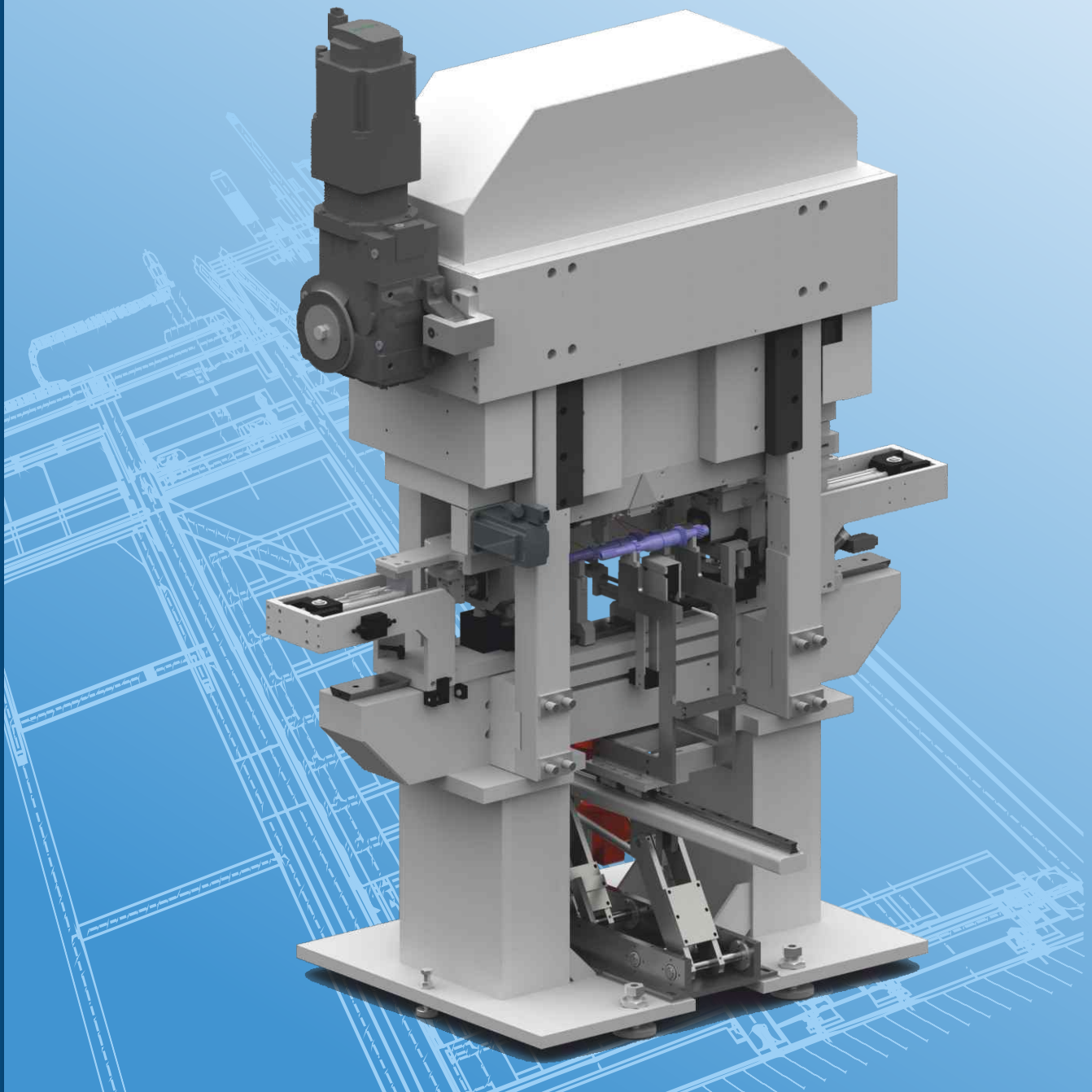




# **Straightening Presses Single-purpose Machines Automation**



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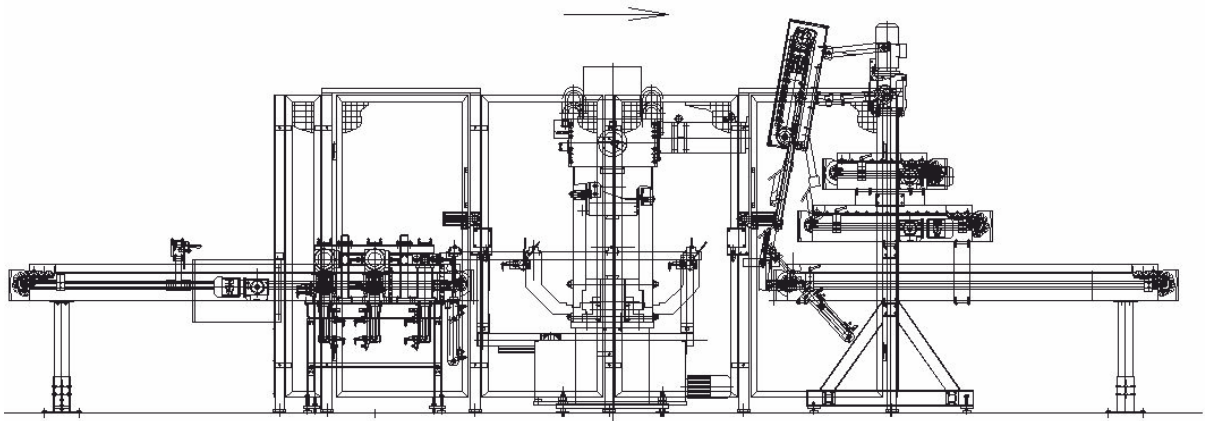
These are machines with an electromechanical drive. The straightening stroke is controlled by the rotation of the pairs of cams which are mounted on a common shaft in the upper part of the machine. This solution provides sufficient space for peripheral equipment and for the replacement of worn-out straightening tools.

The straightening machines come in two basic series, up to 100 kN and up to 300 kN of the bending force. Based on the customer requirements we are capable of delivering the straightening machines with electromechanical drive up to a force of 1,000 kN.

The straightening machine allows:

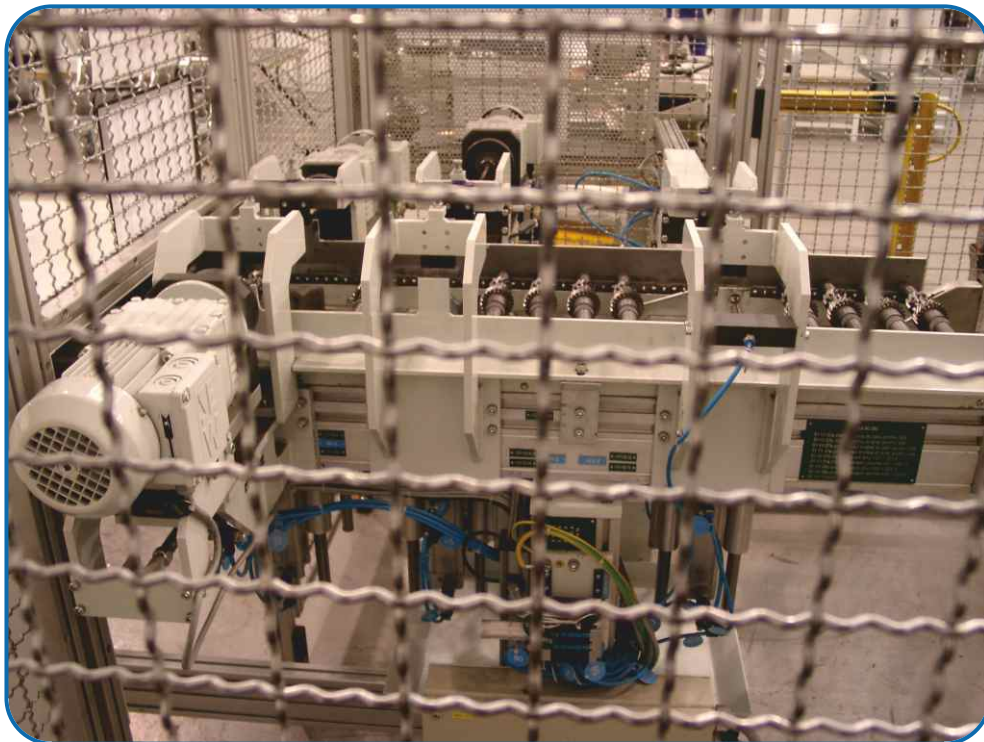
1. Optimisation of the straightening process based on customer requirements.
2. Automatic calculation of the straightening stroke with a learning algorithm that optimises the calculated strokes based on the straightening results of previous parts.
3. Optimisation of the direction and magnitude of the straightening force such that the cracking of straightened parts is eliminated.
4. Use of Fast Fourier Transform FFT, which eliminates the measurement errors that are caused by unevenness.
5. Remote diagnostics, setting the straightening parameters and all technical support via the Internet.
6. Assessment of the straightening process using statistic functions.
7. Detection of cracks during the straightening.





