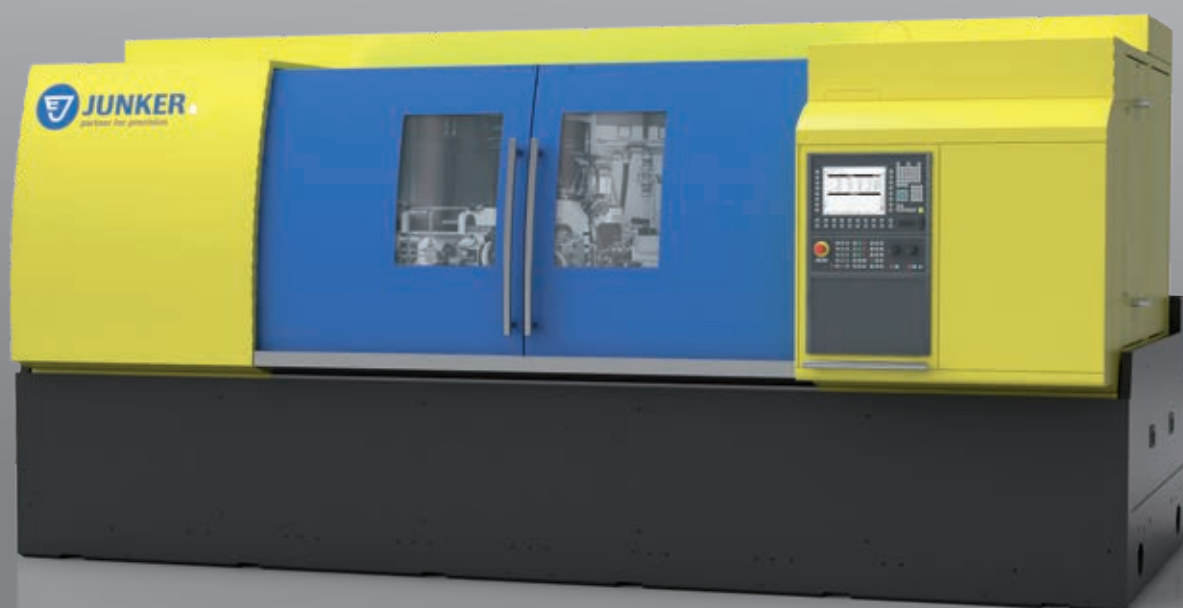


JUCRANK

CRANKSHAFT GRINDING



PRECISE IN A SINGLE SET-UP

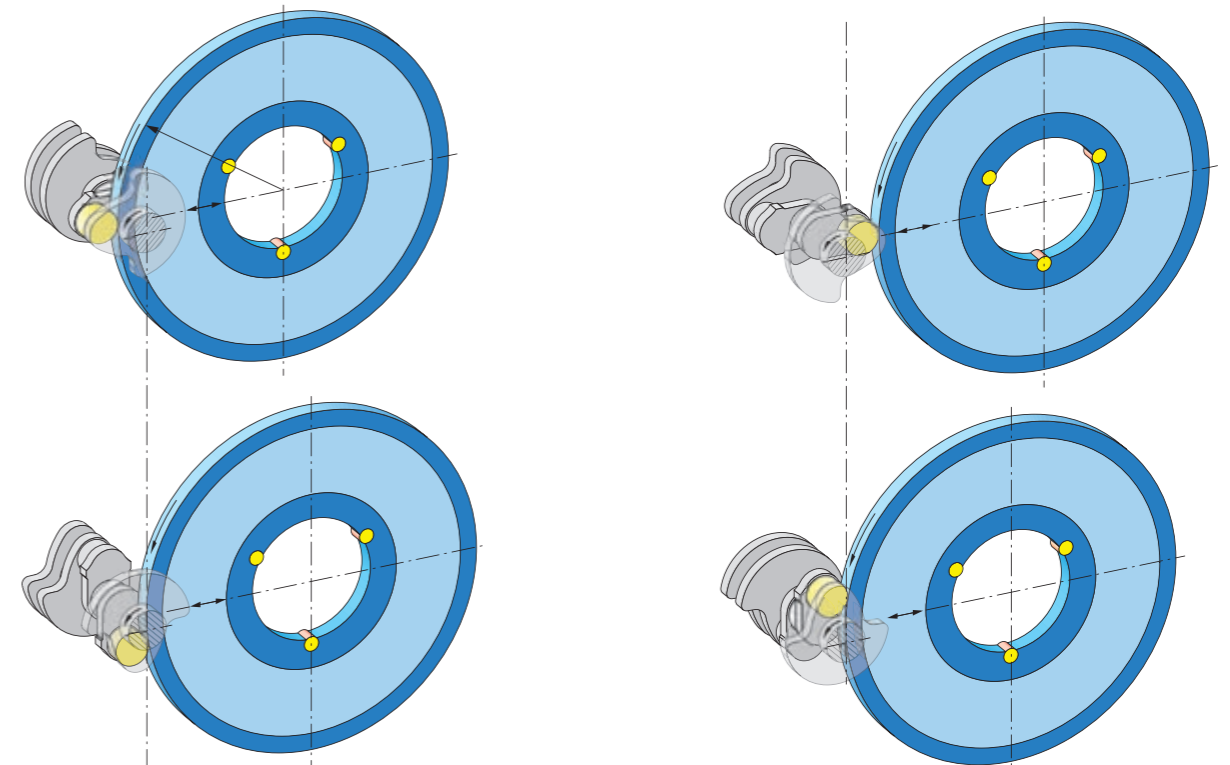


The JUCRANK non-cylindrical grinding machine accomplishes all grinding tasks on crankshafts. Maximum accuracy and quick cycle times are achieved through oscillation grinding in a single clamping set-up and through the productive machine concept. Ideal dimensional stability and high process reliability are ensured through in-process measurements, for example.

Rough and finish grinding of crankshafts in all batch sizes can be carried out on platforms with various dimensions. For main, pin and thrust bearings, diverse geometric shapes as well as plane surfaces and radii can be ground. Internationally renowned engine manufacturers place their trust in the versatile, productive JUCRANK non-cylindrical grinding machine.

PENDULUM GRINDING

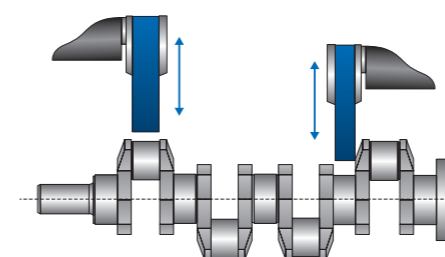
