening surrounded by several smaller holes and screws. The background is blurred, showing other parts of the machinery and blue cables.

EngRoTec-Solutions GmbH Leading in Robotic Hemming

05 innovation:
hemming systems
for door frames

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for doors & lids

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References

ABB Engineering

Adam Opel

ALLGAIER AUTOMOTIVE

Altinay Robot Teknolojileri

Autobox Technology
(Shanghai)

AUTOMATE Technology
(Shanghai)

AWL Technik

Beycelik Gestamp

BMW Group

C.A.A.R. – Consulting Automotive Aero-
space Railway

Carthago Reisemobilbau

Chopyňská strojírna

Porsche

DURA Automotive Body &
Glass Systems

Emil Bucher

FFT Produktionssysteme

FIBRO-LÄPPLE Technology

Five Lakes Automation

Ford-Werke

Kuka Systems

Kunshan Noke Automotive
Technical Machinery

LÄPPLE Automotive

Magna Cosma International

Magna Steyr

MINO Automation

Reißler-Technik

Salzgitter Automotive Engineering

Schuler Hangarter Maschinenbau

SD Automotive

ŠKODA AUTO

Suministros Industriales Servofluid

Tesla Motors

ThyssenKrupp System Engineering

TMS Turnkey Manufacturing
Solutions

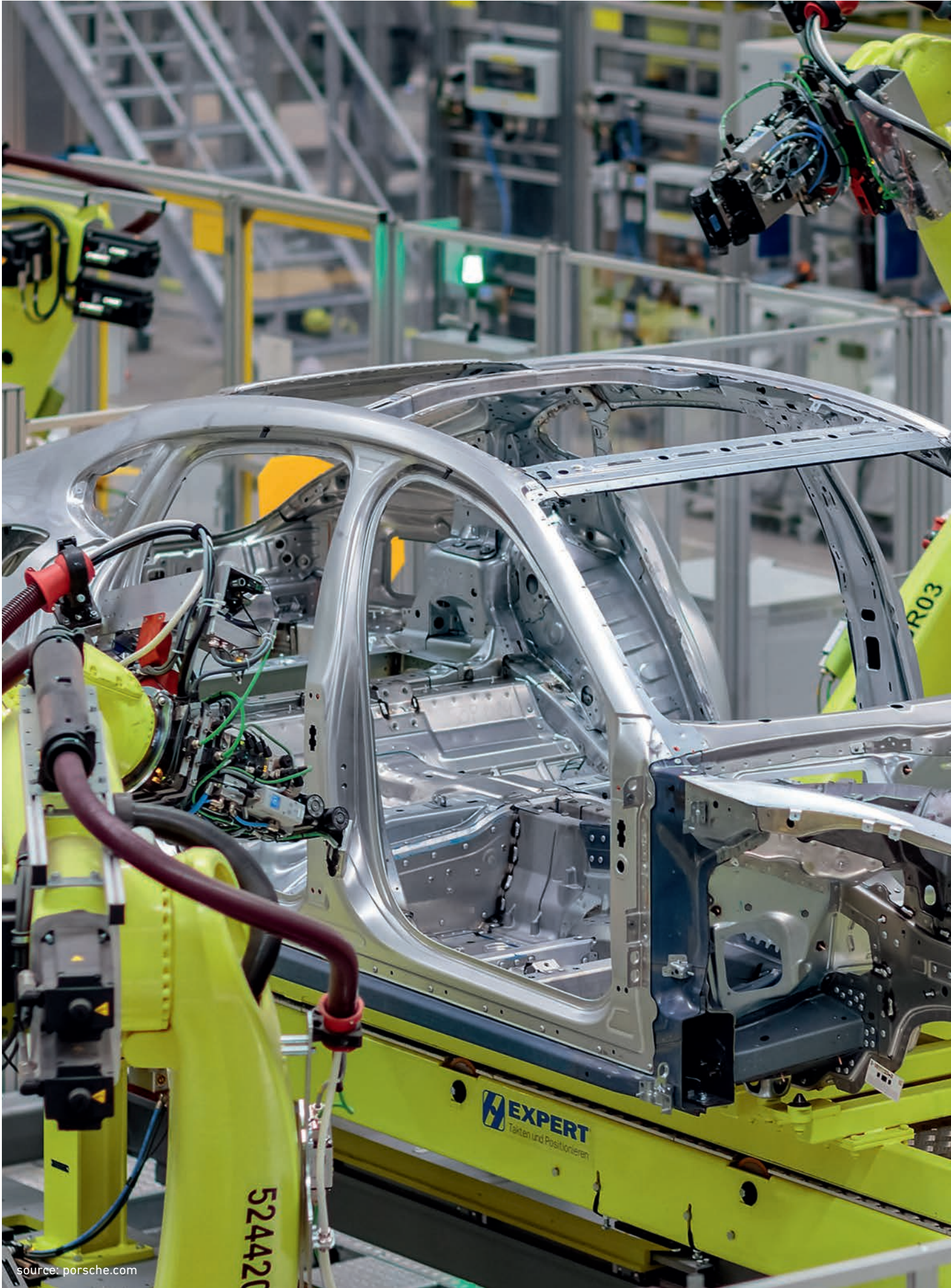
Valiant International

VDL Steelweld

voestalpine Polynorm

Volkswagen

Waldaschaff Automotive



source: porsche.com



innovation: hemming systems for door frames

Through new innovative material combinations, joining technologies have to meet new challenges. Conventional welding applications are replaced by hemming applications also within doorframes of a car body.

We played an important role in the development of our customers' product. We are the market leader with a system that solves the task simply and efficiently.

A double roller tool and a robot guidance system from AI^o are put into effect. This combination avoids expensive investment in equipment for positioning completely. The integration of further models is done in software only.

Components	Description
FW270	pneumatic roller hemming tool (see page 16)
AI^o VISIONSCANNER2	laser triangulation sensor incl. software with the application ROBOTGUIDANCE (www.ai-engrotec.de)





roller hemming systems for doors & lids

Our hemming tools have been developed to meet the quality and planning requirements of modern door and lid systems. Combined with corresponding production fixtures, there are different possibilities in the installation of the system as well as realization of different cycle times. Our hemming systems guarantee an even hemming result with optimum adhesive distribution within the hemming geometry.

The tools are protected against overload. Optionally, they are attachable to a force control device to facilitate commissioning or as a process control system in mass production.

The use of high quality and high strength materials lead to an outstanding lifetime with a minimum of maintenance required.