Straightening machine for the components of the gearbox - technical layout

The enclosed images depict the straightening line which was delivered to ŠKODA AUTO. The line is intended for straightening the drive and the drive shaft of the power transmission. The line consists of the straightening machine, the input and output conveyor, the gripper, the cleaning system and the sorting unit that sorts out the parts in aligned, unaligned and cracked parts. Five of these straightening lines were delivered to ŠKODA AUTO within a span of 10 years. The last two straightening lines were already equipped with non-contact laser measurement that allows to measure smooth diameters, teeth and folds. Some major advantages of the laser measurement include minimal operating costs and the possibility of automated retrofitting to another type of the straightened part.



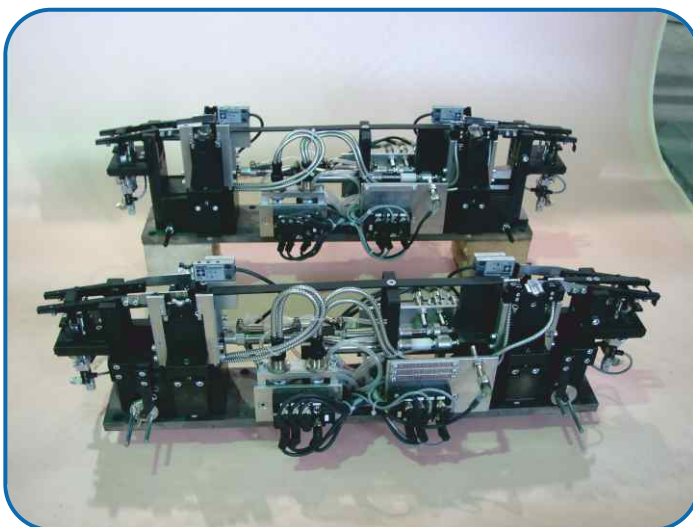
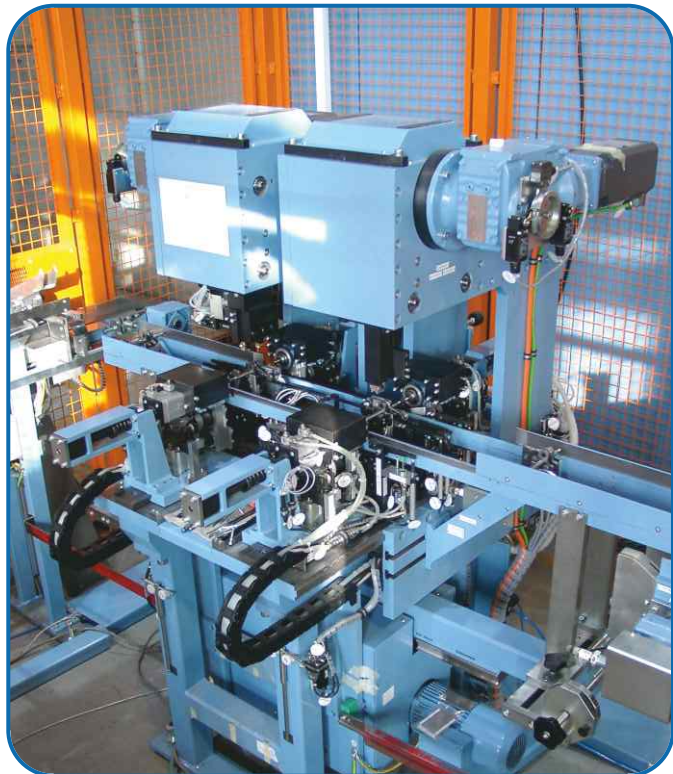




For straightening the crankshafts of power saws, a special straightening machine which is assembled from two straightening lines was developed.

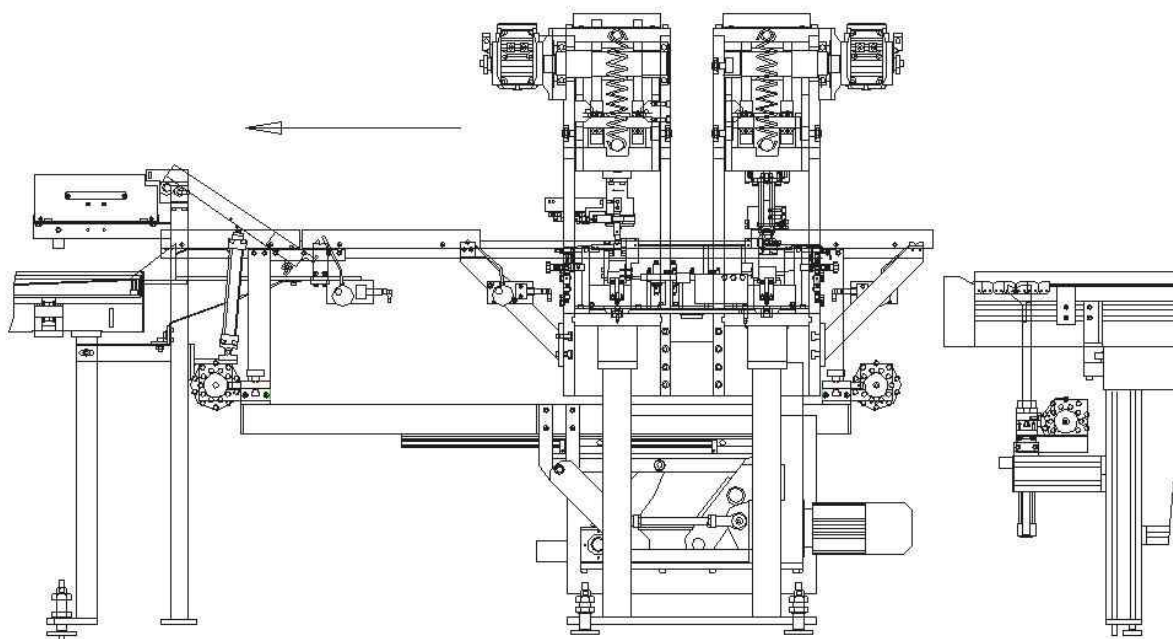
The first unit is used for angular alignment of the two flywheels of the crankshaft and the axle of the crank pin. The second unit is intended for straightening the bend of the crankshaft. The special design of the plunger allows the straightening of both pins of the crankshaft symmetrically or each pin individually.

The whole line consists of the input conveyor, gripper, the straightening machine with two units, sorting unit and the round output container. The straightening line is designed such that it allows easy retrofitting to 20 different types of crankshafts.



