

Krauss Maffei

PEOPLE FOR PLASTICS



SPRINGBOARD FOR PRODUCTIVITY AND ENERGY EFFICIENCY

AX series injection molding machines

IN PARTNERSHIP WITH INDUSTRY

KraussMaffei is a premium partner for the plastics and rubber processing industries worldwide



Automotive



White Goods



Construction



Life Sciences



Electrical/Electronics

Whatever you aim to achieve in plastics or rubber processing, KraussMaffei is your partner. We are the only company with intensive expertise across the three main engineering fields. And we have a strong track record in integrating this expertise to develop new processes and systems.

Ready for any challenge

Our **Injection Molding Machinery Division** supplies machinery and systems from 35 to 4,000 tonnes for standard applications and for all processing variants, together with fully automated solutions. We have a strong customer base in all the relevant industries worldwide.

Our **Reaction Process Machinery Division** supplies machines and complete systems for processing polyurethanes and other reactive materials.

Completing our product portfolio, **Automotive Component Systems** supplies foam molds, cutters and routers. Our customer base is wide, with a focus on the automotive, construction and white appliances industries.

Our **Extrusion Technology Division** supplies machinery and systems for compounding, for pipe, profile and sheet extrusion, physical foaming, and the production of technical rubbers and intermediates for tire production. Machinery from the company's range – from single extruders to

complete extrusion lines – is used in many industries, including chemicals, pharmaceuticals, automotive, construction, furniture and packaging.

People for Plastics

We are the “people for plastics”. We are your partners from the first exploratory discussion, through development to commissioning, servicing and operating your system, and final disposal. At all times, you are assured of outstanding competence in planning and engineering, as well as reliable and fast spare parts, service and support.

Adding value for customers

We put our expertise to work for your success. With machine ranges engineered for modularity, we can deliver application-specific solutions based on our wide range of standard modules and specially engineered solutions. This strategy offers customers technical and cost advantages.

Close to customers around the world

As an international company, KraussMaffei has a presence in all the major markets for the plastics and rubber processing industries and employs around 3,000 people worldwide. Our sales and service network keeps us close to all our customers around the world.

A strong move towards lower production costs – AX series injection molding machines



Packaging

The AX is a range of all-electric injection molding machines, with the machine concept based on a toggle clamp. The machines have been systematically engineered for outstanding performance levels and the lowest possible resource consumption.

The kinematically optimized double Z-toggle together with robust mechanical systems guarantee efficient and repeatable molding. Precision injection units, with advanced control technology, ensure that AX machines meet your requirements for precision molding and lower energy consumption. This makes the machines in the AX series reliable, full-value performers in expanding and cost-conscious injection molding companies today and tomorrow.

TRANSPARENT TECHNOLOGY

Meet the machine: take a tour of an AX injection molding machine

LRX linear robot
fully-integrated to produce a compact manufacturing cell

Krauss Maffei

AX 100-380

5-point toggle
optimal application of force
for maximum efficiency

Moving platen
with precision linear guides, supported
on the rugged machine bed

**Generous daylight between
tiebars and large mold fixing area**

VX 100-380



High-precision MC5 control system
with VARAN bus

Proven screws and non-return valves
from KraussMaffei's wide product spectrum to
process a wide range of materials and deliver
excellent melt quality

All-electric drives
for high repeatability and
energy efficiency

Siemens converter

Buffer store
with function: convert supply voltage to DC
(decoupling from power grid)
Capacitors help to stabilize voltage and to store
energy from regenerative braking

DETAILED PRODUCT INFORMATION

AX clamp unit

Double toggle with optimized force/stroke conversion

The all-electric AX series covers the clamp force range 50 to 350 tonnes – ideal for a very wide spectrum of standard applications. The 5-point double toggle is mature, proven technology. With its optimal force/stroke conversion, it guarantees excellent machine dynamics and low power consumption.

Improved clamp concept for high efficiency

Energy saving is a key feature of AX machines. To achieve this, the 5-point double toggle system was substantially improved. Optimally engineered pivot points and a powerful recirculating ball screw ensure sensitive transmission of force and fast opening and closing. Automatic central lubrication ensures smooth toggle movement at all times. Even relatively modest motor output generates high speeds and

forces. Users benefit from significantly reduced energy consumption and a highly dynamic system.

