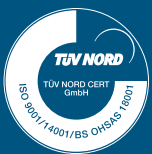




# OPEN-DIE FORGING EQUIPMENT



Integrated  
forging units

Forging presses

Forging manipulators

# ZDAS



# Open Die Forging Process

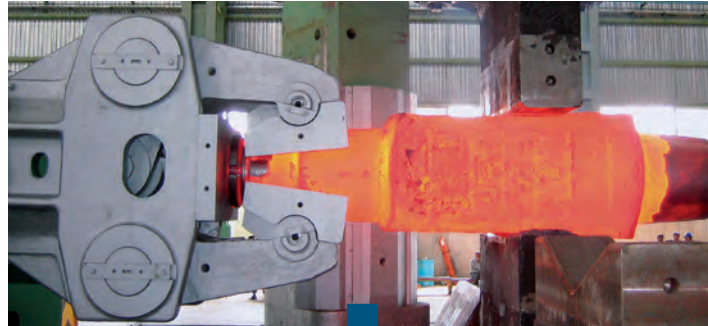


*Forging press CKW 1800, Nakamura Iron Works, Japan*

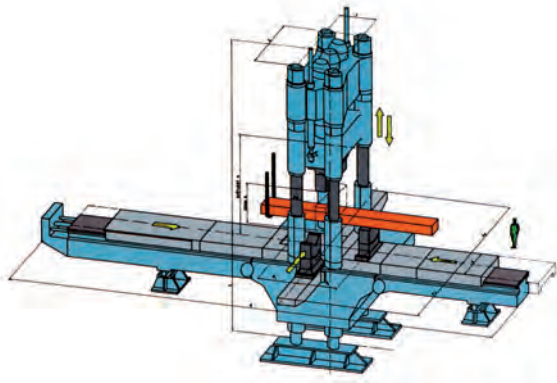
Open-die forging is one of the most advanced production methods of semi-products for all branches of heavy engineering. By this technology, bar- and shaft-shaped forgings, blocks, discs, rings, balls, plates are forged as well as other complicated shapes according to customer's requirements. The forgings are forged by hydraulic presses incorporated in integrated forging units.

The open-die forging presses represent one of the basic groups of supplied forming machines in the production programme of ŽDAS joint-stock company. They are mainly used for piece and small-lot production. Technological experience and possibility to prove new designs at the company's own forge shop have created good conditions for supplies of integrated forging units of top technical level. Up to now, plenty of forging units of various tonnages have been built and supplied to various European and Asian countries.

## Classification of Hydraulic Open-Die Forging Presses



### PUSH-DOWN PRESSES



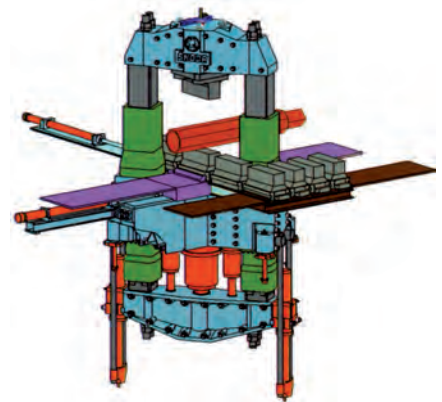
#### FOUR-COLUMN PRESSES model CKV



#### TWO-COLUMN PRESSES model CKVX



### PULL-DOWN PRESSES



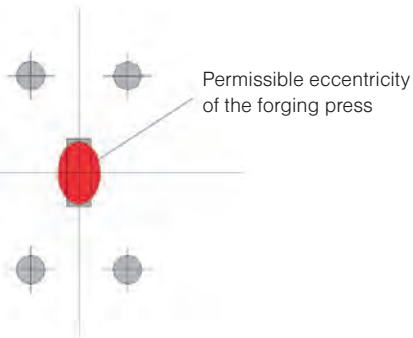
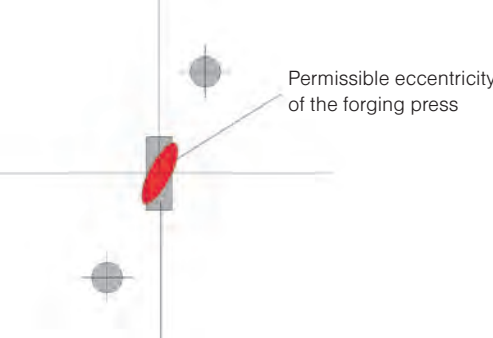
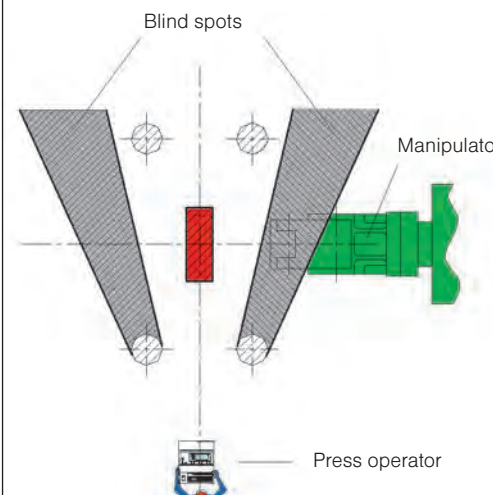
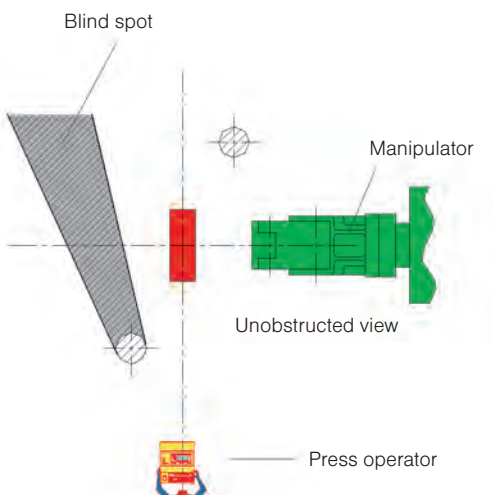
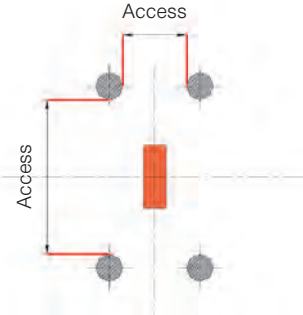
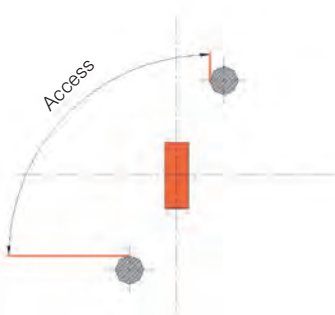
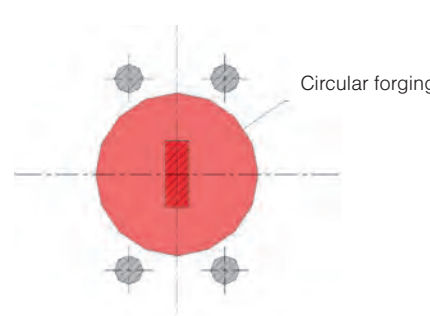
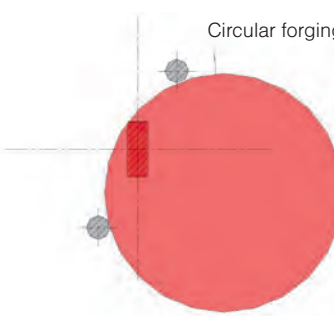
#### TWO-COLUMN PRESSES model CKW