Technical data	FW100 – hemming tool for closure panels	
Weight	max. 12 kg (approx. 10 kg without force control device)	
Pre-load	1,000 N > 1,000 N	by elastomer suspension on request
Process forces	< 1,000 N 1,000 – 2,000 N > 2,000 N	rigid system spring-loaded system on request
Features	<ul style="list-style-type: none"> • less wear out • protection against overload • compact and modular set-up • easy to use 	

Product overview – hemming tool without force control device

FW_100_00_VAR_01

FW100



hemming tool without force control device with:

- 2× standard roller,
- 1× pin for calibration short

FW_100_00_VAR_02



hemming tool without force control device with:

- 1× standard roller,
- 1× standard shaft,
- 1× pin for calibration short

FW_100_00_VAR_03



hemming tool without force control device with:

- 2× standard roller,
- 1× standard shaft,
- 1× pin for calibration long

FW_100_00_VAR_04



hemming tool without force control device with:

- 2× standard roll or shaft
(to be used for glass channel area at doors)

Product overview – hemming tool with force control device

FW_100_00_VAR_11

FW100



hemming tool with force control device and:

- 2× standard roller,
- 1× pin for calibration short

FW_100_00_VAR_12



hemming tool with force control device and:

- 1× standard roller,
- 1× standard shaft,
- 1× pin for calibration short

FW_100_00_VAR_13



hemming tool with force control device and:

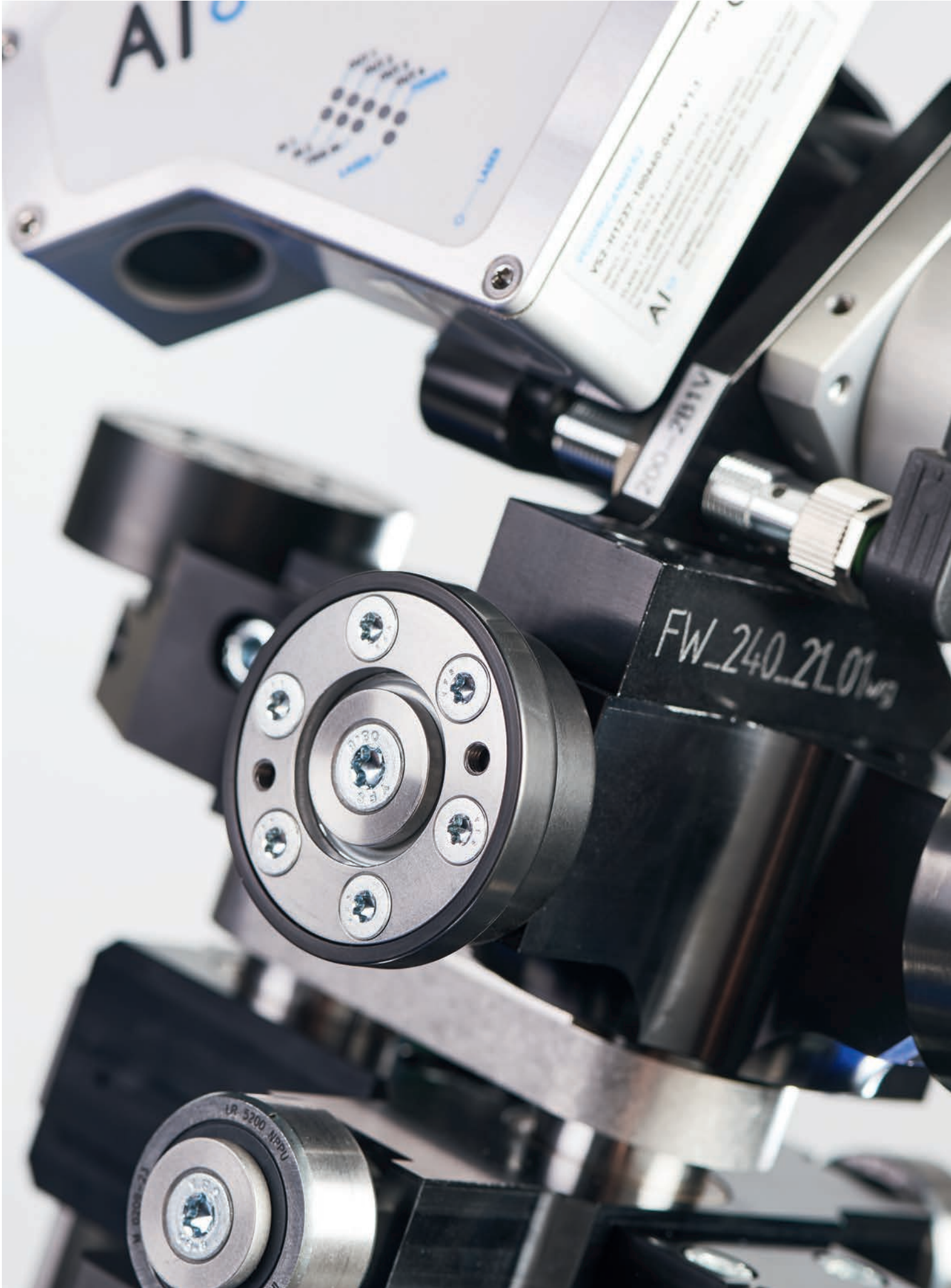
- 2× standard roller,
- 1× standard shaft,
- 1× pin for calibration long


FW_100_00_VAR_14



hemming tool with force control device and:

- 2× standard roller or shaft
(to be used for glass channel area at doors)





systems for wheel house & door frames

The pneumatically supported tools of the FW 2XX series have been developed for hemming applications with a double roller system.

The tools carry multiple pairs of rollers on a special bearing system which guarantees a steady flow of hemming forces. The robot has a guiding function only.

A robot guidance system from AI^o (www.ai-engrotec.de) complements the systems in order to compensate tolerances of automotive body panels. It can additionally be used for the control of the hemming result. A robot-guided surface protection with clamping technique is being used for hemming processes at the wheel house.

Furthermore, our hemming tool offers high flexibility in the possibility of a stationary set up in the production line. Different tasks can be realized by guidance of different parts at one tool on a stand.

Technical data	FW200 – hemming tool for wheel houses
Weight	max. 25 kg
Interfaces	<ul style="list-style-type: none"> • central air supply • central power supply 24 V DC • connection to fieldbus with output of analogue values (IO Link) for Profibus DP, Profinet (Cu + LWL), Ethernet IP, DeviceNet
Features	<ul style="list-style-type: none"> • simple operation • simple optimization of quality (proportional valve) • compact set-up • easy to maintain • optionally equipped with hem inspection system AI^o INLINE PROCESS INSPECTION

Product overview

FW_200_00_VAR_01

FW200



hemming tool with standard equipment for
3 hemming steps with
3× standard rollers

FW_200_00_VAR_02



hemming tool with standard equipment for
4 hemming steps with
4× standard rollers

FW_200_00_VAR_03



hemming tool fully equipped for
3 hemming steps with 3× standard rollers

and sensor measurement system, including:

- 1× smart sensor VISIONSCANNER2 incl. connection,
- 1× power supply cable and 1× LAN cable,
- 1× artefact,

with software

FW_200_00_VAR_04



hemming tool fully equipped for
4 hemming steps with 4× standard rollers,

and sensor measurement system, including:

1× smart sensor VISIONSCANNER2 incl. connection,
1× power supply cable and 1× LAN cable,
1× artefact,

with software

FW_240_21_VAR_01

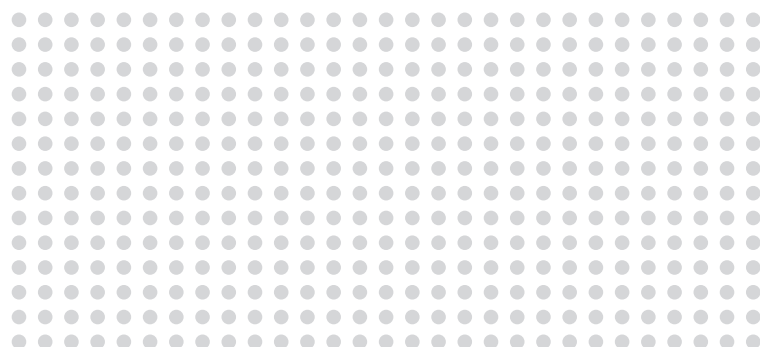
FW240



sensor measurement system
for robot guidance system AI° ROBOT GUIDANCE
and quality control AI° INLINE PROCESS
INSPECTION including:

1× smart sensor VISIONSCANNER2
incl. swivelling connection to roller hemming tool,
1× power supply cable and 1× LAN cable,
1× artefact,

with software



Product overview – hemming tools for applications without hemming bed or stationary configuration

Technical data	FW270 – hemming tool for door sills
Weight	max. 25 kg
Interfaces	<ul style="list-style-type: none"> • central air supply • central power supply 24 V DC • connection to fieldbus with output of analogue values (IO Link) for Profibus DP, Profinet (Cu + LWL), Ethernet IP, DeviceNet
Features	<ul style="list-style-type: none"> • simple operation • simple configuration of hemming force (proportional valve) • compact set-up • easy to maintain • optionally equipped with quality control system AI◦ INLINE PROCESS INSPECTION

FW_270_00_VAR_01

FW270



hemming tool with double roller technique for applications without hemming bed.

basic configuration for 3 hemming steps with 3 pairs of standard hemming rollers and control technology according to standard installation.