The pendulum grinding method enables crankshafts to be rough and finish ground in a single clamping set-up. The crankshaft rotates around its central axis and the grinding wheel follows the circular motion of the pin bearing by interpolation of the workpiece spindle (C axis) with the grinding spindle (X axis).



To achieve top concentricity quality, crankshafts are frequently supported on a steady. The rough grinding process relieves any hardening stress in the material and an in-process measuring system supplies correction data for finish grinding.

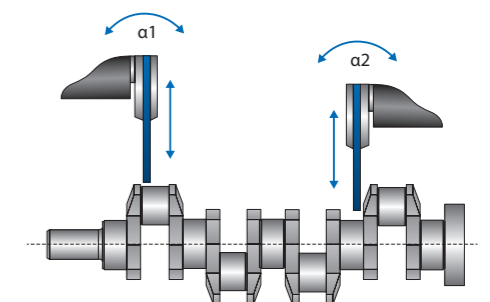
AXIALLY PARALLEL

The grinding wheels and the workpiece are arranged in axially parallel formation, enabling straight plunge grinding of the bearings. The grinding wheels are dressed to ensure the geometric shape of the bearings.



WITH ADJUSTING AXIS (WK AXIS)

Pendulum grinding is made more flexible by a new development from JUNKER: The WK axis. This axis swivels the grinding spindle, on which narrow grinding wheels are mounted, within the micron range during grinding. Benefit: Every main and pin bearing can be given its own profile shape – compensating for tapers and without the need to exchanging the grinding wheel.