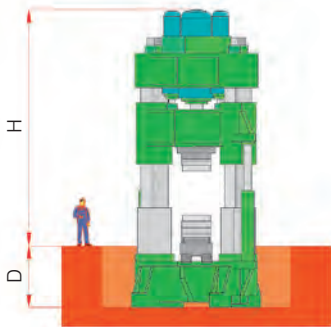
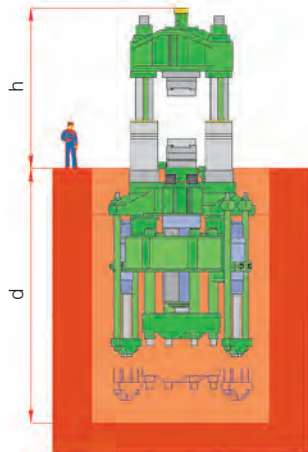
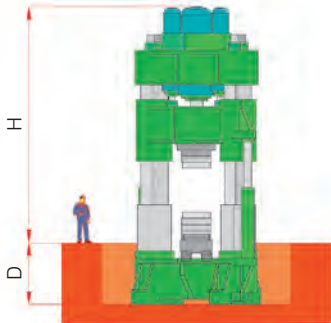
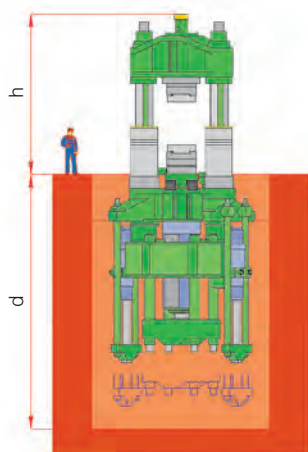
#### FOUR-COLUMN PRESSES model CKZW



# Main Advantages and Disadvantages of Single Press Designs

ACCORDING TO NUMBER OF PRESS COLUMNS				
FOUR-COLUMN PRESS			TWO-COLUMN PRESS	
+	Double guide system, compared with the two-column press	Press stability	Half guide system, compared with the four-column press	-
+	 <p>Permissible eccentricity of the forging press</p>	Range of permissible eccentricity	 <p>Permissible eccentricity of the forging press</p>	-
-	 <p>Blind spots</p> <p>Manipulator</p> <p>Press operator</p>	View of the forging and manipulator jaws	 <p>Blind spot</p> <p>Manipulator</p> <p>Unobstructed view</p> <p>Press operator</p>	+
-	 <p>Access</p>	Handling access to the press	 <p>Access</p>	+
-	 <p>Circular forging</p>	Dimensions of ring/disk-shaped forgings	 <p>Circular forging</p>	+

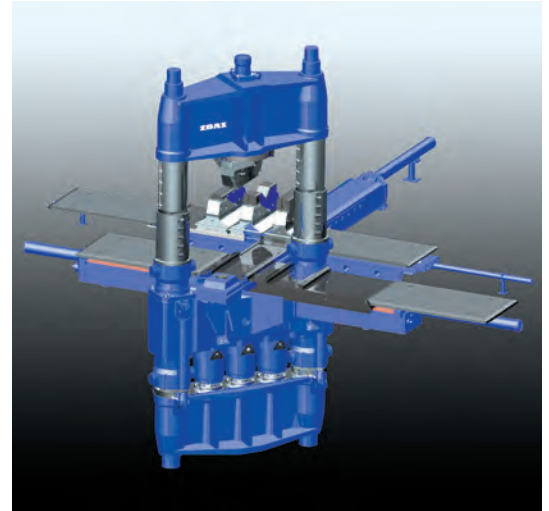
## ACCORDING TO PRESS TYPE

PUSH-DOWN PRESS			PULL-DOWN PRESS	
-		<b>Workshop height requirement</b> $H \gg h$		+
+		<b>Foundation depth</b> $D \ll d$		-
+	Press cylinders, all moving parts and related guide systems are located above the floor	<b>Accessibility of press parts for maintenance</b>	Press cylinders, all moving parts and related guide systems are located below the floor	-
-	In case of leak, working liquid gets into touch with the hot forging, which may result in fire	<b>Safety in case of working liquid leak from the oil drive</b>	In case of leakage of the working liquid, the fluid leaks directly into the retaining pits below the press	+





CKW 4000, BGH Siegen, Germany



CKW 4000 – Computer Model

The CKW hydraulic forging presses are of a pull-down, two-column design. They are intended mainly for forge shops, where small press height above the floor is requested at the expense of deeper foundations. They are intended for all open-die forging operations on steel and non-ferrous metal forgings such as ingot upsetting, piercing, open-die forging of various blanks of circular and angular sections and mandrel forging of rings and hollow cylinders.

The press cylinders are mounted in an immovable middle cross girder and act on the lower cross beam of the movable frame down in such a way that the anvil clamped in the upper cross beam of the frame is pulled to the material.

The movable frame of the lower-tonnage presses, i. e. 6.3 and 10 MN, is cast monolithic and a single-cylinder design is used. The presses of higher tonnage, i. e. 16–70 MN, are provided with a sectional frame. Joints between of the columns and cross girders of the movable frame are pre-loaded by hydraulic nuts by means of anchors. The higher-tonnage presses are fitted with either one or three press cylinders that enable to select the forming force intensity (by activating one, two or three press cylinders).

The CKW hydraulic presses are standardly supplied with direct oil drive located below the forge shop floor.

The CKW hydraulic open-die forging presses feature a robust vertical structure with a long guide of the movable frame in the middle cross girder, and an oil closed-circuit lubrication system ensuring high service life of gibs and the whole equipment. All press motions are monitored by linear proximity sensors, data of which are transmitted to the control computer. By means of software, it is possible to control the whole integrated forging unit.