Generously dimensioned platen guide system for high precision

The moving platen is supported on four generously dimensioned precision linear guides to ensure high platen parallelism and avoid tilting. The closing action always closely follows mold contours in order to maximize mold service life. The precision guides are centrally lubricated to minimize maintenance effort. Roller-bearing technology reduces frictional resistance by 80% compared with conventional guide units. Thus there is no drop-off in repeatability or parts quality towards the end of a production run and no change in the low energy consumption.



The solid “box” construction of the mold fixing platen ensures even application of force. The generously dimensioned guide system contributes to excellent platen parallelism.



Large double precision linear guides for the moving platen guarantee absolutely repeatable mold closing.

Optimized mold fixing platens for ideal force application

Both the moving and the fixed platen consist of a base plate and an adapter plate on which the mold is fixed. The platens have been optimized using the finite element method (FEM). This composite platen guarantees very high stiffness and optimal distribution of forces over the whole platen area. As a result, the mold closes precisely whatever its weight. The design also helps to ensure a long mold service life. The tiebars have no contact with the platen; their task is purely to transfer forces to the mold. Without lubricant contamination, the product zone remains clean. The two-part structure of the platens – substrate plus fixing platen – makes

it easier to accommodate different drilling patterns, thread types and sizes, even retrospectively.

Precision part ejection with parallel function cuts cycle time

The platen base plates are predrilled to accommodate different ejector positions, adding to the flexibility of the system. Like the rest of the AX, ejection is electric. A parallel ejector function can cut cycle time by up to 15%. Highly accurate and repeatable ejector movements ensure precision demolding. Easy access to the mold and ejector saves time during mold changes and boosts productivity.

DETAILED PRODUCT INFORMATION

AX injection unit

Minimal drive energy and maximum precision

All KraussMaffei's considerable expertise in this area has gone into engineering the AX injection units. Their outstanding quality is key to AX performance as reliable workhorses in an injection molding shop.

Drive engineering for minimal power consumption

The basis for the AX drive concept includes high efficiency servomotors, optimized force/stroke conversion and smoothly operating mechanical systems with low moments of inertia. This drive concept guarantees that target productivity can be achieved with the lowest possible power consumption.

Built-in precision – the injection unit

The AX takes the concept of precision a good step further. The injection stroke is driven by high-precision servomotors. The motors react with extreme precision and their control system maintains the set process parameters within very tight tolerances. Injection pressure, one of the most important parameters in the process, is measured directly using high-resolution sensors. The actual injection pressure value is supplied as an absolute value to the control system. This helps to make the process highly transparent.



AX injection units can be configured with a wide range of plasticizing systems – interchangeable with those of our EX and CX series.



A swing-out plasticizing unit and nozzle viewing flap make it easier to monitor and maintain all key components of AX machines.

Performance reserves for a broad range of applications

Parallel operation where plasticizing continues in parallel with mold opening/closing and part ejection is standard with every AX machine. This can cut cycle time significantly compared with hydraulic standard machines. Customers who buy AX machines profit from our core competence in engineering and manufacturing plasticizing units and the high level

of vertical integration in our screw production. Our plasticizing units have a reputation for good melt quality and for achieving excellent results with a huge range of different materials. AX plasticizing units are interchangeable with those of CX and EX machines. The optional injection pressure booster allows processors to use the AX to mold high-spec technical products.

AX series control and drive systems

Know-how delivers power savings

KraussMaffei's AX series has been systematically engineered for efficiency – cost efficiency and energy efficiency. We've achieved this by combining advanced software solutions with high-performance motors to supply a highly efficient machine.

Intelligent drive concept: efficient, compatible, fast reacting

AX machines are powered by electric drives with optimized servomotors capable of regenerative braking. This is standard in many electric injection molding machines. The AX goes one step further. A generously dimensioned intermediate circuit buffers even large flows of regenerative energy, returning it to the process at the next opportunity. This solution cuts power consumption by up to 10%, anywhere in the world. The smoothly operating precision transmission with belt drives limits the masses that must be moved, contributing to lower power consumption. High-response servomotors and the powerful MC5 control system deliver exactly reproducible machine movements and reduce power consumption.

Self-explanatory operation with a large 19" touchscreen

The operator interface to the MC5 control is intuitive. Easy-to-understand, full-color process graphics facilitate error diagnosis. Touchkeys show only the relevant functions for the next input, making set-up and operation intuitive.