Exchange straightening units for different types of crankshafts

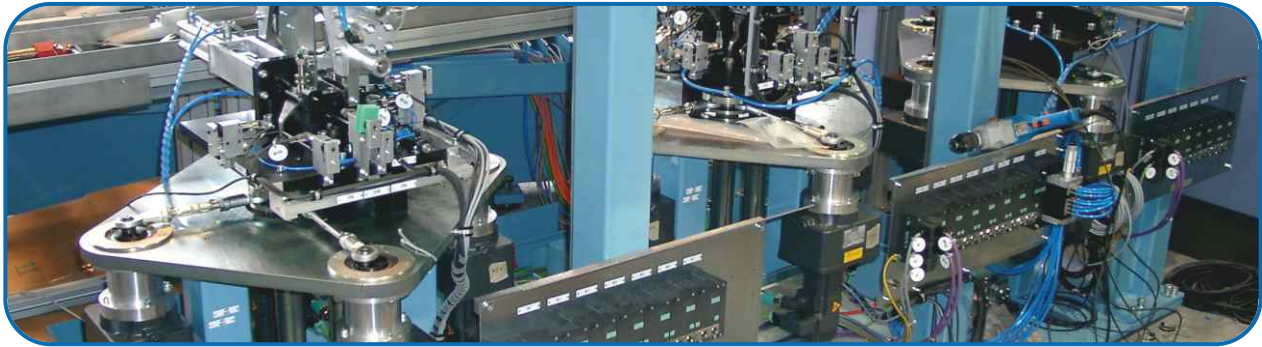




Straightening machine for crankshafts - technical layout



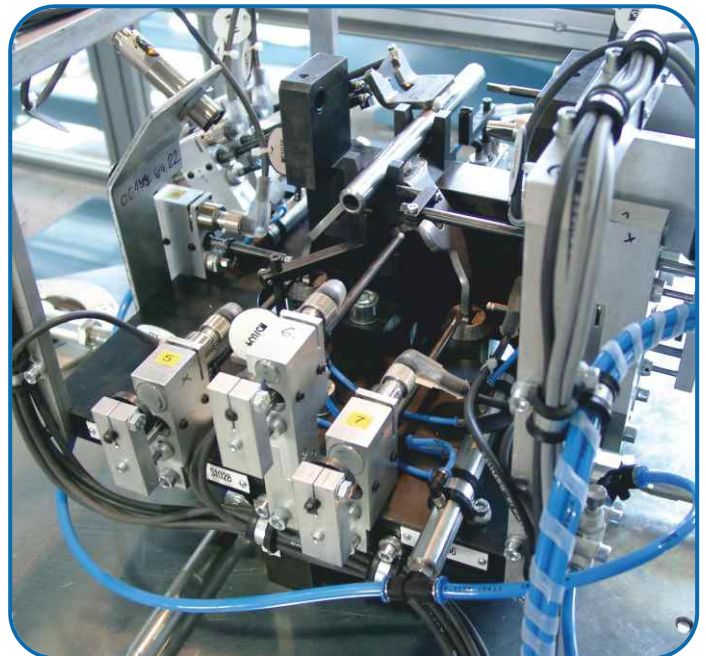
Individual types of checked crankshafts to be aligned later



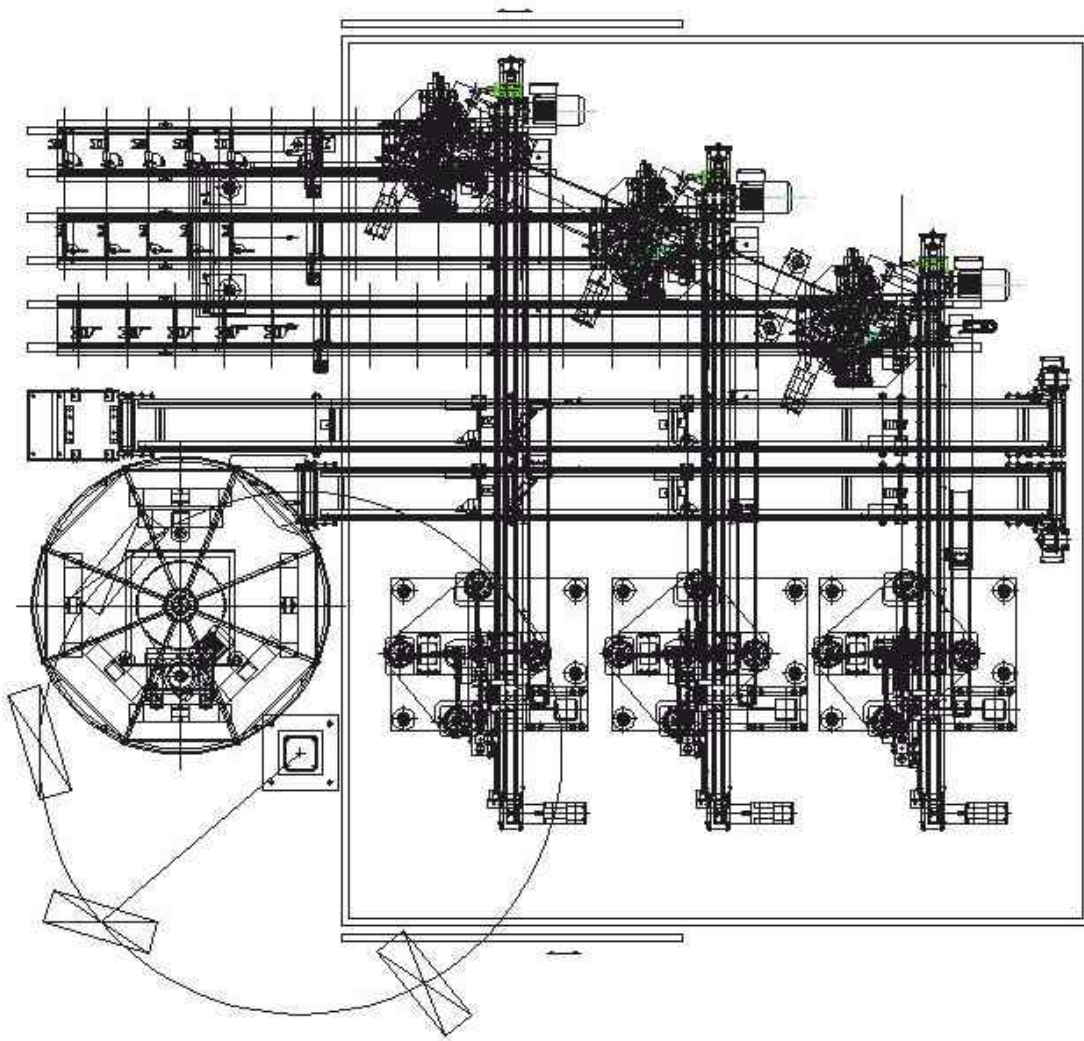
For straightening of shift-forks in the MQ-350 gearboxes for VW, a special straightening line which is used to straighten three different types of shift-forks was developed.

The straightening line consists of a total of six straightening units. A straightening unit is intended for each part for straightening the shift-forks and a second straightening unit for straightening the fork blades.

The parts are transported to the straightening units using input conveyors, from where they are removed along with the reloader after straightening the shaft and transported for straightening the forks. After the completion of the straightening process, the parts are transported to the output bin to be taken out by the operator.

