ALFING

ALFING KESSLER SONDERMASCHINEN

AM Manufacturing Module

Perfection in the high performance connecting rod machining segment

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ALFING – Machine building in perfection since 1938

Karl Kessler (1880 – 1946)

Alfing headquarters

Founded in 1938 the Alfing Kessler Sondermaschinen GmbH stands for more than 75 years of experience in developing, designing and manufacturing transfer lines, dial machines, machining centers and fracture splitting systems. We develop customized solutions for any machining process – if it is a single machine or a high-efficient manufacturing line. Particularly in the field of connecting rod machining Alfing is one of the leading engineering companies: Every second connecting rod worldwide is manufactured on an Alfing machine. All big automotive manufacturers as well as the supplier industries belong to our customers.
With our subsidiaries, Alfing Corporation in North America and Alfing Machine Tools in China, as well as numerous distributors we are globally present and always close to our customers to react promptly.

The Alfing group consists of Alfing Kessler Sondermaschinen GmbH, Alfing Montagetechnik GmbH as well as the subsidiaries in the USA and China and is managed as a holding with 500 employees all over the world.

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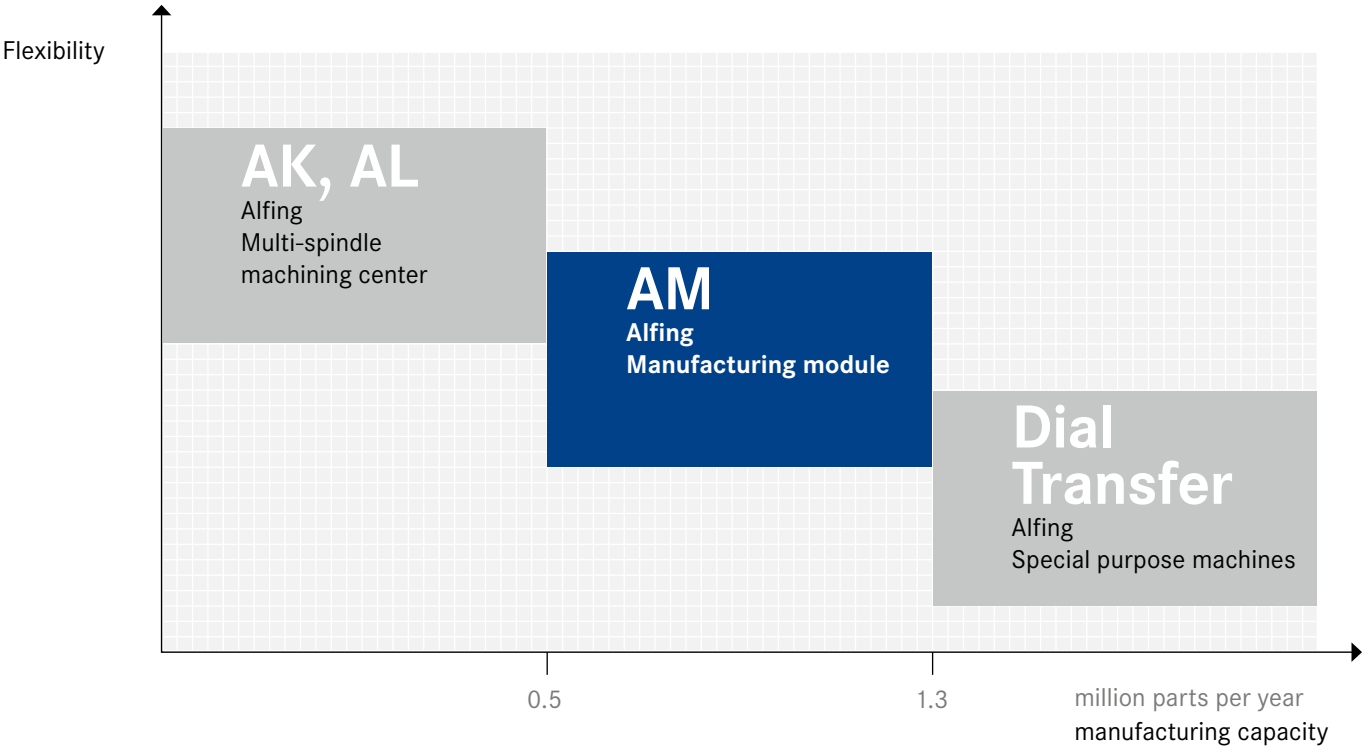
Transfer lines
Machining centers
Fracture splitting systems

AM manufacturing module – the perfect solution for 500,000 up to 1.3 million connecting rods per year

With an impressive manufacturing capacity and flexibility, the AM offers the best results and conditions for the machining of connecting rods. This is why the manufacturing module is an essential factor of success for a production segment from 500,000 to 1,300,000 connecting rods per year.