HIGHEST PRECISION FOR EVERY CRANKSHAFT

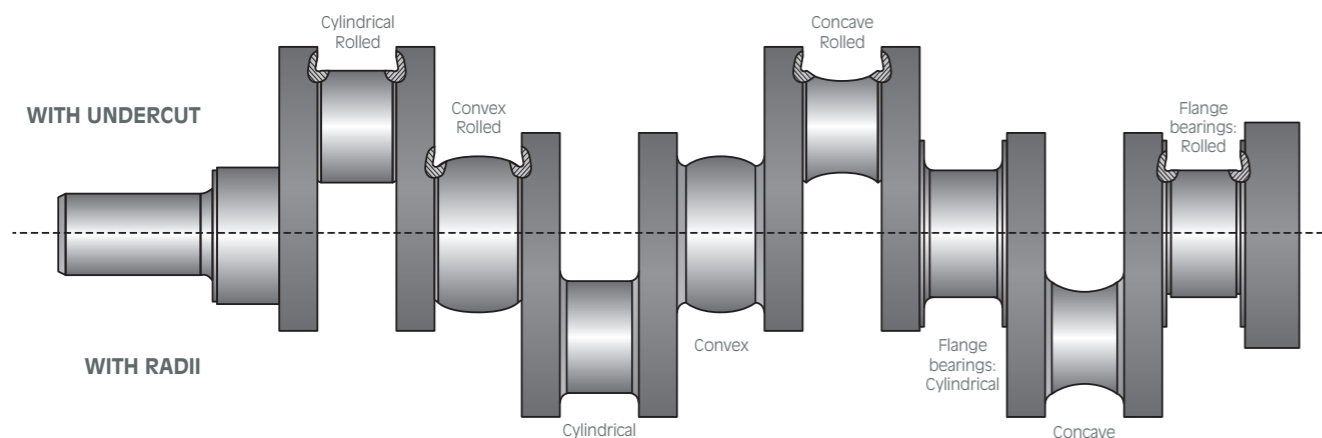


WORKPIECE SPECTRUM

JUCRANK pendulum grinding machines take care of almost every conceivable crankshaft grinding operation. The main and pin bearing (cylindrical, concave, convex), thrust bearings as well as flanges and journals can all be ground in a single clamping set-up. Flat surfaces and radii can also be ground.

The crankshaft is used wherever piston movements are converted into rotary movements. This means that there is a significant variation in size. Crankshafts ground using JUCRANK are used in applications such as:

- Vehicles
- Pneumatic and refrigeration compressors
- Power generation units
- Ships' motors and power plant generators



For main, pin and flange bearings, diverse geometric shapes can be ground, and free selection of convexity.

HIGHLIGHTS

- **High process reliability** due to complete grinding in a single set-up
- **Optimum grinding quality** due to automatic compensation of disturbance variables
- **High dimensional stability** due to in-process measuring system
- **Flexible use** for wide-ranging different cylinder numbers by CNC resetting
- **Extreme smooth running** due to directly driven grinding and work piece spindles
- **Optimum support** provided with self centering three point steady rests

LARGE CRANKSHAFTS

The JUCRANK 8 grinds crankshafts with a peripheral diameter of 470 mm and a clamping length of up to 4800 mm completely in a single clamping set-up. The crankshaft is supported by CNC-controlled steadies, measured following rough grinding and then selectively finish ground with the aid of the WK axis – all ensuring that only GO parts ever leave the machine.



USED CRANKSHAFTS

In the interests of sustainability: Used crankshafts can be reground. Using an automatic work cycle, whereas the crankshafts are measured in the machine and subsequently ground without operator intervention.

COOLANT TRACKING

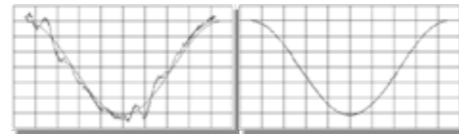
When using large grinding wheels, a CNC-controlled swivel motion of the coolant nozzles follows the pin along the grinding wheel at a constant distance. This guarantees optimum cooling, as the coolant is directed permanently towards the grinding zone.