FW_270_00_VAR_02

FW270

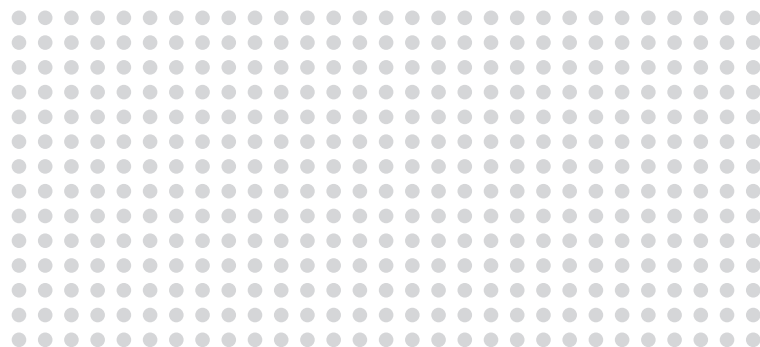


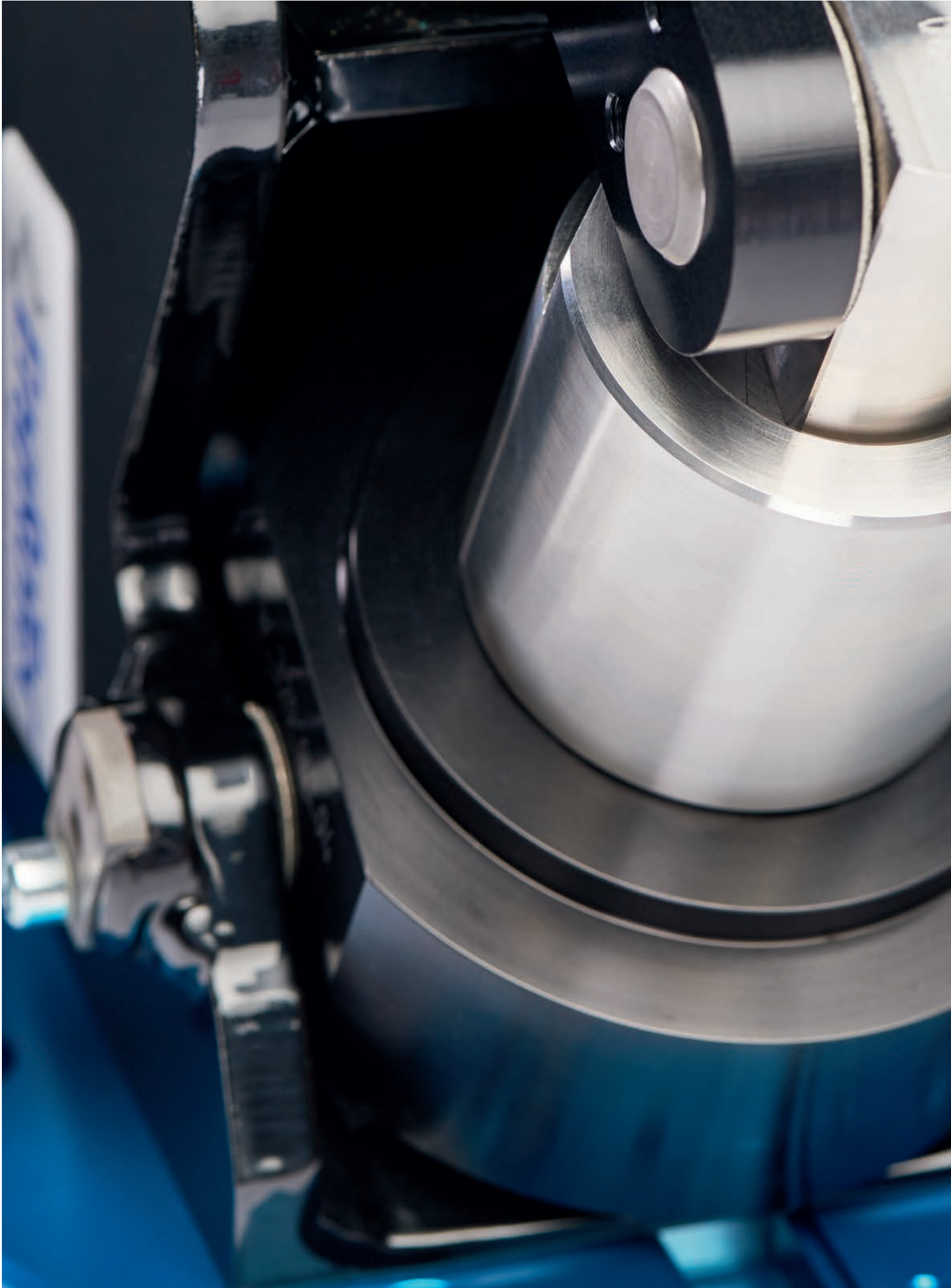
hemming tool with double roller technique for applications without hemming bed.

basic configuration for 3 hemming steps with 3 pairs of standard hemming rollers and control technology according to standard installation. additionally:

- 1x smart sensor VISIONSCANNER2 incl. bracket,
- 1x set of cables (Power, Ethernet)
- 1x reference artifact