Product line expansion and factor of success with the AM in the higher volume segment

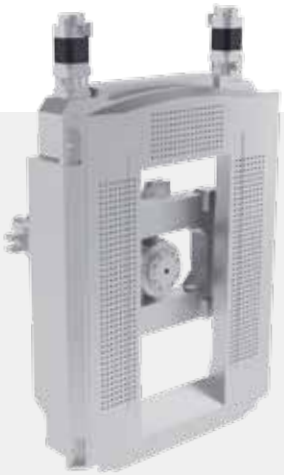


AM – a successful concept in its 5th generation

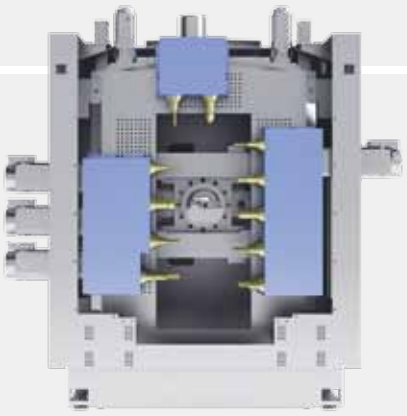
The AM is the result of a co-operation with the German machine manufacturer ELHA. The basis is an established base machine of which today more than 300 are installed. With many years of expertise, ALFING adapted and further developed this machine type especially for the machining of connecting rods. Therefore, the AM manufacturing module offers sophisticated technology for all purposes.

Structure/design features

The core of the machine has a solid and closed frame made of cast iron with strengthening rib structure. The vertically arranged frame separates the machine components from the machining area.



The front side of the frame serves as mounting for the project specific equipment like clamping fixtures and spindle units and represents the machining area.



The rear side of the frame provides the mounting for the 4-axes sliding unit (X-, Y-, Z- and C-axis) and is the machine component area.

1997
Type 1001

First ELHA FM3 was introduced at the EMO show

1999
Type 1002

2nd generation of the machines with extended cross stroke

2000
Type 1003

Used for steel machining and enhancing of linear guides

2004
Type 1004

Strengthening of structural parts

2009
Type 1005

Joint hydrostatic guiding of C- and Z-axis.
5 times higher stiffness and higher dampening at the same time

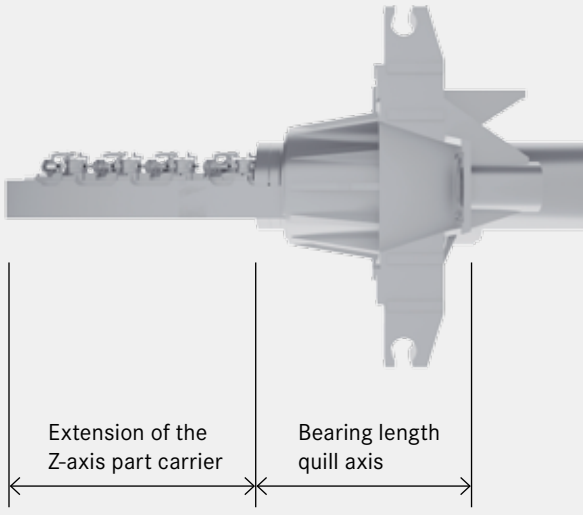
2013

More than 300 machines installed

The unique features of the AM

Hydrostatic round quill
The core piece of the AM is its hydrostatic round quill. It is characterized by its high rigidity and combines the feed motion in the Z-axis with the rotatory motion in the C-axis. Compared to the former parallel linear guides, which are subject to wear, the quill has the advantage of being wear free and does not lose the setup. The oil film of the hydrostatic quill guiding results in high dampening of the process and separates part vibrations of the machine.

The cantilever concept
Short force distance as well as short levers secure high rigidity. Machining is mainly performed with retracted quill. Therefore, the extension of the Z-axis equals the bearing length of the quill axis.