EQUIPMENT AND OPTIONS

LEARNING FUNCTION

The JUCRANK's control system comes with automatic compensation of runout and disturbing variables such as temperature influences, grinding allowance fluctuations or material changes. Even minimal deviations between the target and actual position of the grinding wheel are automatically corrected.

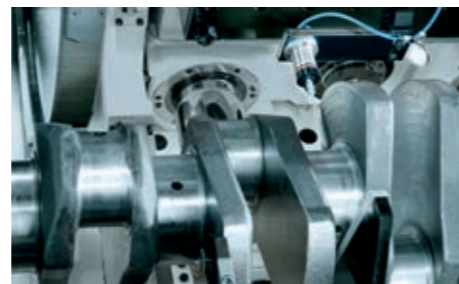


STEADIES

The self-centering three-point steadies ensure centric support even in the event of different workpiece diameters. Tracking hydraulic jaws guarantee a balanced ratio of forces at all three support points. CNC controlled steadies are optionally available which support the crankshaft with two support prisms. Each of these steadies has its own CNC axis, allowing them to be individually controlled and compensating for deflection occurring in heavy crankshafts.

LONGITUDINAL AND RADIAL POSITIONING

In order to generate a precise width and angular position of the main and pin bearing, the position must be precisely determined when clamping the crankshaft. For this, a touch probe measures the radial position of the pin bearing and the longitudinal position of the main and pin bearing. The measured values are automatically integrated in the grinding process by the control system.

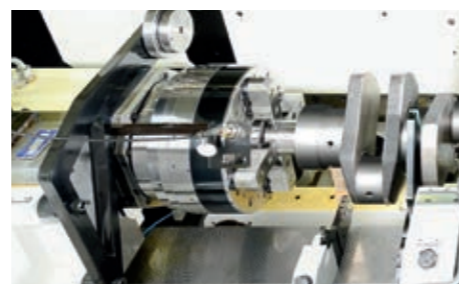


IN-PROCESS MEASURING SYSTEM

A swivel-in measurement probe carries out an in-process measurement of the diameters of the main and pin bearing. The control system logs the measured values, calculates the correction data and generates the precise shape. After grinding, the JUCRANK is able to measure the entire geometry of the crankshaft – depending on requirements: from the bearing width through the lift height to the taper of each element.

C AXIS WITH DIRECT DRIVE

Torque motors are used for direct drive of the C axis. This ensures impressive quiet running, high torque rigidity and superb dynamics in the C axis. Torsionally unstable crankshafts are driven by two C axes.



CONTROL SYSTEM

The Erwin Junker Operator Panel was specifically developed to control grinding machines. All machine components are controlled using the operator panel – irrespective of the series and the used control system. The identical structure, intuitive menu guidance and visualization of the workpiece geometry make for extreme user convenience and flexibility in operation. Programming takes place directly using the operator panel or an external programming tool.



AXIS DRIVE AND GUIDANCE

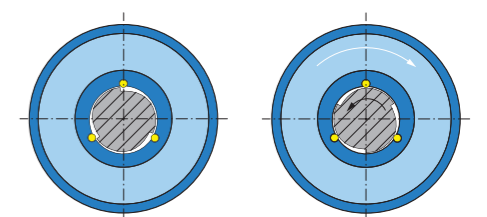
With platforms 1 to 8, the wheelheads traverse along the Z axis. The mechanical direct drive uses the rack and pinion to perform play-free positioning depending on both load and temperature – thanks to two drive motors per slide. With platforms 1000 to 5000, the grinding table traverses on a flat prism guide with pre-tensioned ball screw.

The X axis with hydrostatic round guide carries out stick-slip-free positioning with minimal wear and maintenance requirement – due to the absence of any metal contact between the guide column and housing. Drive takes place by means of an ultra-precise hydrostatic feed spindle which is suitable for extremely high forces and has no acceleration limit.

The B axis of the wheelheads is driven by a play-free gear or torque motor. Every angular position is programmable; the path measuring system has a sensational resolution of 0.00001 degrees. The directly driven grinding spindles – manufactured by JUNKER – ensure extremely low-noise running, with structure-borne sound sensor and dynamic balancing system on one or two levels.