Rigid structure of the press and well-proven components in the hydraulic, electric and electronic circuit control ensure:

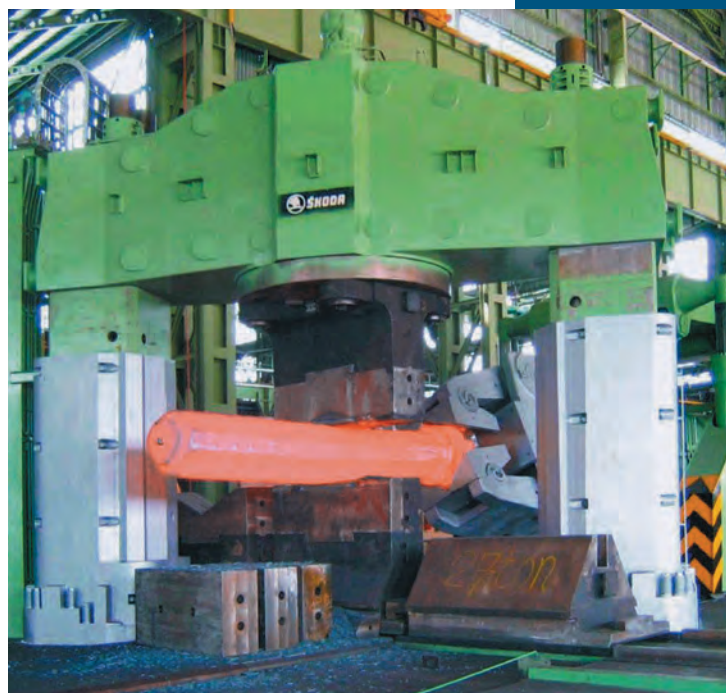
- safe operation of the press
- long service life and reliability
- admeasurement accuracy during forging  $\pm 1$  mm
- auxiliary time reduction
- energy consumption reduction
- possibility of integration with the forging manipulator



CKW 1000 press – NIW, Japan

### Technical parameters (for information)

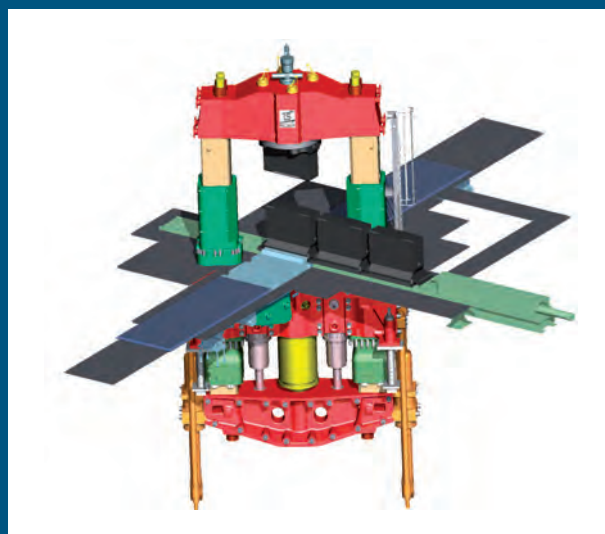
Nominal forming force	MN
Return force	MN
Stroke	mm
Maximum daylight	mm
Maximum eccentricity	mm
Column spacing	mm
Anvil plate stroke in longitudinal direction	mm
Max. height above the floor	mm
Max. depth below the floor	mm
Total length	mm
Total width	mm
Forming speed	mm/s
Number of planishing strokes	1/min.
Total installed input	kW



Forging unit with the CKW 6300 press and QKK 80 manipulator – Iran



CKW 630 + QKK 3 – England



CKW 6000/8000 – Computer Model

CKW 1600 + QKK 12 – RAJKUMAR FORGE, India



CKW 630	CKW 1000	CKW 1600	CKW 2500	CKW 3200	CKW 4000	CKW 6300	CKW 7000
6,3	10	16	25	32	40	65	70
1,1	1,9	2,8	4,8	5	8,9	13,7	13,7
800	1 000	1 250	1 600	1 800	1 800	2 500	2 800
1 800	2 250	2 800	3 600	4 000	4 000	6 100	6 400
140	180	200	250	280	400	500	500
2 250	2 800	3 500	4 500	5 000	3 400	4 700	4 700
±800	±1 000	±1 250	±1 600	±1 800	±1 700	±3 000	±3 000
3 065	3 920	5 340	6 830	7 450	8 700	10 400	13 500
3 830	4 670	6 340	8 100	8 150	11 000	13 500	16 500
8 620	10 700	12 700	15 800	19 800	21 500	23 200	24 000
10 070	11 650	13 500	16 100	20 500	21 000	21 750	22 300
100	100	100	95	75	70	63	63
100–120	90–110	90–110	80–100	85–90	70–80	60–70	60–65
650	900	1 360	2 150	2 720	3 200	4 600	5 000



The CKV conventional push-down four-column forging presses are applied in open-die forge shops and are intended for all open-die forging operations on steel and non-ferrous metal forgings such as ingot upsetting, piercing, open-die forging of various blanks of circular and angular sections and mandrel forging of rings and hollow cylinders. They are suitable for the shops, where a shallow foundation is requested that enables to install the press even in places with high underground water level.

The press cylinders push on the forging from above via a movable cross girder carrying the upper anvil. The sectional immovable frame consists of four forged columns pre-loaded in hubs of the upper and lower cross girders. The upper anvil along with the anvil holder is fastened on the movable cross girder guided in the frame by so-called three-point system. The middle press cylinder fixed in the movable cross girder is guided in the upper cross girder of the frame and the guide bushes mounted in hubs of the movable cross girder are guided by the frame columns. One or three press cylinders induce the pressing force, reverse motion is ensured by return cylinders fastened in the upper cross girder of the frame. The presses can forge with relatively high forging force eccentricity.

The hydraulic open-die forging presses feature a robust vertical structure ensuring high service life of the equipment. All press motions are monitored by pulse generators or absolute sensors, data of which are transmitted to the control computer. By means of software, it is possible to control the whole integrated forging unit.