Parameters for the mold locking system can be set in up to 16 profiles. One of five possible sensitivity levels is assigned to each target profile via a simple dropdown field. Using this input, the MC5 control system calculates the required tolerance bands based on a reference run. This eliminates the need to enter the tolerances as absolute values. After a process change, these tolerances are automatically reset following another reference run. The result is outstandingly accurate mold closing from the very first cycle – without manually calculating forces or making adjustments. In consequence, the process is more tightly controlled, but with less input from the operator.



Clear visualization on the 19" touchscreen

DETAILED PRODUCT INFORMATION

AX options for a compact and productive manufacturing cell

Cost-competitive production was top of the agenda in developing the concept for the AX series. This goal covers far more than the actual molding operation. Reliable demolding, and space-saving and economical material flows are some of the key factors in cost-competitive production. We offer a manufacturing cell option, with a fully-integrated LRX robot that delivers these benefits.

AX machine + LRX robot = higher productivity per square meter

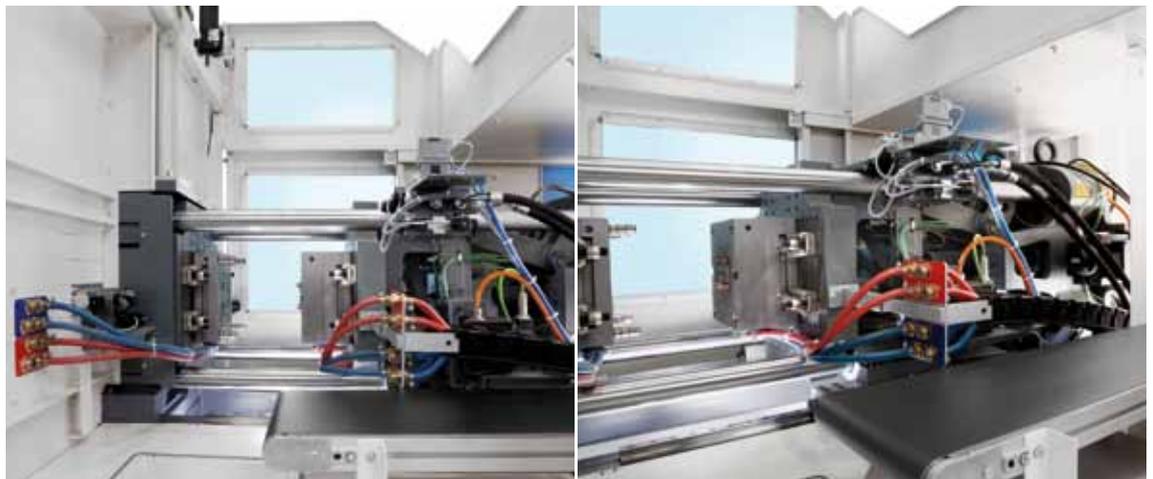
In the AX automation version, the safety housing is extended by the width of the conveyor belt; this area is also the robot's safety envelope. This solution saves the cost of an additional safety enclosure with a door for the robot. Moreover, the integrated, compact concept results in a machine footprint about 25% smaller than an equivalent system. The switching cabinet for the LRX robot is mounted on

the robot's Z axis; so that it doesn't take up floor-space. A conveyor belt for parts transport can be installed across the front face of the machine. This makes for more flexibility for siting the machine in the production area.

Machine and robot operate as a unit

The LRX robot is fully integrated in the MC5 machine control. A fast VARAN Ethernet bus is used to transmit signals in real time. Robot data are logged and stored together with the injection molding machine data. The LRX program can be started and stopped via function keys. The safety housing complies with current standards and with the EU Machinery Directive. The manufacturing cell (AX + LRX) is CE compliant. This all adds up to a very high level of reliability and safety.

The AX/LRX manufacturing cell is a compact unit with ideal material flows.



YOUR BENEFITS

Redefining cost effectiveness – the AX machines

The AX takes cost effectiveness to a new level. The AX series reduces machine costs – power, space or maintenance – to a minimum. At the same time, AX machines stand for maximum reliability, flexibility and very high performance.

More performance, lower power consumption

The AX stands for outstandingly efficient machine technology. With minimal power consumption, AX machines are highly dynamic. All the elements have been engineered for highest efficiency – from the smooth-acting mechanical systems, the precision servomotors, the optimized gear ratio and the minimized coefficient of friction to regenerative braking.

More productivity with less effort

The servomotors feature very fast responses. High acceleration and parallel movements on all axes mean faster dry cycle times. High resolution signal detection, fast data processing and precision operation guarantee highly accurate injection processes and precision control of the parameters. The result is a higher yield of good parts.