CLAMPING FIXTURE

The patented 3-point mounting interface allows grinding and dressing wheels as well as work holdings to be mounted and centered on grinding spindles, workpiece spindles and tailstock sleeves in record time. Adjustment of the tailstock and, where applicable, the workhead take place using optionally using a chain wheel, a hydraulic cylinder or a CNC axis with rack and pinion drive. An airlift function simplifies position adjustment. Depending on the workpiece, in addition a wide range of clamping systems are also available



MACHINE BED

The machine bed made of mineral cast provides impressive damping behavior and torsional rigidity. The temperature stability allows fluctuations in the ambient temperature to be compensated with a minimum of effort, ensuring a high level of dimensional stability throughout the whole day.

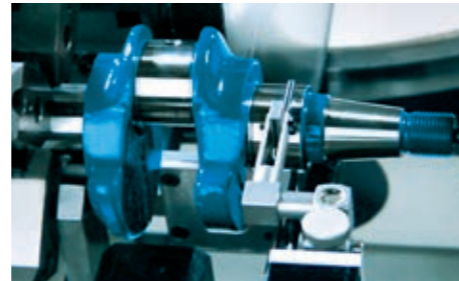


LOADING SYSTEMS

JUNKER offers both internal and external loading systems for all its machine series, depending on customer and workpiece requirements. The loading systems can be combined with different infeed and discharge systems such as conveyor belts or custom tailored systems.

MEASUREMENT SYSTEMS

The measurement systems are also individually adjusted to the various workpieces and customer specifications. The measurement processes entail evaluating the recorded measured values and utilizing them for measurement correction in line with the prepared measurement strategy. A grinding wheel measuring system to determine the diameter, axial position and width of the grinding wheel completes the wide range of systems on offer.



DRESSING UNIT

Grinding wheel dressing is CNC controlled. A driven diamond dressing wheel or a workpiece-dependent diamond profile roller can be used. Dressing takes place manually or using an automatic dressing program with grinding wheel compensation.

ABRASIVE

Depending on the application, the abrasive CBN or diamond is used. The basic bodies of the grinding wheels comprise steel or carbon. In conjunction with CBN, it can make sense to use a carbon base body: It is light, has vibration-damping properties and remains dimensionally stable even at high speeds.



FIRE PROTECTION AND LTA AIR FILTERS

In case of an fire, the machine interior is automatically hermetically sealed, suffocating a fire before it has a chance to spread. If required, extinguishers (CO₂ or water mist systems) and exhaust air purification systems can be additionally installed. A competent partner for fire protection and filtration solution solutions is LTA Lufttechnik GmbH, which also belongs to the JUNKER Group and which researches, develops and produces filtration systems for industrial air purification.

FIELDS OF COMPETENCE

TECHNOLOGY CENTERS

The JUNKER Technology Centers in Nordrach, Germany and in Holice, Czech Republic offer a wide selection of grinding machines for demonstrations and customer-specific grinding tests. These facilities give potential buyers and customers the chance to be impressed by the technical and economic performance of JUNKER and ZEMA grinding machines and test them on their own workpieces.

SERVICE

The company group's growing sales and servicing network ensures satisfied customers worldwide. JUNKER Premium Service acts swiftly and with outstanding expertise wherever its customers are around the globe. Available around the clock, this service provides the assurance of planning security for customers: The highly qualified team will find the right solution no matter what the problem.

ENERGY EFFICIENCY

The key indicator for the efficiency of a machine tool is the energy requirement for each good part produced. Through the use of JUNKER grinding machines, this value is continuously dropping. As the number of grinding steps possible in a single machine increases, machine downtimes diminish and precision improves. The company's energy management program continues to uncover and leverage added potential for savings. Examples include frequency-regulated components, recovered braking energy or optimized sealing air consumption in our own internally developed grinding spindles.

PRODUCTION LINES

JUNKER is able to provide comprehensive references for the design and implementation of production lines ideally tailored to the specific requirements of its customers. As a general contractor, JUNKER places added importance on standardized interfaces such as workpiece transport, coolant systems or measuring devices. This enhances efficiency and ensures the long-term interaction of all the different components of a production line.