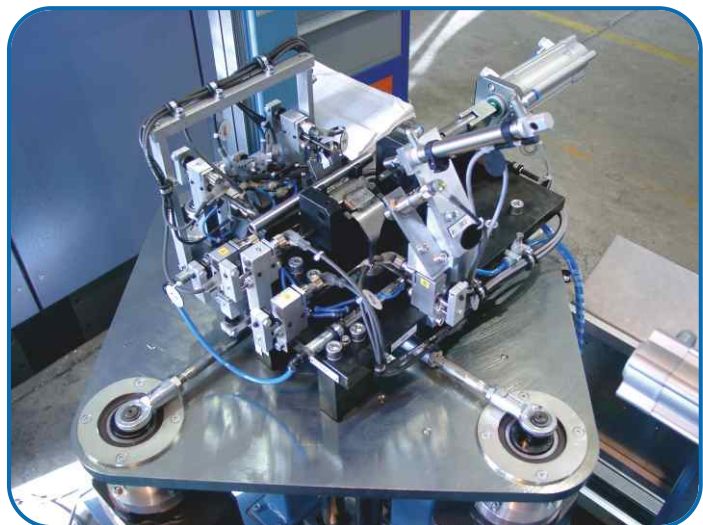






Fully automated line for straightening three types of shift-forks - technical layout

The forks are straightened with two straightening rams. Each straightening ram is driven by two servo motors. 12 sensors are used for measuring, 4 of which to measure the forks themselves and 8 as a reference.



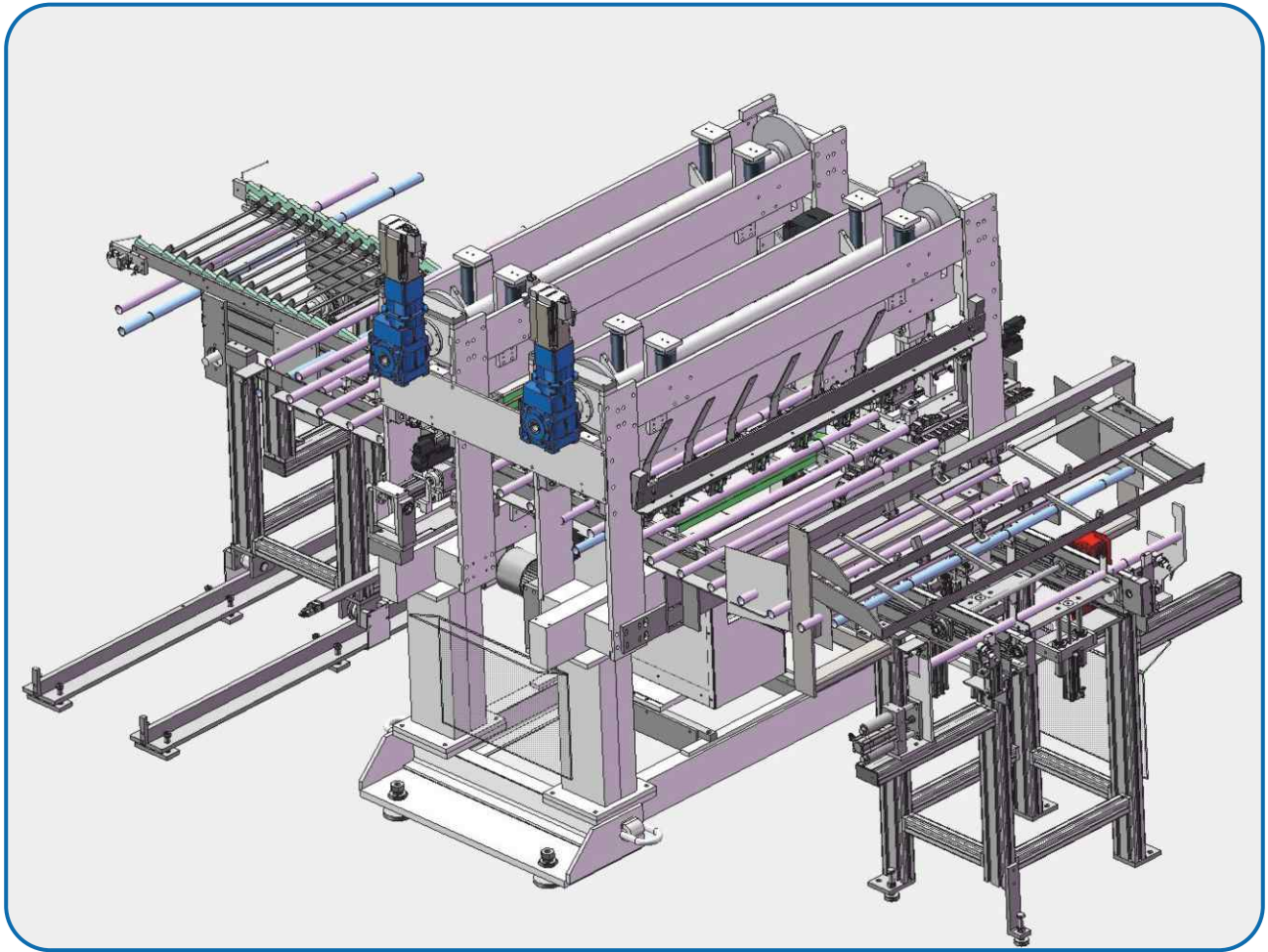


This automatic straightening line is intended for straightening tubes which are an integral part of the bodywork of cars. It consists of the input conveyor, gripper, two straightening units and the output conveyor with the sorting station. The whole system is integrated in the tube manufacturing line.

The requirement for the cycle time of 5 seconds has required two identical and serial straightening units. Both the whole production line as well as the two straightening units can be fully automatically adjusted according to the part type. The fully automated adjustment of the straightening units has been possible mainly due to the use of laser triangulation sensors for measuring the run-out.