incl. software





systems for limited access

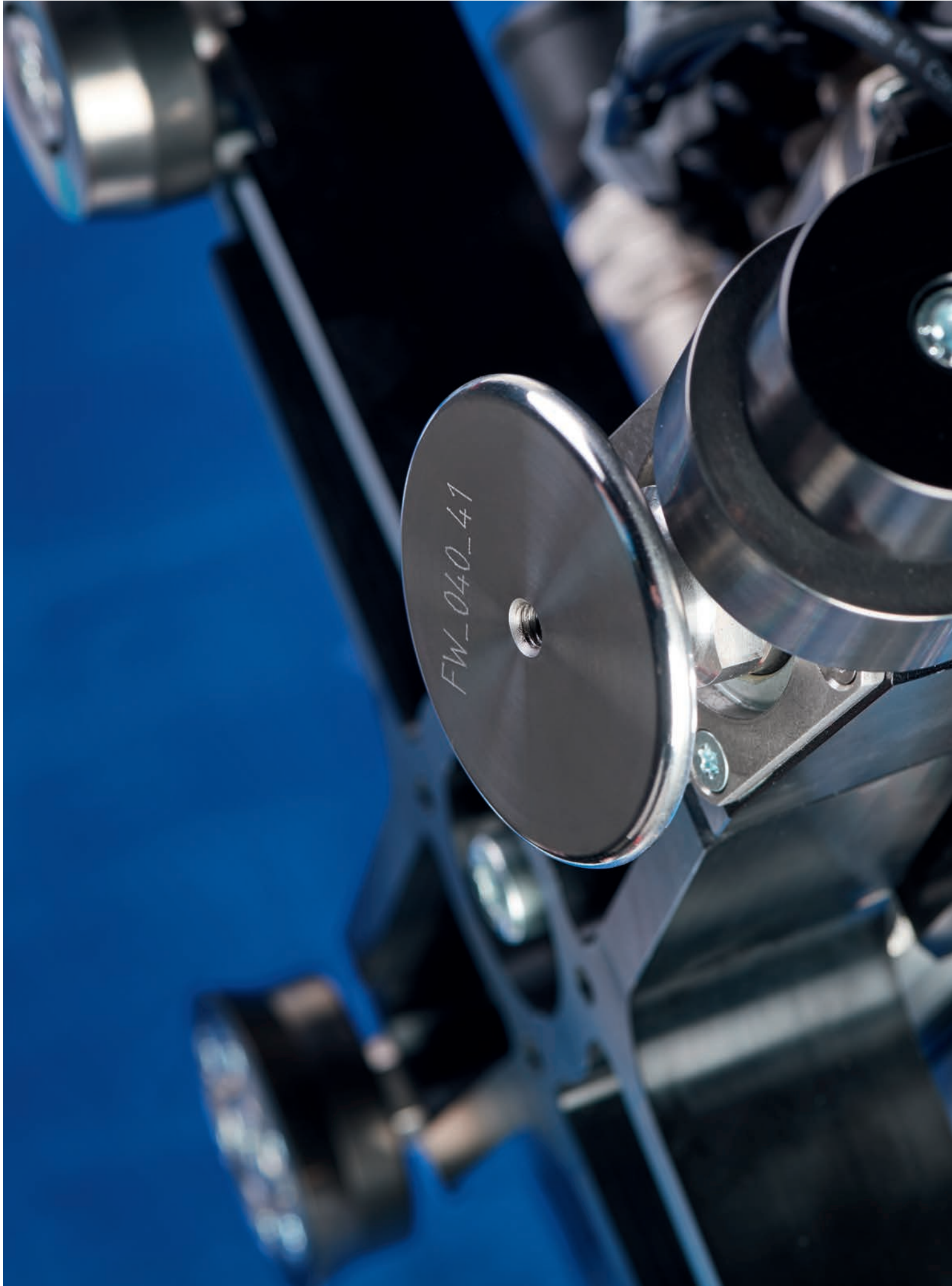
Technical data	FW300 – hemming tool for closure panels	
Weight	max. 13 kg	
Pre-load	1,000 N > 1,000 N	by elastomer suspension on request
Process forces	< 1,000 N 1,000 – 2,000 N > 2,000 N	rigid system spring-loaded system on request
Features	<ul style="list-style-type: none"> • less wear out • protection against overload • compact and modular set-up • programmer-friendly 	

FW_300_00_VAR_01

FW300



hemming tool with roller carrier and
1× standard roller or shaft,
1× pin for calibration short





systems for sun roof & panoramic roof

The tool FW400 has been developed for the hemming of sun roof and panoramic roofs.

The flange – open 180° – is hemmed by using various, electrically driven pairs of rollers. Due to the innovative design of the tool and its compact dimensions and disturbance ranges, complex devices of conventional systems can be omitted. Quality optimization can be done by program changes only.

Optionally, the system can be complemented with a quality control by AI^o (www.ai-engrotec.de).

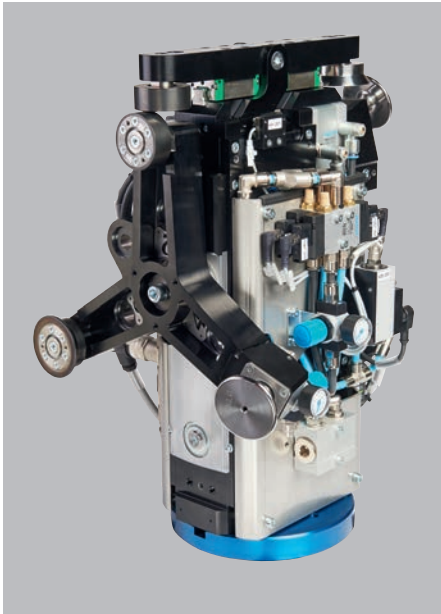
The tool can be mounted stationary, the robot leads the component. Thus, production for various models can be realized efficiently.

Technical data	FW400 – hemming tool for sun roofs
Weight	max. 34 kg
Interfaces	<ul style="list-style-type: none"> • central air supply • central power supply 24 V DC • standard connection to fieldbus Profibus DP, Profinet (Cu + LWL), Ethernet IP, DeviceNet
Features	<ul style="list-style-type: none"> • simple operation • compact design • easy to maintain • high flexibility • optionally equipped with quality control system AI^o INLINE PROCESS INSPECTION

Product overview

FW_400_00_VAR_01

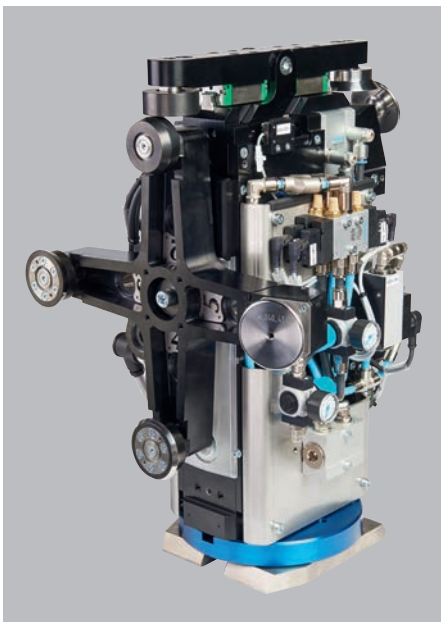
FW 400



hemming tool basic configuration

with roller carrier for
4× pairs of standard hemming rollers

FW_400_00_VAR_02

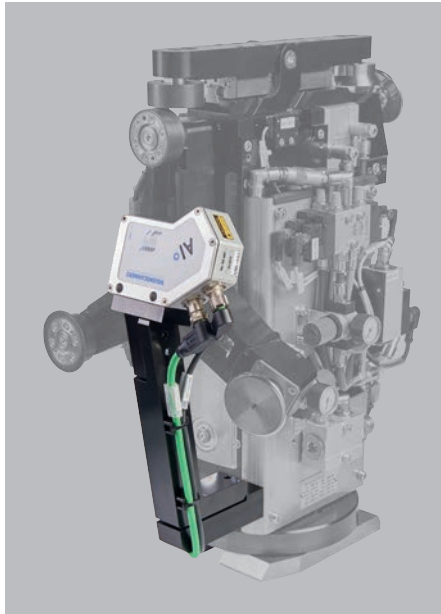


hemming tool basic configuration

with roller carrier for
5× pairs of standard hemming rollers

FW_480_01

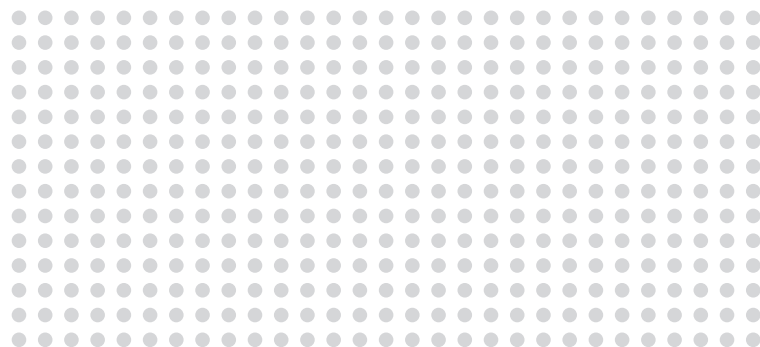
FW480



tool extension for quality inspection consisting of

1× smart sensor AI° VISIONSCANNER2 incl. connection,
1× power supply cable and 1× LAN cable