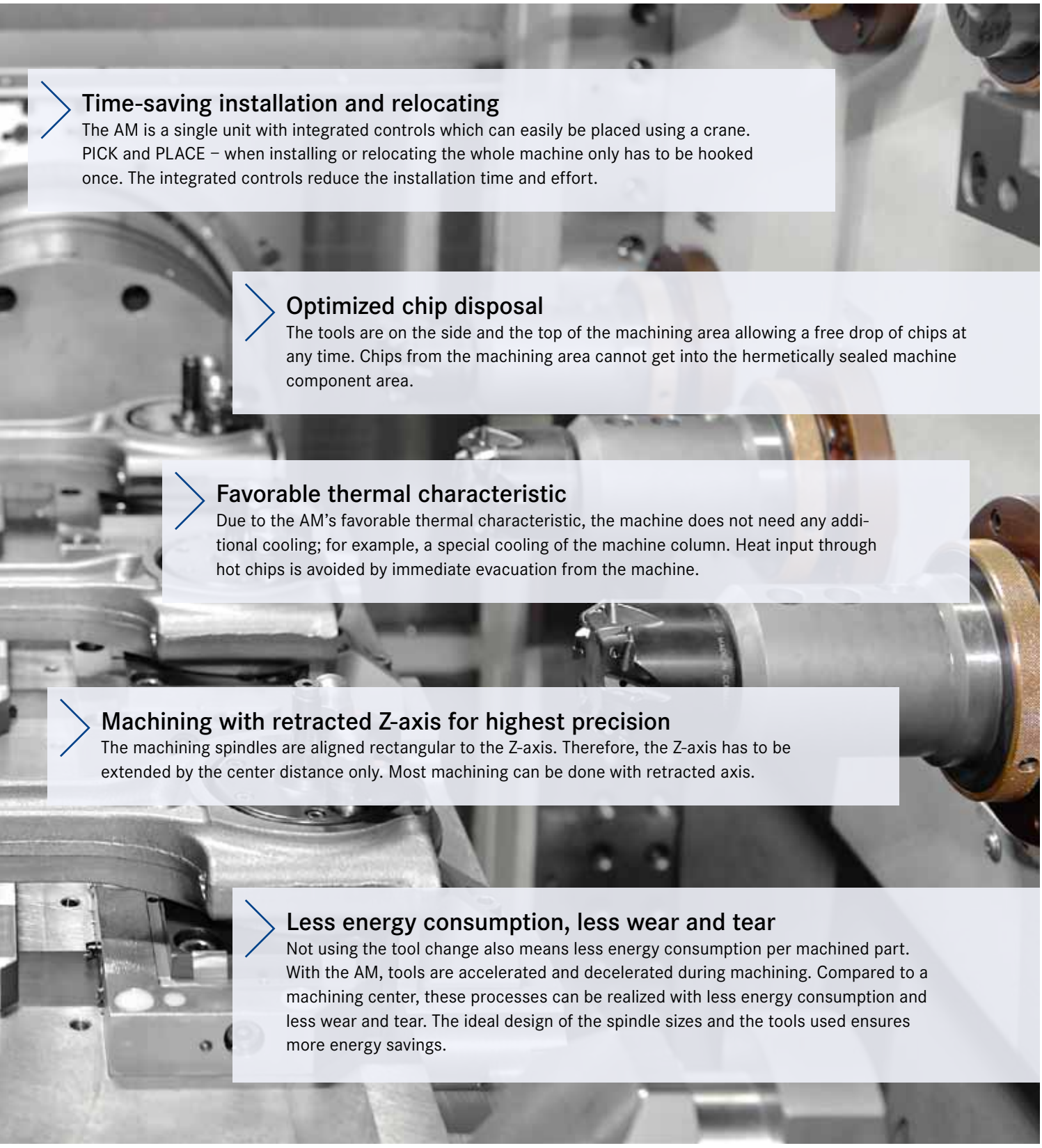
Factors of success of the AM manufacturing module

Maximum efficiency
The fast switchover between the different steps of machining as well as fast acceleration and high feed rates are the basis for an excellent production output.

Flexibility
You are planning to change your production to a different connecting rod type? AM provides you the necessary flexibility. A new fixture and new tools are often sufficient to change over to a different connecting rod type. Alfing's comprehensive process know-how will help you! Even replacing or adding a spindle is easily possible.