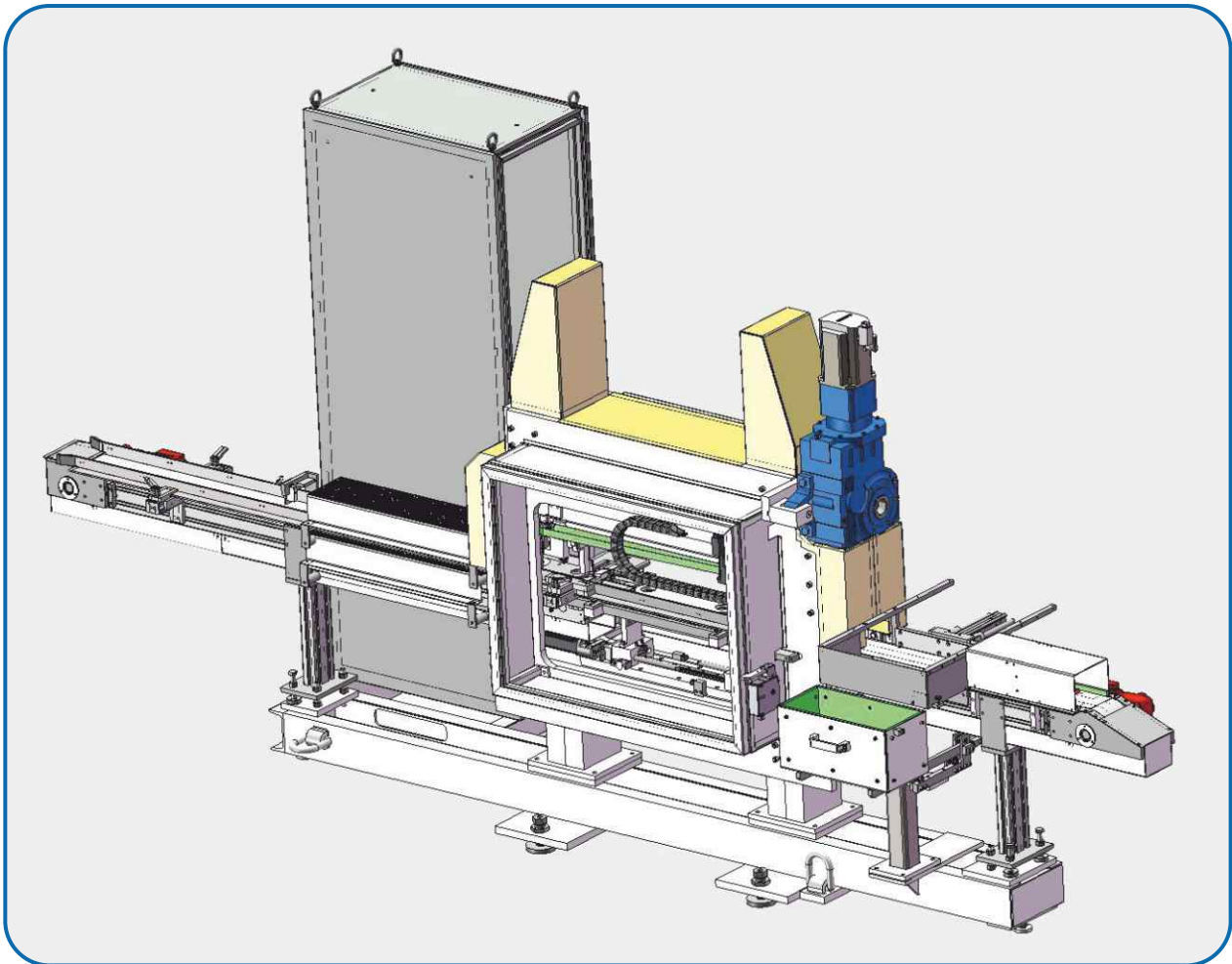






Straightening line for tubes - technical layout

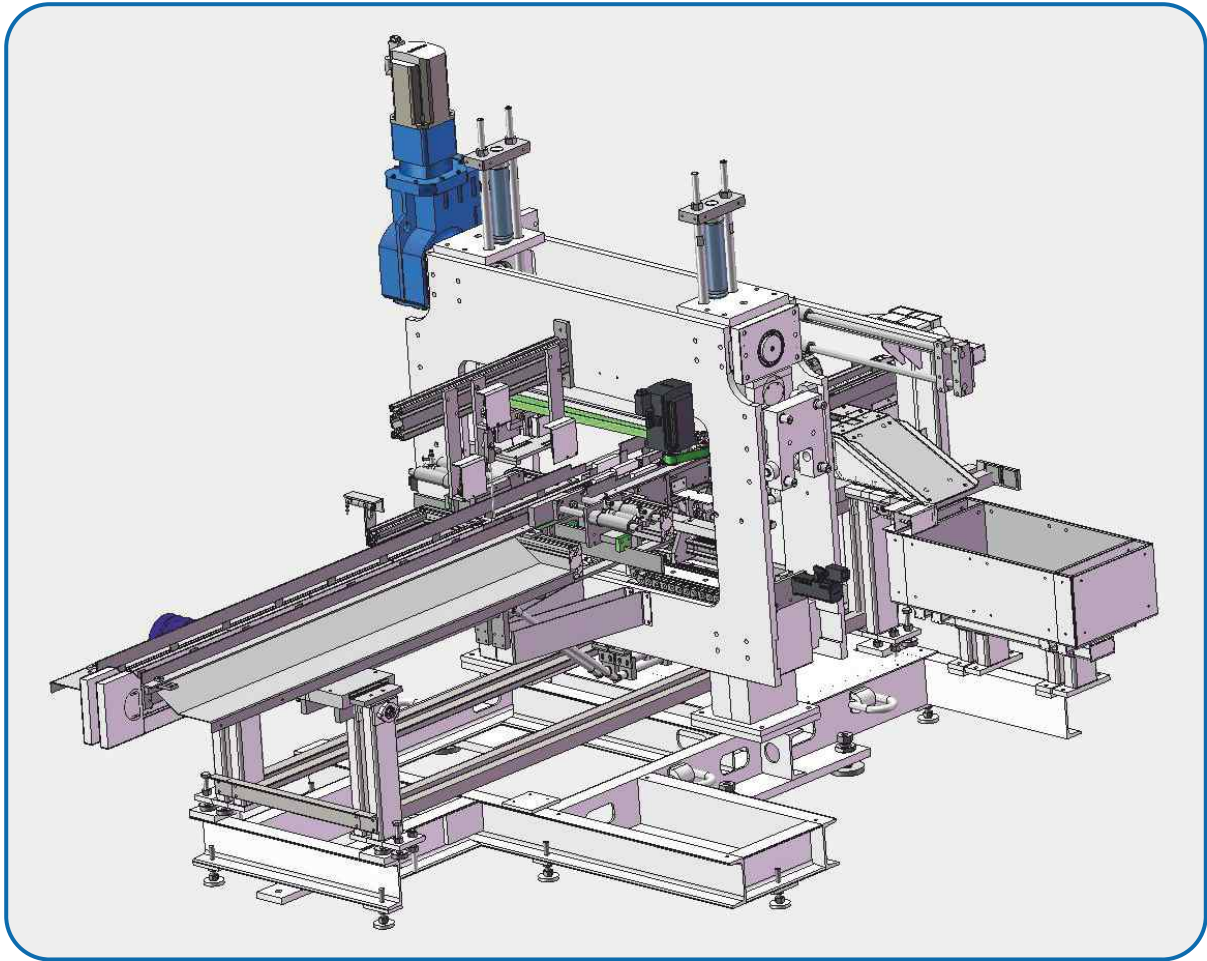




These automatic straightening lines are used for straightening chain links. Each link is measured with two laser sensors and then the link is straightened by means of two mobile rams and two mobile supports. The parts that cannot be straightened are automatically rejected.







The machine can easily be retrofitted to different sizes and shapes of the chain links.

Parameters of the straightened chain links:



Length: 180 - 600 mm

Width: 30 - 120 mm

Thickness: 4 - 13 mm





## Vertical Workpiece Storage

Timed step-wise chain storage, a decoupling module for compensating fluctuations in production and overproduction. In the field of storage technology and storage systems KBH offers workpiece storage systems in various designs and dimensions.



## Storage Bunkers for Shafts

The KBH storage bunkers are used for storage and sorting of shafts and pipes.

The spatial separation of the machining unit and the workpiece storage enables simultaneous loading of the workpiece storage during machining.

Using a chain conveyor system, the workpieces are transported one after another upwardly to the processing area.