article-no. 108398







spare & wear parts

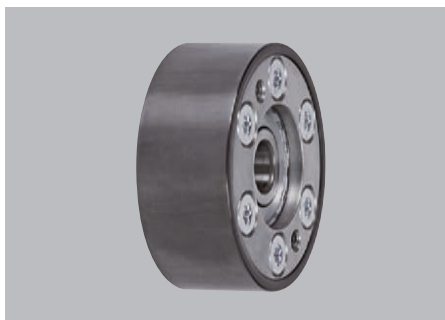
On the following pages, you will find components and wear parts for our products.

	FW100	FW2xx	FW 300	FW 400
Rollers	p. 26–29	p. 26–29	p. 26–29	p. 30–31
Axles	p. 32	p. 32	p. 32	p. 32
Carriers	p. 33–34	p. 35	–	–
Calibration	p. 36–37	p. 36–37	p. 36–37	p. 36–37
Spare and wear parts	p. 37	p. 38	p. 39	p. 40–41

Rollers – FW 100, FW 200, FW 300

FW_040_01

FW_040_01



hemming roller
□ 50, cylindrical

article-no. 107066

FW_040_02

FW_040_02



hemming shaft
□ 20, cylindrical

article-no. 107271

FW_040_03

FW_040_03

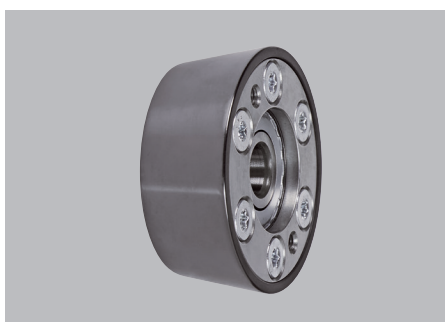


hemming roller
□ 50, tapered 5°

article-no. 107064

FW_040_04

FW_040_04

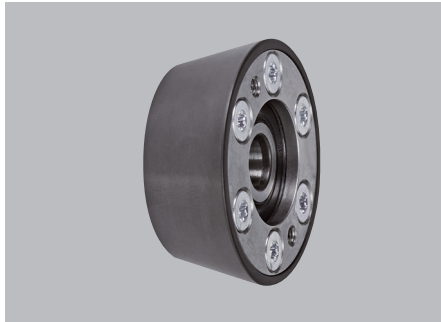


hemming roller
□ 50, tapered 10°

article-no. 107063

FW_040_05

FW_040_05

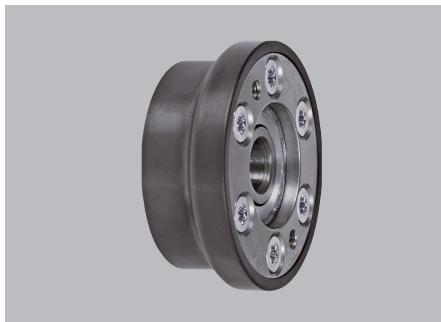


hemming roller
□ 50, tapered 15°

article-no. 107062

FW_040_06

FW_040_06

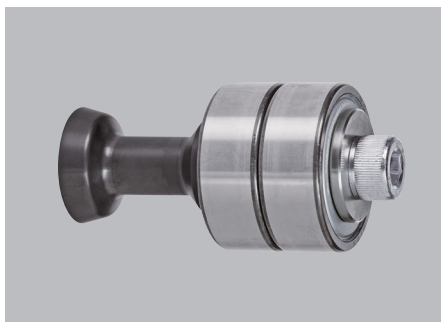


hemming roller
□ 50, cylindrical stepped
for drop hemming

article-no. 107061

FW_040_13

FW_040_13

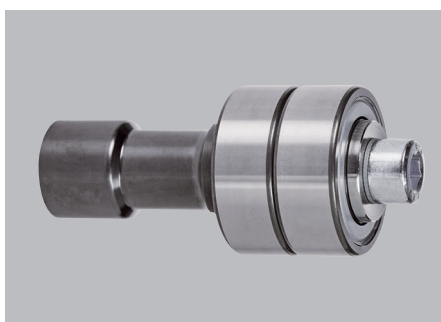


hemming shaft
□ 30, tapered stepped 15°,
for drop hemming

article-no. 107057

FW_040_17

FW_040_17



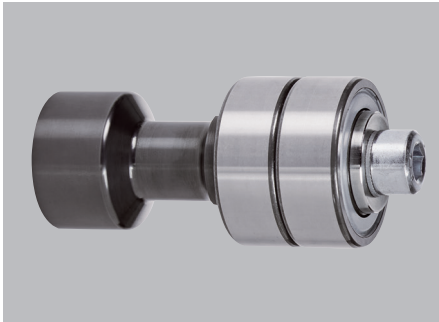
hemming shaft
□ 25, cylindrical stepped B=20