Easy, errorfree operation

Intelligent control technology, easily understandable graphics, context-related sensor keys and direct touchscreen navigation take the operator straight to the goal – independent of the level of complexity. The AX operating concept is completely focused on what's essential – fast and intuitive set-up of the process parameters, with built-in plausibility checks. It saves time and guarantees consistently high production quality.

Small footprint

Production space is expensive. Being able to fit more machines into the available floorspace has a positive impact on productivity and profitability. An AX injection molding machine with a fully integrated LRX robot is a compact manufacturing unit with a 25% smaller footprint than a conventional system. Four AX manufacturing cells can be fitted into the space otherwise occupied by three standard systems.

Advanced technology and extremely cost competitive

AX machines are reliable, highly productive, lean machines that take cost effectiveness to new levels. They are engineered to deliver a high return on your investment. With its dynamics and precision, an AX is a cost competitive workhorse in an injection molding shop. The AX series is flexible and future-proof, because an application-specific machine can be configured from a wide range of plasticizing units and over 500 special options. You'll profit from the intelligent engineering for which KraussMaffei is renowned – it puts you in a strong position to respond flexibly to changing market demands. In other words, it offers you excellent prospects for high and sustained returns on your investment.

APPLICATIONS ACROSS INDUSTRY

The AX is an asset in many sectors – automotive, consumer goods, electrical and electronics

Plastics processors find the AX the right machine for many applications right across industry. These machines are the perfect answer for efficient, repeatable production of many widely used products. Easy access and generous mold fixing dimensions mean that mold changes are fast and simple.



Automotive

From handwheels for seat adjustment to fixing clips – AX machines are dependable workhorses producing bulk products in reliable quality with low power consumption and low unit costs.



Electrical/electronics

AX machines are fast, precision machines. As such they're ideal for electronics applications such as producing connectors or mobile phone housings.



Toys

AX machines produce quality toys and toy components at low unit costs.



Home and DIY

Constant shot weights and tight tolerances are important in manufacturing technical components, eg, for garden equipment or power tools. AX machines are ideal for this type of application.



SERVICE WORLDWIDE

Service, support and spare parts – when you need them, where you need them

Rely on us for a fast and competent response to all your service needs anywhere in the world. Whatever you need – from troubleshooting and training to spares or repairs – we're on the job.

We're dedicated to supplying service quality on a par with the outstanding quality of our machines and systems. We offer far more than spare parts and hotlines. We'll work with you to choose the best and most cost-effective solution for your operation. We'll help you test new applications and we'll plan customized service packages.

All-round service

Our service offering is broad. We'll configure your system, install and commission it, train your staff, plan measures to minimize your downtime risk and maximize productivity, and carry out maintenance, repairs and upgrades. You'll find us fast, reliable and competent. Our hotline is manned by highly-trained and experienced service technicians. If necessary, we'll get a technician to you quickly. Remote diagnosis, interfacing directly with your machine's control system, can be a practical alternative. Spares for all important wear parts are available at short notice. We're continuously expanding our service network to speed up spare parts shipment. Talk to us about the right service solution for your business.

Customer trials and prototyping in our test lab

The Injection Molding Division operates a test lab fitted with the latest machinery and equipment. We can run trials, produce prototype parts and fine-tune processes on your behalf. We can work with you to test and evaluate processes, machines and equipment in order to identify the best approach for a particular project. Our highly-qualified application engineers are there to help you.

Training with high hands-on content

Courses are held in our lab and training centre, or, optionally, on your premises. We offer clearly-structured basic and advanced training in operation, process control and maintenance for KraussMaffei injection molding machinery. On request, we'll plan and hold special courses on topics of your choice. All participants spend a high proportion of their training working hands-on with original KraussMaffei machines. A well-structured training program produces skilled operators and technicians, which will positively impact your up-time and productivity.

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At your service worldwide



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KraussMaffei is a premium partner for the plastics and rubber processing industries worldwide. KraussMaffei machines and systems are used wherever plastics and rubber are converted into products. As a knowledge-driven technology company, we build on many decades of experience and a strong commitment to research and development.

The AX series is our answer to cost competitive injection molding – they're fast, energy efficient, precise and economical. The all-electric machines are engineered to deliver high repeatability and stable processes with minimal resource consumption. The optimized double toggle, efficient servomotors and smoothly operating mechanical systems deliver the machines' outstanding efficiency. With AX series machines, processors can be sure of producing flexibly, reliably and above all at low unit cost.

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