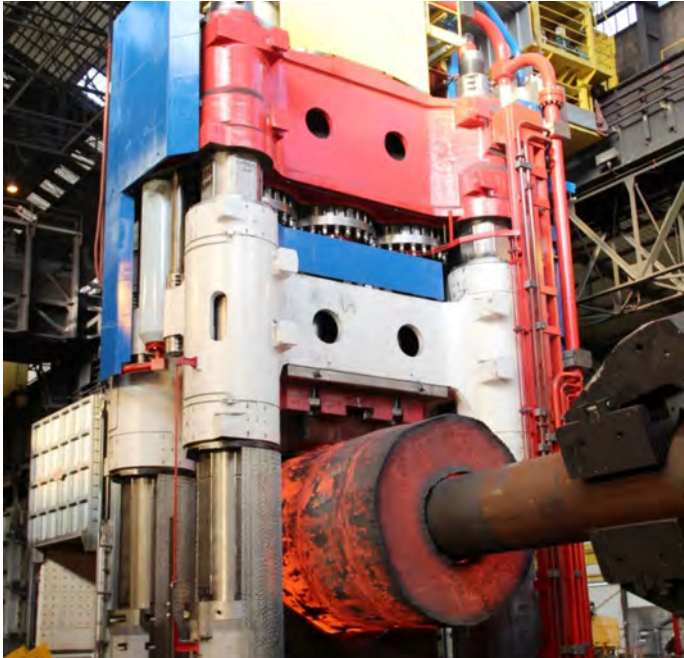
Rigid structure of the press and well-proven components in the hydraulic, electric and electronic circuit control ensure:

- safe operation of the press
- long service life and reliability
- admeasurement accuracy during forging  $\pm 1$  mm
- auxiliary time reduction
- energy consumption reduction
- possibility of integration with the forging manipulator

The CKV presses standardly use the drive with working medium – 3–5 % water and mineral oil emulsion (central drive from the accumulator station is conveniently used for more presses installed in the forge shop). For the CKV presses, a direct pump drive can also be used running on mineral oil as working medium.



CKV 9000 ton press, France



CKV 1250/1600 forging press and QKK 8 NK manipulator, ŽDAS, a.s., Czech Republic

Technical parameters (for information) – with central accumulator drive		CKV 630	CKV 1000
Nominal forming force	MN	6.3	10
Return force	MN	0.6	1.5
Stroke	mm	1 000	1 250
Maximum daylight	mm	2 000	2 500
Maximum eccentricity	mm	150	250
Distance between columns	mm	1 370	2 040
Max. height above the floor	mm	5 600	7 400
Max. depth below the floor	mm	1 440	1 700
Total length	mm	8 620	10 700
Total width	mm	10 070	11 650
Forming speed max.	mm/s	120	120
Number of planishing strokes	1/min.	100–120	95–110

\* direct pump drive – oil    \*\* 56 mm/s – 98 MN, 39 mm/s – 140 MN    \*\*\* 2 columns



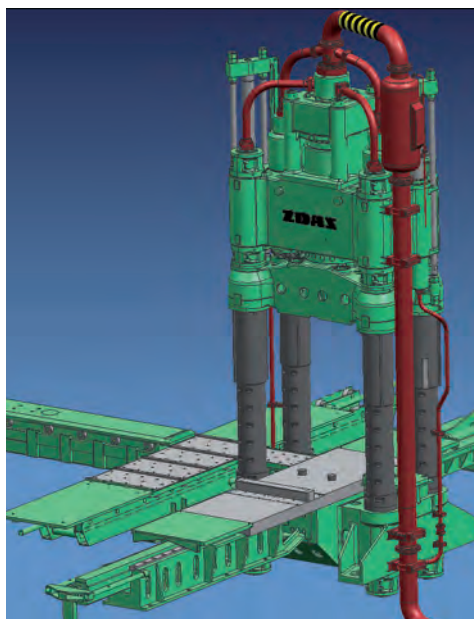
# CKV

## Push-down four column forging presses

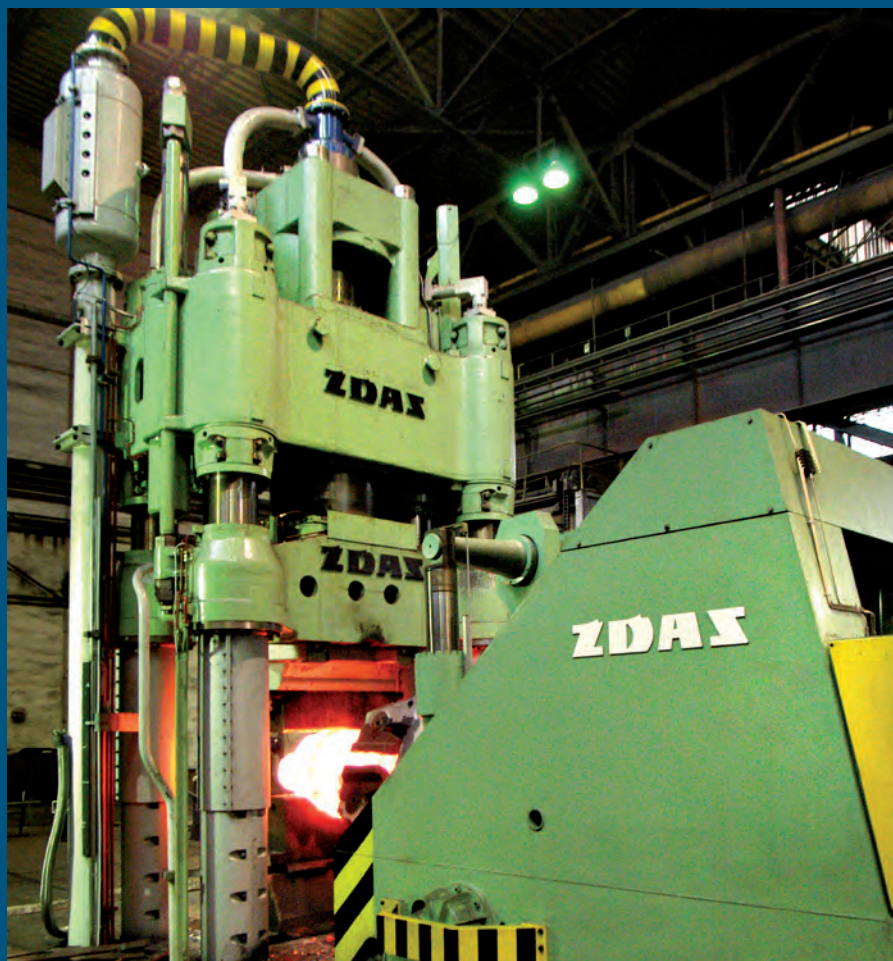
CKV 9000/12000 – Pilsen Steel,  
Czech Republic



CKV 630 – CPF Praha, Czech Republic



CKV 2250 – Computer Model



CKV 2250 – ŽDAS Forge Shop, Czech Republic

CKV 1600	CKV 2500	CKV 3200	CKV 4000	CKV 4000/ CKV 5000*	CKV 6300	CKV 8000	CKV 9000/ CKV 12000	CKV 12000	CKV 14000/ CKV 17000*
16	25	32	42	45	60	84	90	120	140
1.9	2.45	3.2	3.9	5.06	5.6	8.0	8.3	9.2	21.8
1 400	1 800	2 000	2 250	2 500	2 500	3 000	3 000	3 000	4 500
2 800	3 900	4 600	4 500	5 000	6 000	7 000	7 000	6 500	8 500
250	300	300	250	500	250	250	250	250	1 000
2 200	2 940	3 400	3 000	3 400/1 980***	4 000	4 300	6 000/1 600	4 700	7 500/2 600
8 000	9 800	11 200	12 500	10 900	14 700	17 800	17 795	18 900	23 000
1 900	2 600	2 800	4 500	3 500	5 500	6 500	6 480	8 000	6 500
12 700	15 800	19 800	21 500	23 800	23 200	24 000	43 100	42 000	51 500
13 500	16 100	20 500	21 000	14 750	21 750	22 300	21 500	28 000	33 600
120	120	120	70	80	63	63	63	60	56/39**
95-110	80-100	70-90	70-80	110	60-70	50-60	50-60	45-55	60



# CKVX Push-down two-column forging presses

The CKVX hydraulic push-down forging presses of an up-to-date two-column design have all makings of economic production of high-quality forgings in more accurate tolerances. They are intended for all basic open-die forging operations.