article-no. 107056

Rollers – FW 100, FW 200, FW 300

FW_040_18

FW_040_18

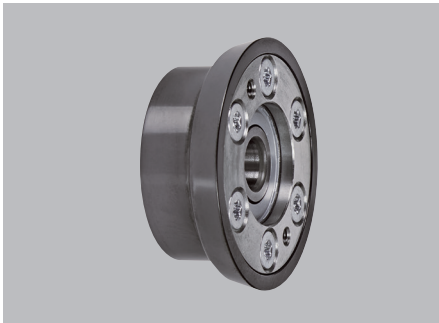


hemming shaft
□ 35, cylindrical stepped B=20

article-no. 107055

FW_040_26

FW_040_26

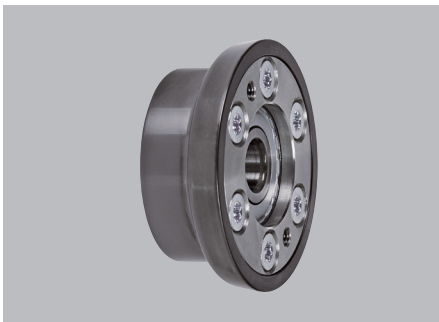


hemming roller
□ 52, tapered stepped 15°,
for drop hemming

article-no. 107051

FW_040_27

FW_040_27

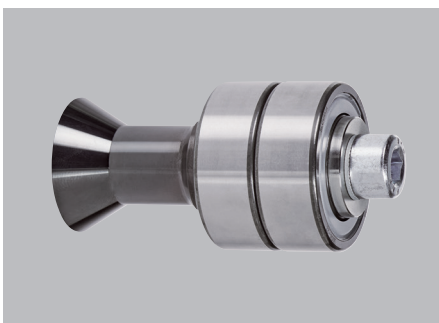


hemming roller
□ 52, tapered stepped 10°,
for drop hemming

article-no. 107050

FW_040_29

FW_040_29

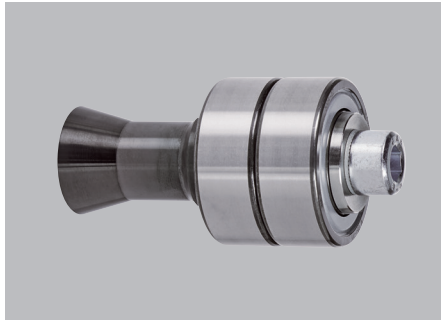


hemming shaft
□ 34, tapered 30°,
for drop hemming

article-no. 107049

FW_040_30

FW_040_30



hemming shaft
□ 28, tapered 15°,
for drop hemming

article-no. 107048

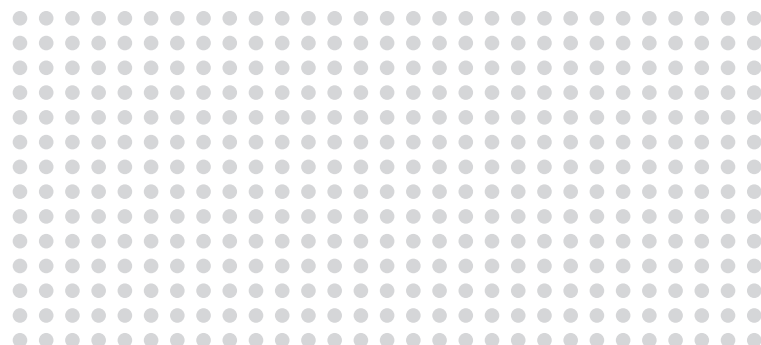
FW_040_xx

FW_040_xx



special hemming roller/shaft
according to customer request

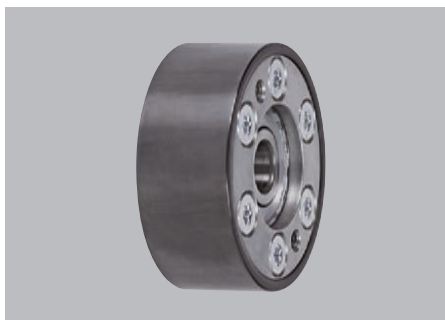
to this, we will provide no guarantee regarding function
and wear resistance; furthermore no corresponding
stockpile is planned.



Rollers – FW 400

FW_040_01

FW_040_01



hemming roller
□ 50, cylindrical

article-no. 107066

FW_040_08

FW_040_08

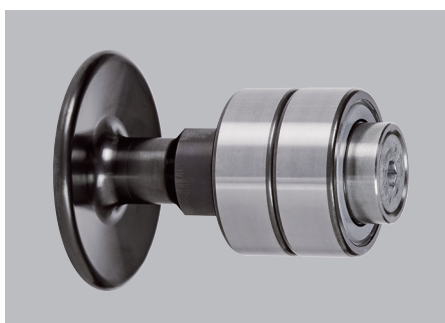


hemming roller
□ 62,5, tapered stepped 40°,
for hemming of sun roof

article-no. 107060

FW_040_20

FW_040_20



hemming roller
□ 62, with undercut 10°,
for hemming of sun roof

article-no. 108197

FW_040_36

FW_040_36



hemming roller
□ 62,5, tapered stepped 35°,
for hemming of sun roof

article-no. 108198

FW_040_37

FW_040_37



hemming roller
 □ 50, tapered 15° towards interior,
 for hemming of sun roof

article-no. 100213

FW_040_38

FW_040_38



hemming roller
 □ 56, tapered stepped 20°,
 for hemming of sun roof

article-no. 100214

FW_040_39

FW_040_39



hemming roller
 □ 60, tapered stepped 55°,
 for hemming of sun roof

article-no. 100215

FW_040_41

FW_040_41



hemming roller
 □ 60, tapered stepped 15°,
 for hemming of sun roof

article-no. 108199

Axles

FW_030_VAR_01

FW_030_01



standard axle for front side assembly
including washer

FW_030_VAR_02

FW_030_02



standard axle for back side assembly
including washer

FW_030_VAR_03

FW_030_03

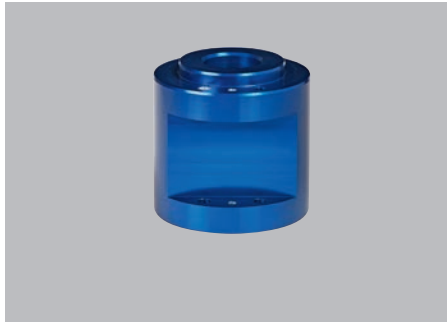


axle adapter for standard rollers
for assembly on hemming shaft carriers

Carrier – FW 100

FW_113_00

FW_113_00



extension tool base 100 mm

article-no. 106955

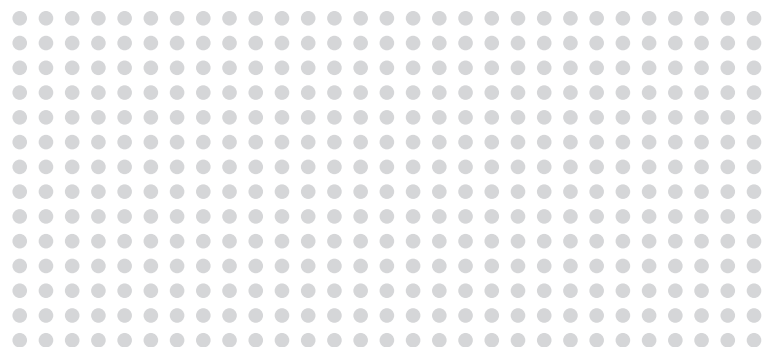
FW_113_15

FW_113_15



extension tool base 150 mm

article-no. 106953



Roller carriers – FW 100

FW_020_VAR_01

FW_020_VAR_01



roller carrier with

2× axle for hemming roller and
1× pin for calibration

FW_020_VAR_02

FW_020_VAR_02



roller carrier with

1× axle for hemming roller,
1× axle for hemming shaft
1× pin for calibration

FW_020_VAR_03

FW_020_VAR_03

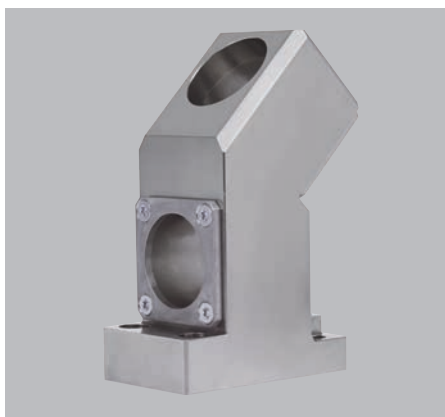


roller carrier with

1× axle for hemming roller
1× axle for hemming shaft or
1× flange axle for hemming roller,
1× axle for forehand roller
1× pin for calibration

FW_020_VAR_04

FW_020_VAR_04



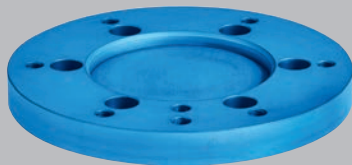
roller carrier for hemming
at glass channel area at doors with

2× covers
1× pin for calibration
1× carrier for pin for calibration

Adapter – FW 100

BM_130_01_01

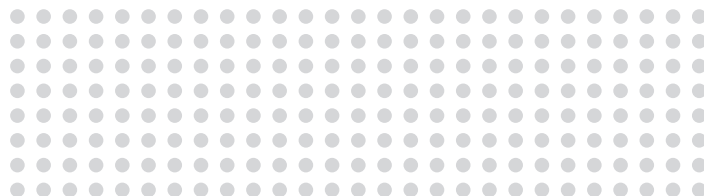
BM_130_01_01



for ISO robot connection D=125 mm
(for ex. Fanuc R-2000-series):