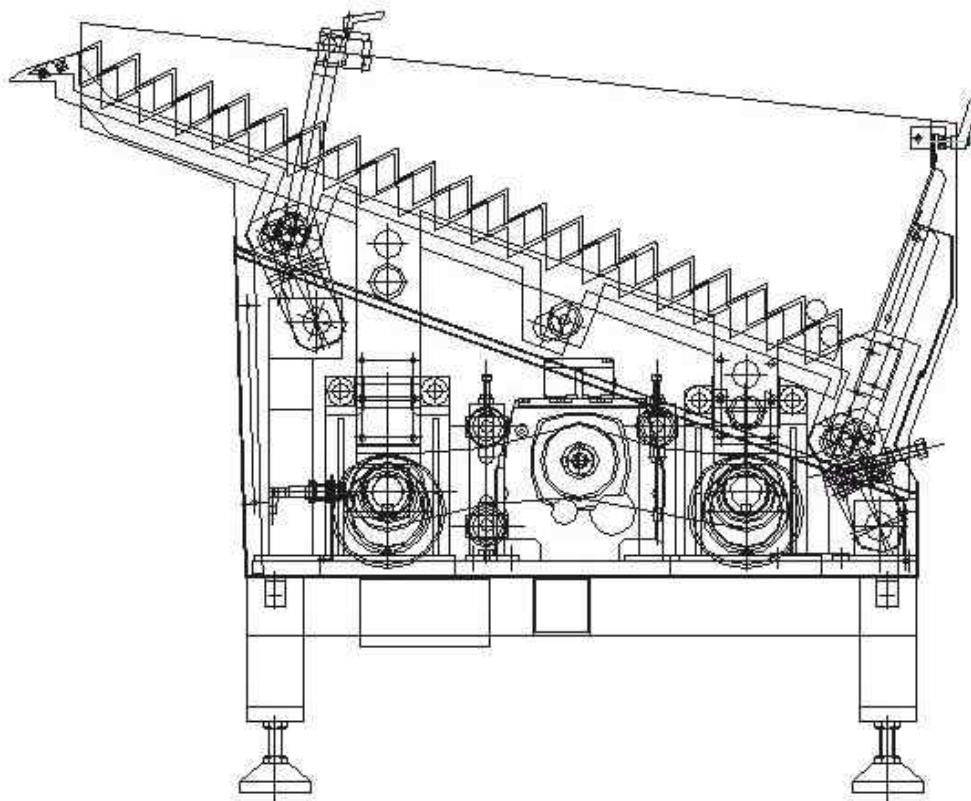


## Feeding Magazine for Shafts

The feeding magazine is used for loading rotary components, pipes and shafts of various lengths and diameters.

The parts are gradually fed by the feeding magazine into the next production process. The transfer of workpieces takes place at specific intervals.

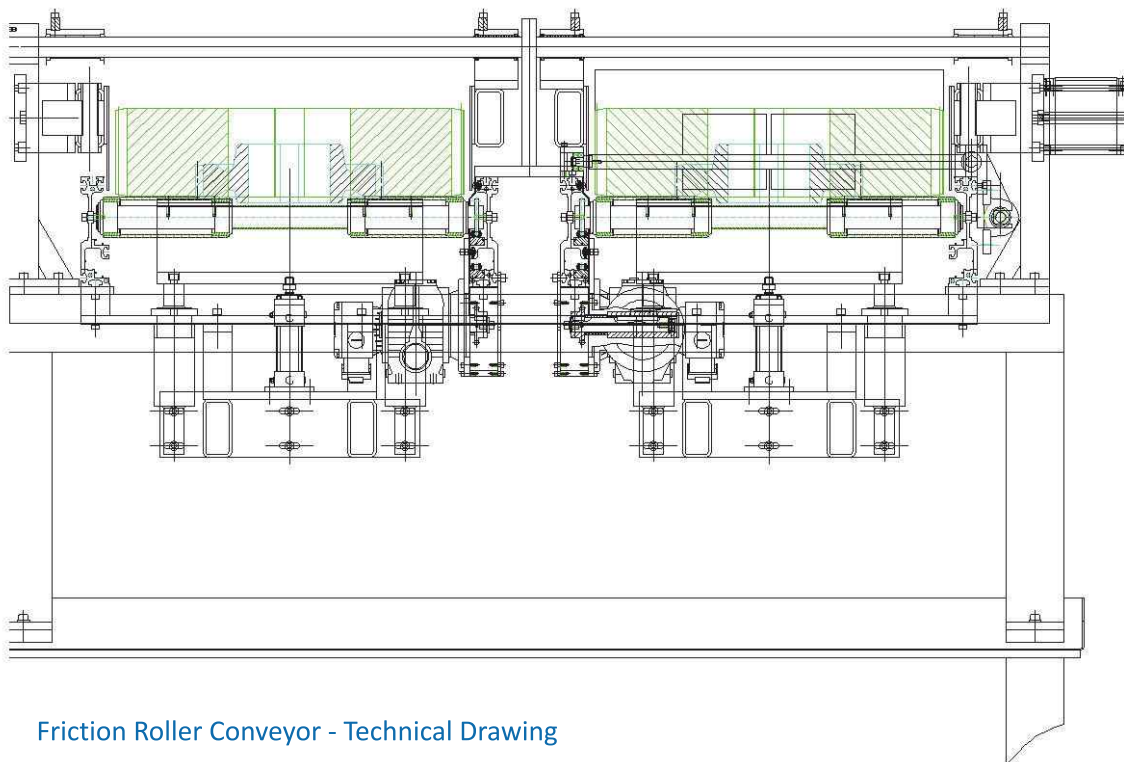
Advantages of this equipment are the space-saving design and economical production.



Feed Stack - Technical Drawing

## Friction Roller Conveyor

Universal transport system for a variety of linking tasks. For the accumulating transport of workpieces with a smooth and flat base as well as for heavy containers or boxes with or without pallets.



Friction Roller Conveyor - Technical Drawing

## Slippage-free Roller Conveyor

Transport system for linking machining equipment. For the transport of workpieces with an even base without a workpiece carrier and low dynamic pressure.







## Flat Chain Conveyor

Transport system with curvilinear run. Transport of light and moderately heavy workpieces that can be transported without a pallet.

The flat chain conveyor is used as a transport system for processed and unprocessed workpieces. The workpiece is transported directly to the chain.

By using a hardened flat chain, blanks with cast or forged surfaces can also be transported like workpieces with a smooth base.

Before transfer to the next processing point, the workpieces can be transferred one by one to the next production process.

## Toothed Chain Conveyor

Transport system for extreme cases of application. For linking machine tools for transporting workpieces from blank to finished products.

The conveyor belt is to be used in areas of production with high incidence of chips, dry-processing and blanks with cast or forged surfaces.

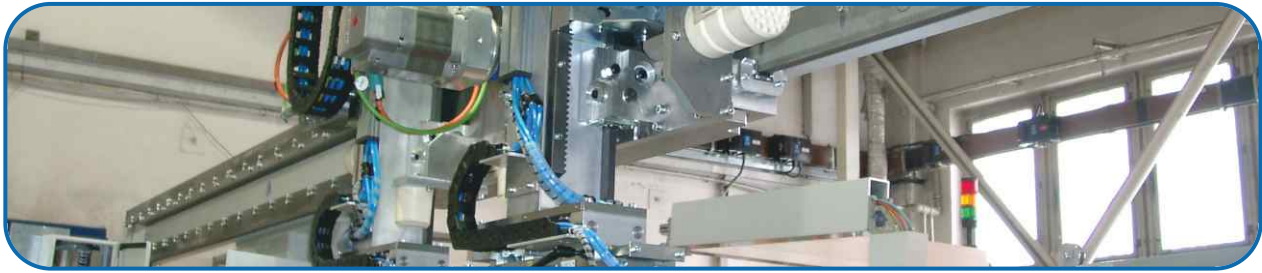


## Towing Frame Conveyor

The KBH towing frame conveyor is offered as both light and heavy-duty versions. It is a transport system with an open drag frame for the transport of different workpieces.