The presses feature a sectional frame consisting of the lower and upper cross girders interconnected by two columns by means of pre-loaded anchors by hydraulic nuts. Located in the upper cross girder are press and return cylinders of a piston version. The press of a three-stage design is provided with side double-acting press cylinders of a piston type that also serve as return ones. The three-point guide of the movable cross girder locks the piston in the press cylinder and two pairs of flat guides on the press frame columns. The guide surfaces are arranged wedgewise to the press centre and are adjustable. The CKVX hydraulic open-die forging presses feature a robust vertical structure ensuring high service life. Their advantages are rigid frame and guide enabling higher-eccentricity forging, shallow foundation and improved view of the working space. The CKVX hydraulic presses can be driven both by the direct oil drive and by the accumulator drive with 3–5 % water and mineral oil emulsion. All types of drives use standard and well-proven components that make the operation failure-free and environmental friendly. All press motions are monitored by pulse generators or absolute sensors, data of which are transmitted to the control computer. By means of software, it is possible to control the whole integrated forging unit.

Rigid structure of the press and well-proven components in the hydraulic, electric and electronic circuit control ensure:

- safe operation of the press
- long service life and reliability
- admeasurement accuracy during forging  $\pm 1$  mm
- auxiliary time reduction
- energy consumption reduction
- possibility of integration with the forging manipulator

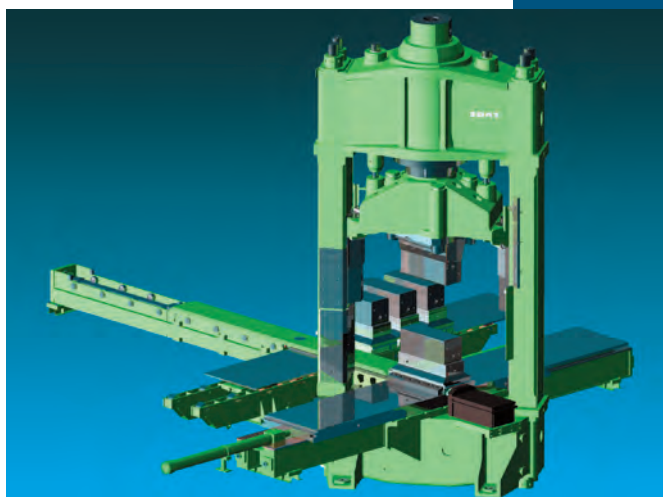
CKVX 1250 – ŽDAS Forge Shop, Czech Republic







Forging unit with CKVX 1250 press for PT Mohgatech, Indonesia



CKVX 1250 – Computer Model



CKVX 2500 – Russia



Forging unit with the press CKVX 1000 – Romania

Technical parameters (for information)		CKVX 630	CKVX 1000	CKVX 1600	CKVX 2500	CKVX 3200	CKVX 4000	CKVX 5600	CKVX 7500
Nominal forming force	MN	6.3	10	16	25	32	42	56	75
Return force	MN	0.7	1	1.8	3	4	4.2	6	9
Stroke	mm	800	1 000	1 250	1 600	1 800	2 000	2 200	3 100
Maximum daylight	mm	1 800	2 250	2 800	3 600	3 600	4 000	4 500	6 600
Maximum eccentricity	mm	140	180	200	250	280	250	250	350
Distance between columns in longitudinal feed axis	mm	1 500	1 750	2 050	2 400	2 800	3 000	3 500	4 200
Distance between columns in adjustment axis	mm	980	1 050	1 120	1 200	1 300	1 300	1 350	2 200
Max. height above the floor	mm	5 200	6 000	7 100	8 250	9 700	11 500	13 000	15 500
Max. depth below the floor	mm	1 800	2 100	2 500	3 000	3 600	4 500	5 000	3 800
Total length	mm	8 620	10 700	12 700	15 800	19 800	21 500	23 200	27 000
Total width	mm	10 070	11 650	13 500	16 100	20 500	21 000	21 750	24 000
Forming speed	mm/s	100	100	100	95	75	70	63	80
Number of planishing strokes	1/min.	100–120	90–110	90–110	80–100	85–90	70–80	60–70	60–80
Total installed input	kW	650	900	1 360	2 150	2 720	3 200	4 500	5 800



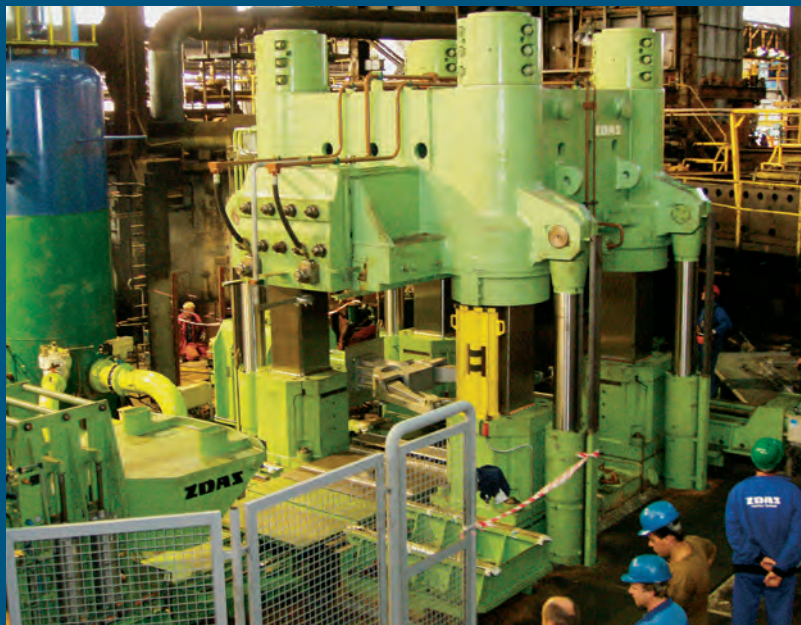
# CKZW

The press is of a vertical four-column pull-down design. Basic part of the press is the middle cross girder being mounted with its feet on four steel columns. The movable frame of the press consists of the lower and upper cross girders and four columns of square section. This frame is guided with its columns along the guides of the middle cross girder with the flat adjustable guide. Pressing force is induced by four pressing cylinders of plunger type built in the middle cross girder. Return motion of the frame is ensured by four return cylinders.