Safe access and good overview
The machining area of the AM is easily accessible by a door at the front side. Tools and parts are safely accessible without having to enter the dangerous area between tools and part fixture. During machining the glass door makes the machining process easily visible.

Reduction of footprint compared to competitors' machines
Despite its easy accessibility and the comprehensive machining possibilities, the AM only needs a footprint of 10.7 sqm.



Time-saving installation and relocating

The AM is a single unit with integrated controls which can easily be placed using a crane. PICK and PLACE – when installing or relocating the whole machine only has to be hooked once. The integrated controls reduce the installation time and effort.

Optimized chip disposal

The tools are on the side and the top of the machining area allowing a free drop of chips at any time. Chips from the machining area cannot get into the hermetically sealed machine component area.

Favorable thermal characteristic

Due to the AM's favorable thermal characteristic, the machine does not need any additional cooling; for example, a special cooling of the machine column. Heat input through hot chips is avoided by immediate evacuation from the machine.

Machining with retracted Z-axis for highest precision

The machining spindles are aligned rectangular to the Z-axis. Therefore, the Z-axis has to be extended by the center distance only. Most machining can be done with retracted axis.

Less energy consumption, less wear and tear

Not using the tool change also means less energy consumption per machined part. With the AM, tools are accelerated and decelerated during machining. Compared to a machining center, these processes can be realized with less energy consumption and less wear and tear. The ideal design of the spindle sizes and the tools used ensures more energy savings.

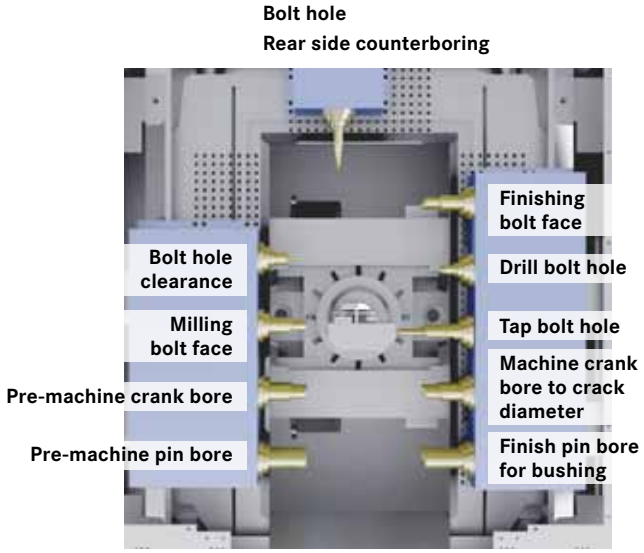
Connecting rod machining without tool change

A spindle row dedicated to each process step – this is the main principle of the AM. Tool change is not necessary, tool changing times do not apply. The advantages of this concept: high efficiency and low energy consumption.

Ideal process layout
With the individual process layout, Alfing's longtime experience in machining connecting rods becomes apparent. That way the machine's full potential comes into play.

All machining steps in one setup
With the AM, spindles can be arranged at both sides as well as on the top of the machining area. Therefore, pre-machining and bolt hole machining or entire finish machining can be done in only one setup. All that takes place in an optimized work envelope.

Chip-to-chip time less than one second
Compared to a machining center the AM does not require tool changing. Chip-to-chip time is less than one second between spindle rows, which are next to each other.



Alfing expertise

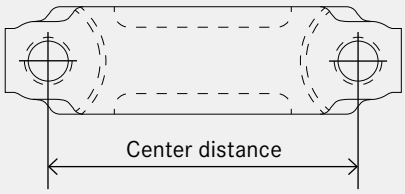
Applications Alfing AM	Applications Alfing dial machines	Applications Alfing AM	Applications Alfing AM
Pre-machining	**Fracture splitting/assembly**	**Finishing**	**Special machining**
• Pin and crank bore • Complete bolt hole machining	• Laser notch • Cracking • Assembly	• Finish crank and pin bore	• Honing • Roller burnishing • Teepee machining • Oil hole machining



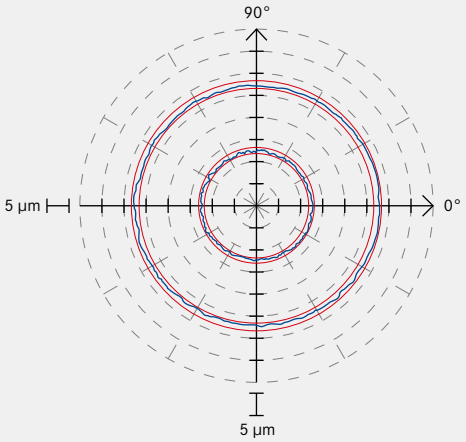

High performance precision

Production analysis reveal the enormous capability of the AM. The level of process quality can be measured and proved by three main criteria.