It allows transport of both rotationally symmetric parts as well as almost any other form of workpiece with the help of preformed holders. Thanks to a NC drive, the accuracy of positioning

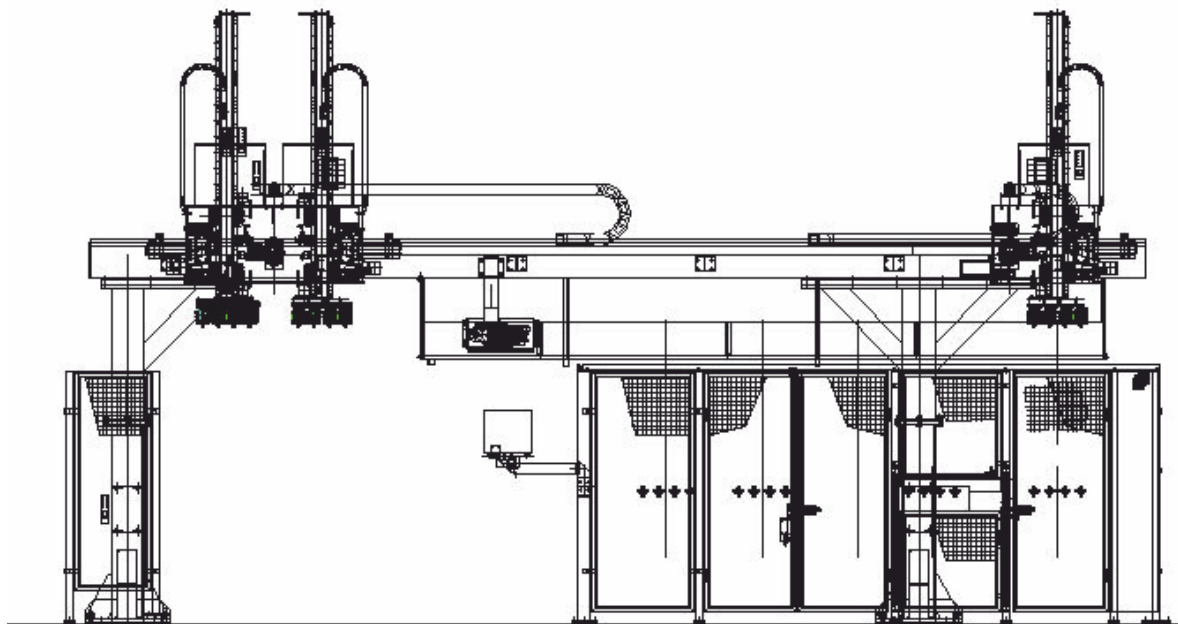
the workpiece is approximately 0.3 mm. The workpiece is transported by means of a chain with hollow pins, in which the drag frames are suspended. The drag frames are mounted manually in most cases.



Handling system for machine tools in linking of production lines and automation of units.

The KBH - NC – linear reloaders are characterised with stability and robustness. The 2010 series is used for workpieces such as steering gears or transmission shafts with a weight of up to 10 kg.

The 2050 series is used for much heavier workpieces, such as car crankshafts up to 30 kg or truck engine parts.



Linear Reloader - Technical Drawing





With a reinforced special design even the heaviest workpieces with weights up to 250 kg are transferred to the machine tool and unloaded after the machining process. The configuration options include single carriage, H-loaders with two vertical axes, double grippers with swivel head, upper transfer with the coupled carriage and fitted with several independently driven carriages.

The machine is characterised with a simple low-maintenance design, high dynamics, shortest workpiece change times and high stability during continuous use.

The field of application of the machine is broad-ranging - workpiece handling, loading and unloading of machines, connecting chain-linked sections, stacking and retrieval of workpieces.





## Single-purpose milling machine for CNC machining of the reciprocating rollers

The CNC milling machine with five axes is designed for HPC milling and for the production and refurbishment of reciprocating rollers for forging of seamless tubes with an approximate weight of up to 3,000 kg. CAD, CAM data processing on the machine, including their archiving. It comprises of a scanning system with a programme for evaluating the wear and determining the shape of the forging saddle. The ideal form of the rotational saddle, high processing performance and good quality of the surface, rigid construction and the stand filled with polymer concrete. The system offers new options in the design and manufacture of rotating saddles for maximum output.







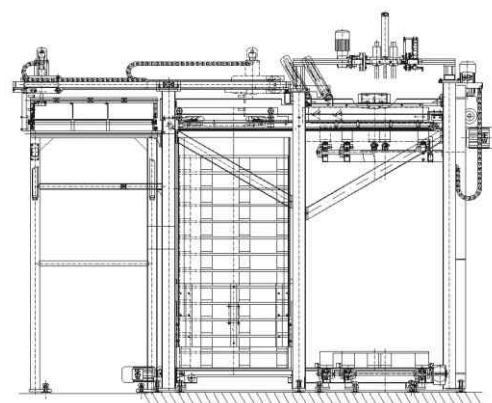
## Food Industry

The food industry is also an interesting growth market for KBH.

In this industry, small packaging units must be transported in a safe and target-specific manner, so that they can be palletised undamaged to a whole unit at the end of the process. Processing of the packaging units also requires a well-thought logistics concept.

Even in this case, KBH is the partner who can share its experience in automation from the past years with these customers.

In a dairy manufacturing plant KBH is able to completely plan, design and implement transportation and palletising of yoghurt products using a modern fully automatic palletiser.



Fully automatic palletiser - Technical Drawing

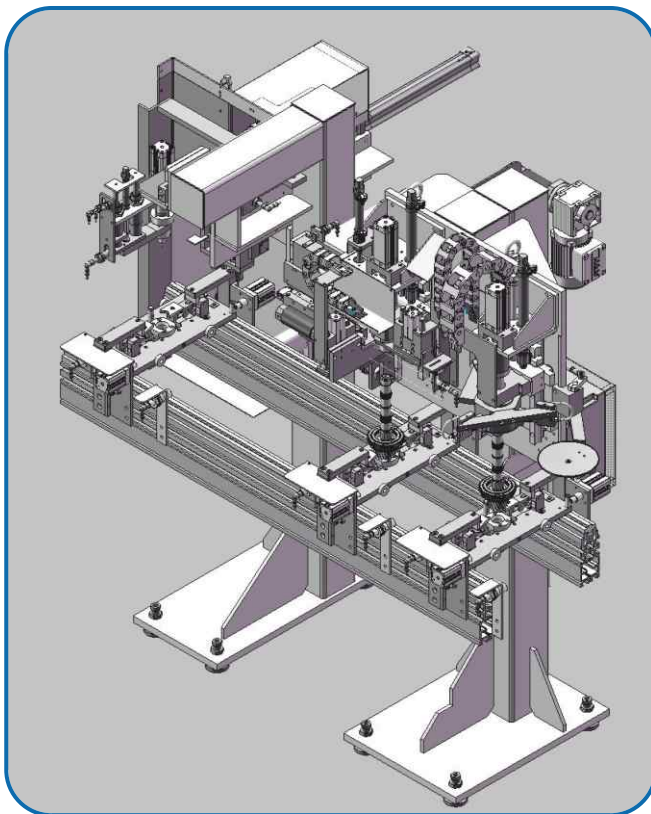
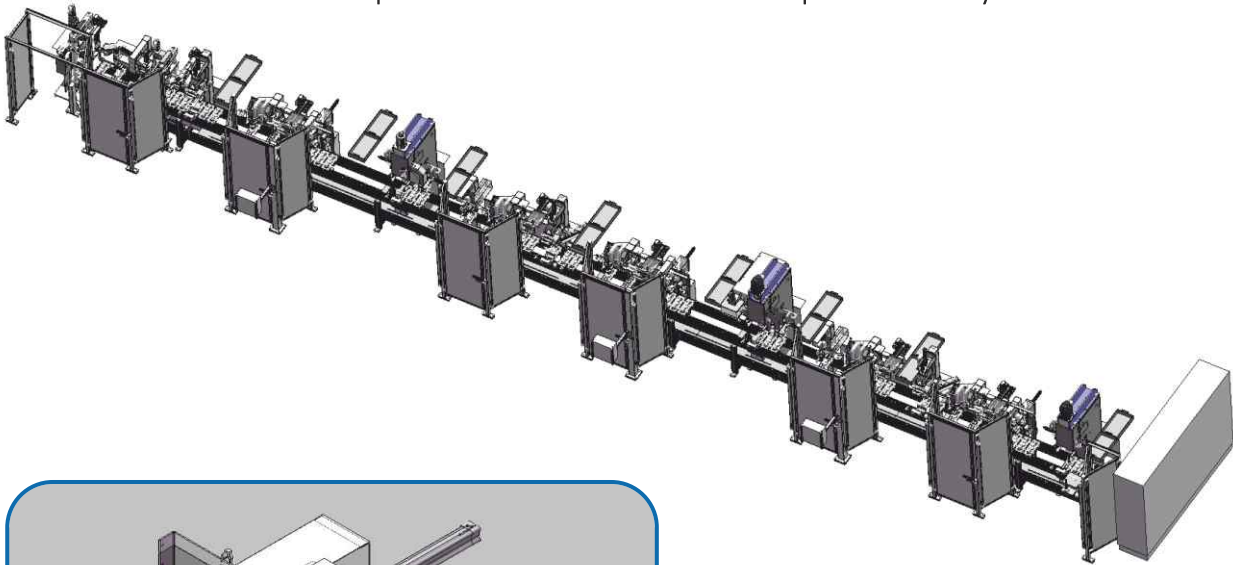


## Automatic Assembly Machine - Assembly of Stabilizers for Mercedes

Automatic single-purpose assembly machine which is designed precisely according to the specific requirements of customers. This machine can be easily calibrated to process differently shaped batches of the blank. The machine performs complete installation of the stabilizer, including the testing of measuring and sorting of the processed parts.