The hydraulic forging press is intended for hot-making railway wheels, i. e. it does the upsetting and forming operations by means of tools fastened on the upper and lower anvil plates. The press cylinders are mounted in the immovable middle cross girder and act on the lower cross beam of the movable frame down in such a way that the anvil fastened in the upper cross beam of the frame is pulled to the material. The press is provided with a sectional frame; joints between the columns and cross girders of the movable frame are preloaded using nuts. The CKZW hydraulic presses can be driven by both direct oil drive and accumulator drive with 3–5 % water – oil emulsion. All types of the drives use standard and well-proven components that make the operation failure-free and environmental friendly. It is possible to use the multiplier of a vertical design to attain increased pressing force.

It consists of lower and upper cylinders of different diameters. Inserted in the cylinder hollow is the piston with the piston rod. Located on the lower cylinder is the hydraulic control manifold.

CKWZ 5600/6500 – Bonatrans Bohumín, Czech Republic



CKWZ 5600/6500 press – Bonatrans Bohumín, Czech Republic

## Technical parameters (for information)

## CKZW 5600

Nominal forming force	MN	56
Return force	MN	6.15
Stroke	mm	1 100
Maximum daylight	mm	2 150
Distance between columns in longitudinal feed axis	mm	2 650
Distance between columns in adjustment axis	mm	2 750
Max. height above the floor	mm	5 250
Max. depth below the floor	mm	1 800
Total length	mm	12 000
Total width	mm	7 620
Forming speed	mm/s	76



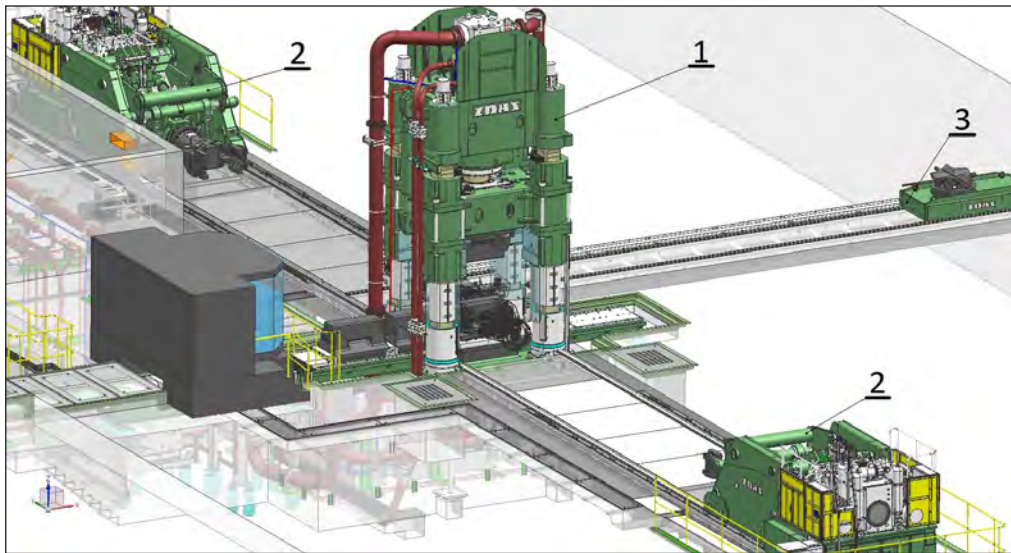
# Integrated Forging Units

The open-die forging unit consists of a forging press with hydraulic drive and of one or two forging manipulators. Electrical equipment of the unit along with a programmable logic controller ensures manual or automatic control including the integration “press – manipulator”. If requested by customer, the unit can be equipped with the ingot bogie, rotating lifting table, tool manipulator and with sets of tools in accordance with the technological application of the unit.

The forging unit is controlled by one operator from the central control console located in a sound-proof and air-conditioned operator's cabin. The operator uses a push-button to select a suitable control mode for the unit with regard to immediate requirements of production technology. Physical demands on the operator have been significantly limited by the introduction of the automatic precise forging mode with an accuracy of measurement  $\pm 1$  mm, by the installation of the technological process/fault diagnostics on the press, and by the automated tool change mechanism. This has resulted in quality improvement with very reduced technological allowances and high productivity of labour.

The control part comprises a programmable logic controller to control single machines within the forging unit, their link-ups, parameter setting and run monitoring including the display of important states of particular power units. The equipment enables user friendly operation with high automation level as well as monitoring of flow of the most important phases of the technological process.

## Example of design of the integrated forging unit:



- 1 CKV 2000 Forging Press
- 2 QKK 8 NK Forging Manipulator
- 3 QHK 8 Ingot Bogie

▲ ▼ Forging unit with CKV 2000 press, two QKK 8 NK manipulators and QHK 8 ingot bogie, BGH Freital, Germany







Forging manipulator QKK 100 for CSOC, China

Forging manipulators are intended to handle a forging within the working space of the press. The current selection includes QKK forging manipulators with carrying capacities of 3, 5, 8, 12, 20 and 35t. Manipulators of higher carrying capacities are designed and manufactured according to specific customer's requirements. The biggest manipulator which has been manufactured so far features a carrying capacity of 160t. Transversally connected side plates form a rigid frame. This frame comprises a suspended box of the peel and a tongs swivelling/gripping mechanism. As all manipulator movements are performed hydraulically, the machine is equipped with a self-contained hydraulic drive and bladder accumulators. The machine is designed, hydraulically connected and electrically controlled in order to provide straight-line movements of a forging in the direction of all three axes of reference, horizontal as well as vertical tilting and longitudinal axial rotation of a forging. The speed of travelling, rotating and vertical movements can be step-controlled.

Spring mounting of the tongs in vertical as well as longitudinal directions is provided by pneumatic-and-hydraulic springs. Functional movements of the manipulator can be controlled manually from the control console while the manipulator works as a teleoperator, or the automatic mode can be selected and the manipulator performs the preset steps and works in the selected mode according to pulses transmitted from the press. Automatic control is provided by using a programmable logic controller within the electrical control system.