- reference circle – outer \square 160 mm for
6× threaded hole M10 with split 60° and
1× precision bore 10H7
cylindrical centre carrier D=100f7
- reference circle – inner \square 125 mm for
6× through hole M10 with split 60° and
1× precision bore 10H7
cylindrical centre carrier D=80H7

article-no. 108254



Carrier – FW 200

FW_221_11

FW_221_11



roller carrier for FW200
4th hemming step

article-no. 106942

Calibration

FW_090_01_08

FW_090_01_08



pin for calibration short,
install at fixture or roller carrier
D= 8 mm

article-no. 106347

FW_090_01_0x

FW_090_01_0x



pin for calibration long,
to be fastened at front panel tool base
or used instead of hemming roller
M8 + M6 AG / M6 IG

article-no. 107350

FW_090_02_01

FW_090_02_01



socket for calibration,
install at fixture

article-no. 106350

FW_090_02_02

FW_090_02_02



sphere for calibration short,
install at roller carrier

article-no. 106351

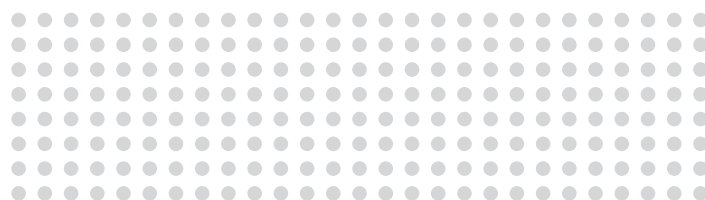
FW_090_02_03

FW_090_02_03



sphere for calibration long,
install at front panel tool base

article-no. 106352



Spare & wear parts – FW 100

no	order no	description / supplier
1	FB70040400A3	elastomer spring 4040 CR EFFBE
2	SOB202820	plain bearing bush SANKYO
3	9186-V3100	force measurement / process value indicator incl. 5 m connecting cable BURSTER
4	106366	ring force sensor incl. socket FW_111_00_04
5	3004 B-2Z-TVH	angular contact ball bearings INA / FAG
6	3200 B-2Z	angular contact ball bearings INA / FAG

Spare & wear parts – FW 200

no	order no	description / supplier
1	EAM4020	end fittings with wiper ZITEC
2	HW15 L = 90 mm	flat cage ZITEC
3	M4020 15x100Q10	guide rail ZITEC
4	V4020 15x150Q10US	guide rail ZITEC
5	SOB253340	plain bearing bush SANKYO
6	ADNH 63x40-IPA-2N	high-force cylinder FESTO
7	Bi4U-M12- AP6X-H1141	inductive sensor TURCK
8	LR5200-2Z	counter roller INA / FAG
9	3802 B-2Z-TVH	ball bearings INA / FAG
10	DSM T-12-270-A-B	swivelling cylinder FESTO
11	BI8U-Q08-AP6X2- 0,6-RS4/S1160	position controlling TURCK
12	CPE14-M1CH-5JS-1/8	way valve FESTO
13	CPE14-M1CH- 5/3G-1/8	way valve FESTO

Spare & wear parts – FW 300

no	order no	description / supplier
1	SOBW 20	thrust washer SANKYO
2	MDZW 18	thrust washer MISUMI
3	PBG 151712 F	plain bearing bush –
4	SOB253325	plain bearing bush SANKYO
5	FB70040400A3	elastomer spring 4040 CR EFFBE
6	SOB202820	plain bearing bush SANKYO
7	3004 B-2Z-TVH	angular contact ball bearings INA / FAG



Spare & wear parts – FW400

no	order no	description / supplier
1	03184-20	tapered bushing NORELEM
2	SHFZ 20-30	flange bushing MISUMI
3	RS-48H10E-3C13B-CT 1AM	rotary encoder TURCK
4	LR-1/8-D-7-MICRO	pressure control valve FESTO
5	PEV-1/4-B-M12	pressure switch FESTO
6	23010-2025	spring-bar coupling NORELEM
7	TKVD 15 BS	guide rail INA / SKF
8	KWVE 15 BS	guide carriage INA / SKF
9	MPBZ 12-10	plain bearing bush MISUMI
10	CPE14-M1CH-5J-1/8	magnetic valve FESTO

no	order no	description / supplier
11	SME-8M-DS-24V-K-0.3-OE	proximity switch FESTO
12	ADN 50-15-A-P-A	pneumatic cylinder FESTO
13	ADN 40-15-I-P-A	pneumatic cylinder FESTO
14	ADVC 50-15-A-P	pneumatic cylinder FESTO
15	6006	radial bearing INA / SKF
16	3000 B-2Z TVH	angular ball bearing INA / SKF
17	3006 B-2Z TVH	angular ball bearing INA / SKF
18	3202 B-2Z TVH	angular ball bearing INA / SKF
19	FW_420_09_13	multiphase motor, configured for 4 hemming steps EngRoTec-Solutions
20	FW_420_11_13	multiphase motor, configured for 5 hemming steps EngRoTec-Solutions
21	10 AT3 / 351 GEN III	cam belt HILGER & KERN



portrait

EngRoTec Group looks back on a successful development since it was founded in 2009. With over 250 experienced employees along with corresponding investments in most modern system and software technologies, EngRoTec presents itself as a professional, flexible and reliable partner for manufacturers and integrators. In 2010, EngRoTec-Solutions GmbH started the development of hemming systems with robot guidance. Until today, the company became the leading supplier of such systems.

Our hemming systems have a modular configuration, with a minimum of maintenance and wear, and are suitable for different hemming designs. They are characterized by the combination of hemming technology and vision systems in order to meet the requirements of modern and flexible equipment.

Production parts are standardized, interchangeable and available on request. The rollers get a special coating so that materials tending to an adhesive wear can be hemmed reliable for the process with longer tool life. Our tools have been developed for the worldwide use in rough production environment. All components have been tested in long-term studies and are fixed and tested with highest care before leaving our plant.

The service portfolio includes virtual validation, methods and commissioning on site at the customer's factory.

Innovation and flexibility are part of our self-conception. As an independent system partner for robot guided hemming systems we supply most of the European automotive manufacturers as well as their suppliers in their worldwide plants.

service

Germany

Order service

- inquiries
- orders
- commercial support

EngRoTec-Solutions GmbH

Zum Wolfsgraben 5
D-36088 Hünfeld

Technical support

- technical product support
- telephone support
for commissioning
- internet hotline service

+49 6652 79 39 48 48 0

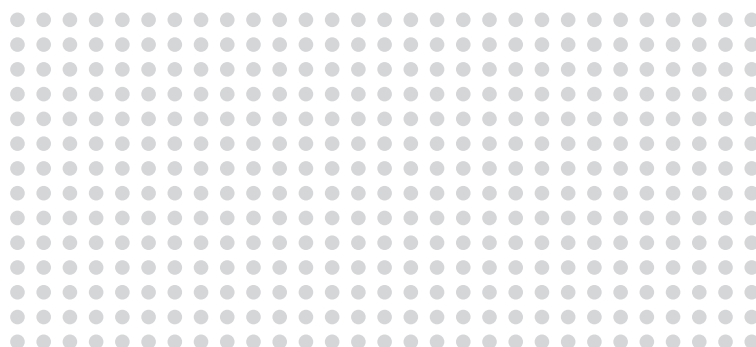
solutions@engrotec.de

International

USA, Kanada & Mexico:

EngRoTec USA Inc.