## Automated manufacturing assembly line

The line for the pinion pre-assembly Škoda Auto is used to construct the pinion of the MQ-100 gearbox. The pinion assembly consists of 33 parts. The line consists of 18 fully automated units and 7 semi-automatic assembly units. The presence of all components is controlled throughout the assembly process in order to ensure the entire pinion assembly.



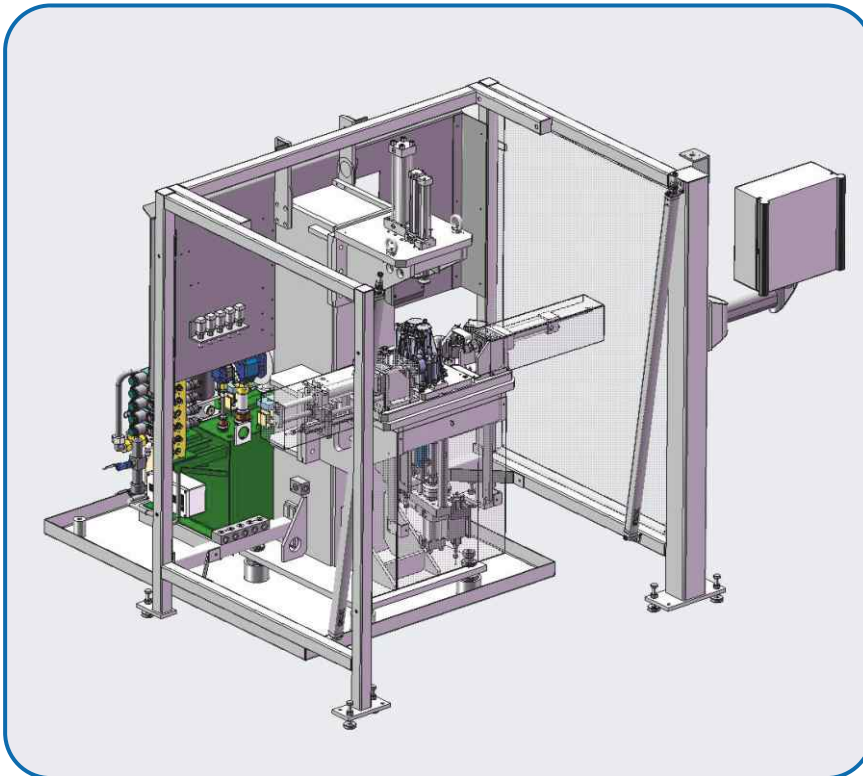
## Assembly Unit A11-13

These three independent fully automated assembly units are used to attach the retaining ring and the bearing cage as well as to lubricate the bearing cage.

The operator only refills the retaining rings and bearing cages in the container from the rear side of the line.







## Assembly machine

For the pre-assembly of the gearbox for Škoda Auto, a machine that presses three bearings, a housing and a shaft into the gearbox in automatic mode was developed.

The run of the pressing force is monitored for ensuring the required quality.

## Assembly machine

For the pre-assembly of the drive shaft for Škoda Auto, a machine that presses two bearings and three gears onto the drive shaft in the automatic mode and performs the assembly of the three lock washers was developed.

The gears are pre-heated with the induction heating before pressing, if required.

The run of the pressing force is monitored for ensuring the required quality.

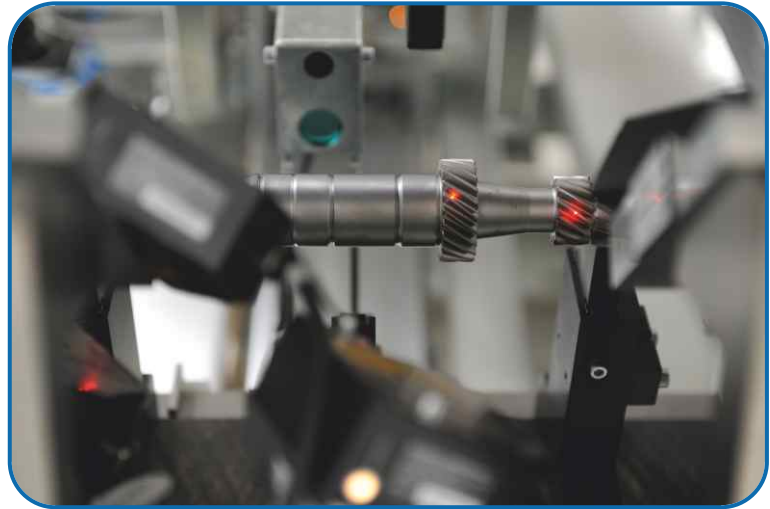


## Non-contact laser measurement of the gearing impact

For measuring the gearing impact and the grooving of shafts during straightening, a new type of non-contact measurement using precise laser triangulation sensors was developed by KBH.

Contrary to contact measurement this new method considerably reduces the operating expenses, as it does not lead to wear and tear of the measurement wheels.

This measurement method also offers completely new options for small-scale manufacturing because it allows very quick and easy automatic retrofitting of a machine.





## Solar Technology

Solar technology will be one of the fastest growing industries in the coming years. Sensitive photovoltaic modules, solar cells and solar panels can be successfully transported only using specialised technologies.

Constant operating speed is crucial while mounting the individual modules. KBH also has a future perspective in the field of renewable energies and already offers concepts and ideas for an economically viable transportation system for solar panels. It keeps an intelligent transportation solution ready for clean and safe logistics in the production of solar technology products.



## Automation in the Automotive Industry

As the automotive industry faces severe competition and pressure to succeed, only impeccable quality, due compliance of specified development cycles and delivery according to the "Just in Time" principle guarantee success in the global market. KBH has been meeting the high demands of the automotive industry and developing and producing customised solutions for the flow of materials in the area of chaining of manufacturing processes and transportation systems for many years now.



KBH orients itself towards new technologies and processing of materials for the future even today and develops clear and economically feasible concepts for the upcoming market. The automotive industry expects its suppliers to provide concepts for a zero-defect strategy.

In addition to these effects, automation in the automotive industry brings a faster and more efficient production. Human errors are also reduced significantly because of the use of less manual labour. Several quality assurance measures can be integrated in the automated processes. Highest standards are set even for the selection of suppliers of special machines and chaining techniques. With its qualified staff KBH has already recognised the way to reach the target and has adapted to the new demands of the automotive industry in the field of automation.





## KBH competence in design and manufacturing sector:

- Straightening machines - shafts
- Straightening machines - crankshafts
- Straightening machines - shift-forks
- Straightening machines - tubes
- Straightening machines - chain links
- Workpiece storage
- Transport systems
- Gantry equipment
- Special milling and single-purpose machines
- Automatic assembly machines

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