Technical parameters (for information)		QKK 1,5	QKK 3	QKK 5	QKK 8	QKK 12	QKK 20	QKK 35	QKK 50
Carrying capacity	kN	15	30	50	80	120	200	350	500
Tilting moment	kNm	30	60	100	160	240	500	850	1 250
Max. tongs speed	min <sup>-1</sup>	30	20	18	15	15	12	12	12
Max. travelling speed	m.min <sup>-1</sup>	50	50	50	50	40	40	40	40
Main el. motor output	kW	23	33	39	95	95	140	190	230
Track gauge	mm	1 600	1 900	2 100	2 500	2 800	3 400	3 800	4 200
Diameter to be clamped	min. mm	120	160	180	200	280	350	550	700
	max. mm	350	500	650	750	950	1 250	1 600	1 650
Tongs height	min. mm	600	650	700	960	950	1 200	1 150	1 600
	max. mm	1 050	1 100	1 300	1 560	1 750	2 000	2 050	2 600
Overall dimensions	length mm	4 200	5 880	6 500	8 170	9 100	10 180	12 150	13 640
	width mm	2 300	2 730	2 950	3 450	3 800	4 650	5 400	5 800
	height mm	1 720	1 930	2 150	2 690	2 850	3 370	3 800	4 470



# QKK

## Forging manipulators



QNM tool manipulator

Each manipulator is equipped with a number of sensors to monitor its main movements, i.e. travelling, slewing and vertical movements of the tongs. If the manipulator is used for the unit where one press works together with two manipulators, it is necessary, furthermore, to monitor transversal and longitudinal movements of the manipulator peel within the machine frame by means of sensors. Joint work of two manipulators makes high demands on the control system used to control the movements in order to provide a longitudinal tension stress inside the forging at any moment.

QKK 80	QKK 100	QKK 120	QKK 160
800	1 000	1 200	1 600
2 000	2 500	3 000	4 000
10	10	10	10
40	40	40	40
305	470	650	950
4 800	5 200	5 600	6 200
800	800	800	800
2 000	2 150	2 300	2 500
1 800	1 900	1 950	2 000
3 200	3 300	3 500	4 100
15 400	15 600	15 800	16 100
6 100	6 500	7 000	7 700
5 500	7 650	7 800	7 900

# QNK



QKK 20 NK forging manipulator for BGH Lippendorf, Germany



QKK 80 manipulator with ingot bogie – Iran

Tool rail manipulators of QNK type and wheel manipulators of QNM type are necessary to be used where the weight of tools does not allow them to be handled manually. These manipulators are designed to handle the forge tools (choppers, knives, piercing mandrels, etc.).

Technical parameters (for information)		QNK 1	QNK 2,5	QNK 5
Carrying capacity	kN	10	25	50
Tilting moment towards the front-wheel axis	kNm	45	115	250
Axis height	min.	800	1 200	1 200
	max.	4 000	5 000	5 000
Side movement	mm	±100	±200	±200
Tongs tilting	upwards	6	5	5
	downwards	6	5	5
Total installed capacity	kW	16	22	55

# Handling Equipment

## QHK Ingot Bogies

Rail-bound ingot bogies are designed to transport an ingot or a forging onwards before the forging unit. They move a heated ingot to the manipulator jaws, rotate a piece being forged and carry it away from the manipulator jaws.

A turntable used for loading a piece being transported or rotated is mounted via the radial-and-axial roller bearing onto a welded frame of the bogie provided with four or three axles, one or two of which are driven. Electromechanical drive of the turntable travelling and rotating mechanisms is provided by electric motors via spur gear boxes. Power supply for electric motors is ensured by means of cable drag chain.



QHK 50 ingot bogie with forging manipulator QKK 35 and CKW 4000 forging press, BFL, India

Technical parameters (for information)		QHK 3	QHK 8	QHK 12	QHK 20	QHK 35	QHK 50	QHK 80	QHK 160
Carrying capacity	kN	30	80	120	200	350	500	800	1 600
Turntable speed	min <sup>-1</sup>	5/2.5	5/2.5	3/1.5	0–5	0–2.5	0–2.5	0–2.5	0–2.5
Travelling speed	m/min	24/12	24/12	24/12	0–20	0–20	0–20	0–20	0–18
Height without turntable	mm	355	396	457	570	650	790	920	1 320
Height with turntable	mm	750	850	950	1 150	1 250	1 450	1 650	2 000
Travelling installed capacity	kW	0.75/0.55	4/3	7.5/4	11	13	15	18.5	30
Rotating installed capacity	kW	0.75/0.55	4/3	5.5/3	7.5	11	11	15	30
Wheel diameter	mm	320	360	400	520	560	580	620	900
Turntable size	mm	850x900	900x1 200	1 050x1 350	1 100x1 600	1 200x1 800	2 100x2 800	2 100x2 800	2 500x2 900

## QWK Rotating Upsetting Tables

The rotating upsetting table serves to upset semi-finished products, flatten and plane the faces in case of disk and ring manufacture. This table is located on the forging plate of the press and the interconnection with the pump station of the press is provided by means of hose supplies with quick-acting couplings. The rotating table consists of a top forging plate, a middle plate and a body of the table with a spring-mounted bearing which allows the two top plates to rotate. The forging table is fixed to the forging plate of the press using fixing blocks. Rotation of the forging plate is provided by the hydraulic motor being fixed-mounted inside the table body.

For forging of rings and cylinders, the piercing table located on the forging plate of the press is used to pierce the upset semi-product. The piercing table consists of a partly machined casting with a hook used for shifting from the tool magazine onto the press forging plate.



QWK Rotating Table at 3300/4000 forging press, Somers Forge Ltd., England

Technical parameters (for information)		QWK 0,8	QWK 4	QWK 11	QWK 40
Loading capacity	kN	8	40	110	400
Forging plate diameter	mm	1 050	1 800	2 300	2 600
Table height	mm	680	850	1 100	1 150
Rotation speed	°/sec	90/45	60/30	30/15	18/9
Working overpressure	MPa	16	16	16	16



# QHZ Rotating Lifting Tables

The rotating table allows a piece being forged, i.e. a semi-finished ingot or forged piece, to be rotated and taken by the manipulator by the other end in order to perform the finish forging of a piece.

The rotating table consists of a frame being fixed to the foundation. Moving within the frame is the cylinder which is secured by two springs to avoid its rotation. Lifting is provided hydraulically using working liquid and by means of hydraulic plunger-type cylinder. Turntable rotation is ensured by the hydraulic motor with a pinion and a gear rim carried on the radial-and-axial roller bearing of the turntable. The equipment is usually located within the manipulator rail-track area.