111 Smith Hines Road, Suite H
Greenville, SC 29607





interfaces & notes

Useful notes for the design of a roller hemming application

A roller hemming tool is only one part of a complex overall system. To achieve the objectives regarding production quality and stability as well as longevity and further process specifications you have to take into account further conditions also being very important.

The following listing will help you to evaluate these conditions:

- Did you evaluate the component in a positive way regarding the possibility of roller hemming?
- Are the requirements of the roller hemming assembly fulfilled regarding part location, part fixation and the repeatability of these both factors?
- Does the process planning comply with a stable and secure roller hemming process within the process time being available?
- Is the robot or the chosen drive unit suitable for the given task?

Furthermore, it is important that the roller hemming tool will be used in the way that hemming can be generated with highest quality, maximum efficiency and high product stability.

If you need help while answering these questions or general support, please do not hesitate to contact us! We will be pleased to give you support.

Use of EngRoTec-Solutions hemming systems

Hereafter, you will find the most important notes for the intended use of our roller hemming tools, the tool FW-100 for doors & flaps as example.

We kindly ask you to take these specifications into account and are pleased to give you further information.

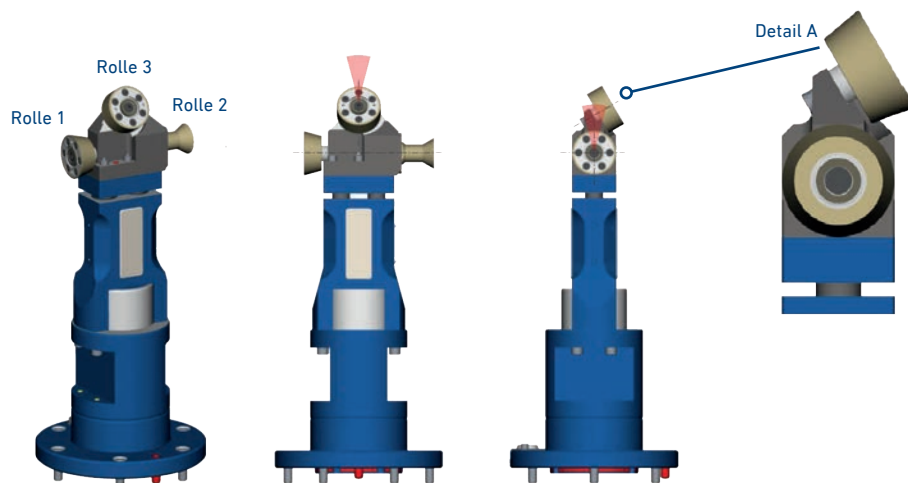
In case of special applications please contact us, we look forward to develop together suitable solutions for your tasks.

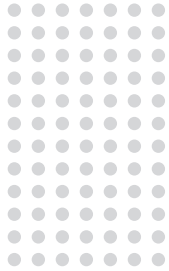
Notes for intended use of FW 100

If you correspond to the following aspects, the roller hemming tool will be used "within the intended application":

- Maximum permitted roller hemming force in loading direction = 2,000 N
- Maximum angle of load transmission, rotating around the roller rotating axis (red area) = $\pm 15^\circ$
- Maximum touching speed = 50 mm/sec at tangential starting
- No pulling operation is allowed
- No use of cone hemming roller on position 3, if the mounting direction corresponds to detail A.
- Extension of the tools basis of max. 150 mm

Please bear in mind that we cannot provide any guarantee for the hemming process or hemming tool if you don't comply to these conditions or even only partially.





Definition of interfaces between EngRoTec and customer

Interface	Scope of EngRoTec-Solutions Depending on the requirements of the production plant - until:
Mechanical	<ul style="list-style-type: none"> • connection flange of the roller hemming tool or • tool-side of tool-change-system or • robot flange at the quick-change adapter
Pneumatical	<ul style="list-style-type: none"> • tool-side of a tool-change-system or • pneumatical main supply (distribution block)
Electrical	<ul style="list-style-type: none"> • input plug of first field bus module for fieldbus and/or power supply • input plug of optical-fibre-converter for fieldbus-supply or • input plug of push-pull/M12-converter or • tool-side of a docking system
<p>Regarding line control system and process control /robot program</p>	<p>Stationary hemming task: delivering of the pure movement program of the roller hemming operation, starting from the home position till re-arriving of the home position.</p> <p>Moreover, this contains the following items:</p> <ul style="list-style-type: none"> • annotations to the necessary robot interlocks • annotations to the necessary process sequences (e.g. clamping units) • annotations to the control of the roller hemming tool <p>The following items are excluded in particular:</p> <ul style="list-style-type: none"> • any type of communication to the line or plant control system (e.g. interlocks, area scans or -releases, ready signals etc.) • any signals for actuating the fixture • any tasks which are part of the part handling or the tool changing • any down-hold movements, if included <p>Dynamic hemming process: delivering of the movement program, starting from the pick-up of the production part until its deposit after the hemming process; beginning from the home-position till re-arriving of the home-position.</p> <p>Moreover, this contains the following items:</p> <ul style="list-style-type: none"> • annotations to the necessary robot interlocks • annotations to the necessary process sequences (e.g. clamping units) • annotations to the control of the roller hemming tool <p>The following items are excluded in particular: any type of communication to the line or plant control system (e.g. interlocks, area scans or -releases, ready signals etc.)</p> <ul style="list-style-type: none"> • any signals for actuating the gripper • any tasks which are part of further processes (e.g. respot welding in the gripper) or the tool changing

Annotations to the interfaces to each fieldbus-system

Interface	Regarding the hemming tools FW2xx and FW400
Field bus connection (if necessary)	<p>The following field bus systems can be connected by default:</p> <ul style="list-style-type: none"> • Profibus DP • ProfiNet (Cu) • ProfiNet (LWL) • Ethernet/IP • DeviceNet <p>The following fieldbus systems can be connected on request/ against surcharge</p> <ul style="list-style-type: none"> • Interbus (Cu) • Interbus (LWL 500 kBaud) <p>The following fieldbus systems cannot be connected if the hemming tools needs an analogue value processing (model series FW2xx):</p> <ul style="list-style-type: none"> • Interbus (LWL 2MBaud)

General annotations to the use of the roller hemming tools

Roller hemming process	
Cycle time	<ul style="list-style-type: none"> • EngRoTec will only accept the responsibility for the compliance with the given cycle time if EngRoTec is also permitted to influence the planning process or is responsible for this process respectively. • Further, EngRoTec will accept the responsibility for the compliance with the given cycle time, if EngRoTec has agreed expressly to the process specifications beforehand. • EngRoTec reserves the right to refuse this responsibility during the project in individual, constituted cases.
Quality	<ul style="list-style-type: none"> • EngRoTec will only accept the responsibility for the compliance with the predetermined hemming quality, if EngRoTec is also permitted to influence the planning process or is responsible for this process respectively. • Further, EngRoTec will accept the responsibility for the compliance with the predetermined hemming quality, if EngRoTec has agreed expressly to the process specifications beforehand. • EngRoTec reserves the right to refuse this responsibility during the project in individual, constituted cases.

The following services are part of the purchase order of a roller hemming tool:

- Definition of the required hemming rollers (shape) depending on the production part.
- Definition of the interfaces in the production cell/line (connection to the robot hand as standard).
- Definition and clearance of the integration of the roller hemming tool regarding process control system

Further consultancy services can be ordered against defined hourly rates and work performance records.