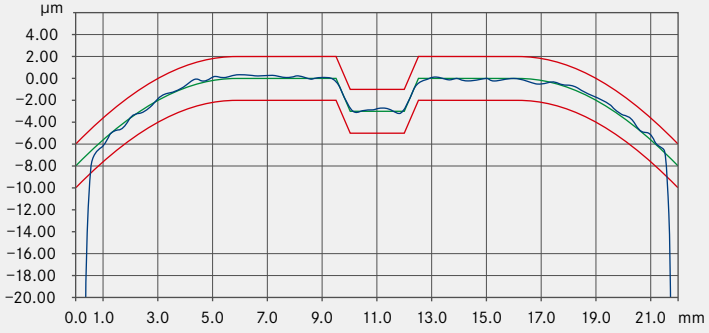
Quill rigidity
The AM is designed to machine connecting rods mostly with retracted Z-axis. Only for machining the second bolt hole the quill has to be extracted by the amount of the center distance. This consistent working condition together with the wear-free hydrostatic guiding of the quill guarantees highest precision.



Roundness
At fine machining a 3 microns roundness of the pin bore can be reached ensuring process capability even when machining four parts at the same time.



Form boring
At form boring a 3 microns roundness of the pin bore can be reached ensuring process capability even when machining four parts at the same time.



Loading and automation

Whether manually or automated: flexible and versatile loading.

The AM can be loaded from the front, right or left side. For front loading a robot is used. For side loading a shuttle is used which moves to the machining area through an additional opening. Both systems can be loaded manually or automated. An automation can be realized without machine modifications.

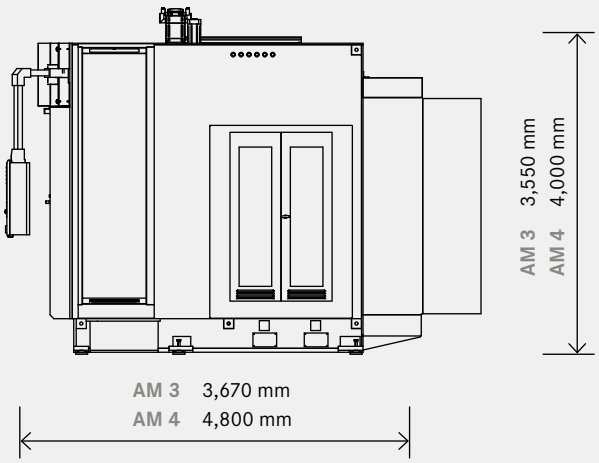
System type 1

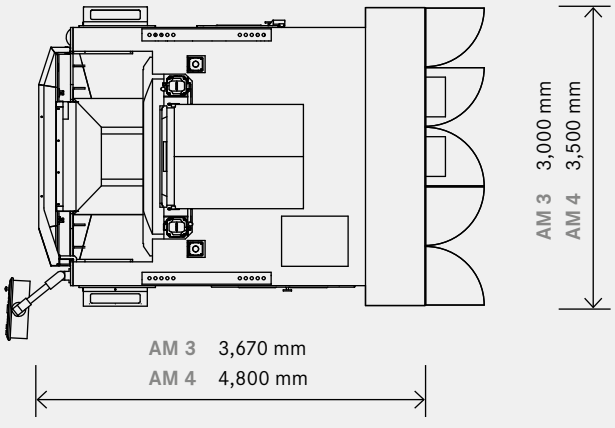
Loading from front
Fixture plate on 2-axes articulated arm
- Best accessibility for retooling
- Manual loading of fixture plate
- Automated loading through robot or gantry

System type 2

Loading from right or left side
Fixture plate on linear shuttle
- Best accessibility for retooling
- Manual loading of fixture plate
- Automated loading through robot or gantry

	X-stroke	Y-stroke	Z-stroke
AM 3	500 mm	1,200 mm	400 mm
AM 4	800 mm	1,400 mm	800 mm





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