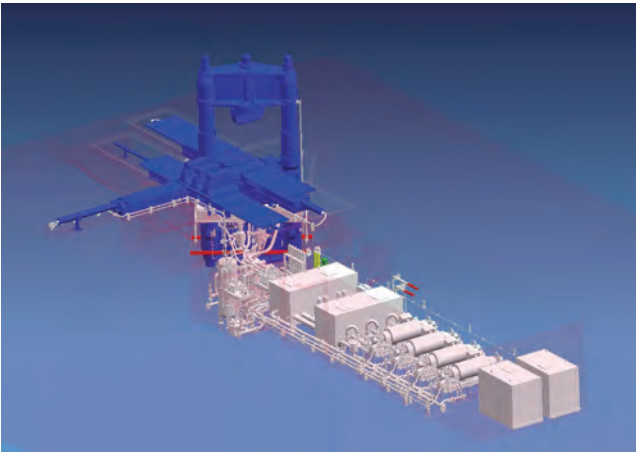
Technical parameters (for information)		QHZ 5	QHZ 10	QHZ 20	QHZ 25	QHZ 40
Loading capacity	kN	50	100	200	250	400
Stroke	mm	710	1 000	1 150	1 100	1 100
Maximum rotating speed	n/min	12.5	10	5	5	4

# Automatic Tongs QMJV

Automatic tongs are a special equipment intended for handling the homogeneous metal ingots where eventual surface spalling and deformation at point of grasping the ingot by tongs is eliminable. They are designed for grasping a load of circular and square section.

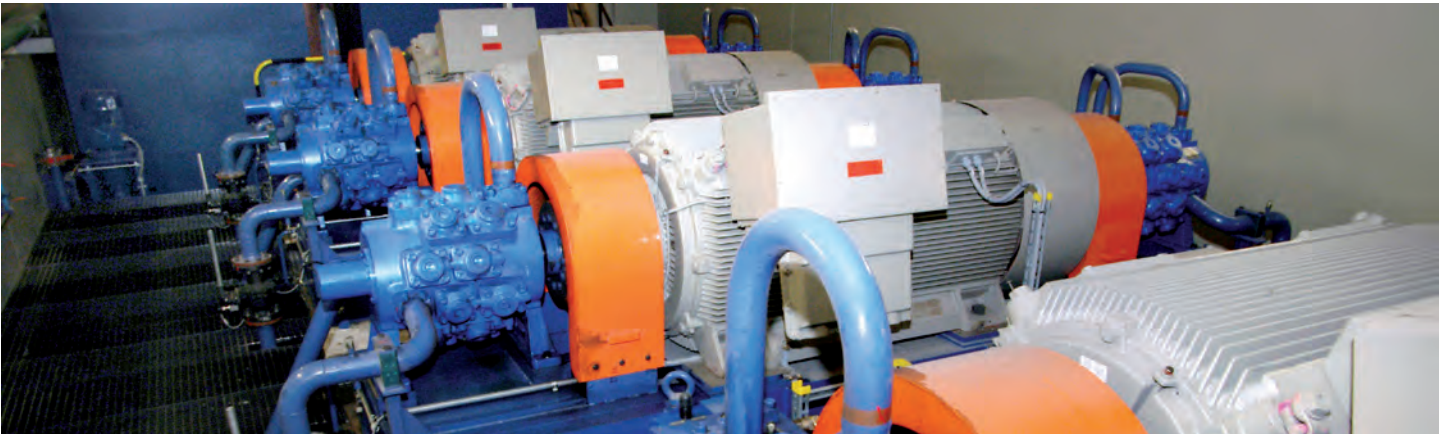
Technical parameters (for information)								
Carrying capacity	kN	100	150	200	250	300	350	500

# Forging Presses Hydraulic Drives



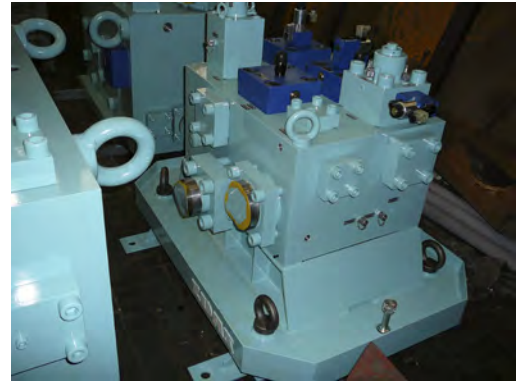
Computer model of the CKW 4000 press drive

The essential part of forging presses is the hydraulic drive which provides the requested forming force by means of pressure and determines the forming speed by the volume of liquid flow into the press cylinder. The magnitude of the forming force of the press is limited by the upset ingot, the size of a forged piece and by the kind of material used for a forged piece. The forming force has an essential influence on the fast running of the press, i.e. number of forming strokes per unit of time, on the number of interstage heats and on productivity of labour. The hydraulic drive has a direct influence on the economics of operation, i.e. electric power consumption, downtimes due to failures, maintenance requirements, and also on the environment. Forging presses of ŽĐAS brand can be additionally equipped, if requested by customer, with an optional type of drive.





# Forging Presses Hydraulic Drives



The basic principle of the **direct oil drive** is the application of a high-speed pump which delivers oil directly to the press cylinder. The magnitude of forming force is direct proportional to the flow rate of the pump. As the pumps must be designed for a maximum forming speed, the direct drives require the installation of pumps of higher capacity. The pressure of the outlet end of the pumps is little higher than the actual necessary pressure produced in the press cylinder in dependence on the forming resistance of material being forged. This results in a much higher efficiency of the drive.

**The improved version of the direct oil drive** is a sinusoidal drive. The system represented features the main pump and the auxiliary pump used only for battery charging and covering the accumulator losses. The change in the oil flow direction is carried out directly on the main pump. The control manifold with valves need not be used and moreover hydraulic shocks are reduced.

**The direct drive with a fast-acting forge valve** results from the idea not to change the liquid flow direction in the interconnection piping between the pump and press cylinder, but to use oil constant-delivery pumps. Return cylinders are permanently connected to the accumulator.







# ŽDAS TechForge Automatic Forging

ŽDAS TechForge is programmed in PLC software TIA Portal by Siemens Company. 3D visualization is also included, in order to make work with the forging unit easier. It displays both simplified and complete hydraulic schemes, the current state of all forging unit elements, energy consumption and statistics, detail alarm reporting including archiving and a lot of other useful maintenance and service information.

Main advantages:

- Reducing forging time
- Reducing power consumption
- Reducing reheating time
- Reducing oven power consumption
- Increasing operational efficiency
- Increasing competitiveness
- Avoiding forging below the minimum temperature
- Facilitating the operator's work
- Minimizing errors by the operator



ŽDAS TechForge is a newly developed expert function of software support for open die forging. It is a simple solution without any laser measuring system of forged pieces. Operator selects one of the preset recipes from the database, clamps the ingot manually into the manipulator tongs, loads into the press to the starting point and presses the button to start automatic sequences. Procedure is then performed out in the individual steps that follow each other.

# ZDAS

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