NON-STANDARD SOLUTIONS

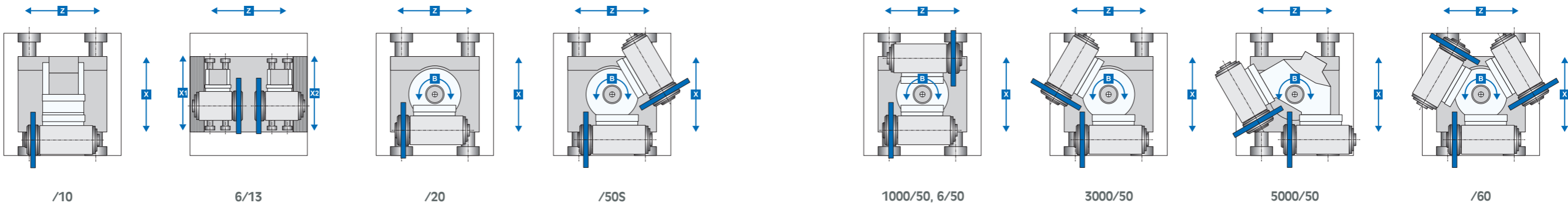
A new grinding technology challenge for JUNKER? „Tell us what your grinding challenge is and we'll supply you with the perfect machine.“ The engineers and technicians of the JUNKER team are able to draw on an enormous fund of technological expertise to provide customized solutions for every field of application. Top priority: Increasing workpiece quality, reducing cycle times.

TECHNICAL DATA



PLATFORM	1S	1000	3000	5000	6XS	6S	6L	6XL	8S	8L	8XL
Available wheelhead versions	/10 /20 /50	/10 /20 /50	/10 /20 /50 /60	/10 /20 /50 /60	/10 /13 /20 /50 /60	/10 /13 /20 /50 /60	/10 /13 /20 /50 /60	/10	/10	/10	
Number of wheelheads	1	1	1	1	1	1 2	1 2	1 2	1 2	1 2	1 2
Grinding length	150 mm	150 mm	400 mm	700 mm	500 mm	1.000 mm 750 mm	1.800 mm 1.500 mm	2.800 mm 2.500 mm	3.000 mm 2.800 mm	4.000 mm 3.800 mm	4.800 mm 4.600 mm
Clamping length	150 mm	150 mm	400 mm	700 mm	600 mm	1.200 mm	2.000 mm	3.000 mm	3.000 mm	4.000 mm	4.800 mm
Center height	100 mm	100 mm	150 mm	170 mm	170 mm	170 mm	170 mm	170 mm	530 mm	530 mm	530 mm
Workpiece weight	5 kg	5 kg	15 kg	130 kg	130 kg	150 kg	200 kg	300 kg	1.000 kg	1.000 kg	1.000 kg
Grinding wheel diameter (max.)	350 mm	350 mm	350 mm	500 mm	500/700 mm	500/700 mm	500/700 mm	500/700 mm	1000 mm	1000 mm	1000 mm
Peripheral diameter	80 mm	80 mm	150 mm	280 mm	280/320 mm	280/320 mm	280/320 mm	280/320 mm	470 mm	470 mm	470 mm
W x D x H mm (without peripherals)	1.800 x 2.500 x 2.100	1.500 x 2.500 x 2.100	3.400 x 2.800 x 2.100	4.900 x 3.400 x 2.350	3.260 x 3.750 x 2.350	4.100 x 3.750 x 2.450	4.900 x 3.750 x 2.450	6.400 x 3.750 x 2.450	7.600 x 4.200 x 3.400	8.600 x 4.200 x 3.400	9.600 x 4.200 x 3.400
Weight	10.000 kg	9.000 kg	12.000 kg	17.000 kg	20.000 kg	25.000 kg 28.000 kg	28.000 kg 31.000 kg	31.000 kg 34.000 kg	69.000 kg 76.000 kg	73.000 kg 80.000 kg	77.000 kg 84.000 kg

WHEELHEAD VERSIONS



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