METAL FORMING TECHNOLOGY THAT SETS NEW STANDARDS

DUNKES
At a time of high quality requirements, the decision which supplier to work with is very largely a question of trust. Trust in the product, in its quality, in its efficiency, and of course, in service.

This all adds up to: Trust in the supplier. For this reason, we would like to say a few words about ourselves. With over 30 years experience in the manufacture of presses, DUNKES nevertheless belongs to the "younger generation" in the field.

Younger generation in the best sense of the word, for this means for us: innovative, open to customer suggestions, and flexible enough to produce complex special machines on request.

Our machines, systems and engineering expertise in forming technology
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BLANKING AND DRAWING PRESSES

DUNKES blanking and drawing presses are made to our customer’s requirements as open-fronted, frame or column types. The design of the frames using finite-element calculation is the basis of a distortion-free welded steel construction. The integration of a hydraulic cutting force absorption in the cylinder system or on the press table lengthens the life of both tools and frame.

Eccentric forces can be almost completely compensated by overlong flat guides and by using hydraulic parallel guiding in conjunction with the cutting force absorbers.
6. Open-fronted blanking press with conveyor belt 1.600 kN

7. Open-fronted press detail
- prism-controlled ram
- light barrier, movable to rear, 2.500 kN

8. 3-fold double-sided drawing press 5.000 kN with tool changing rack

8a) Detail drawing tool

9. Open-fronted blanking press with 6-fold guided ram

10. Open-fronted press with movable drawing cushion 1.600 kN
All versions can be fitted with a wide variety of control systems and tool holders. Depending on requirements on tools and design, various types of guides such as 8-fold/6-fold flat or column guides can be used. Important is that each flat guide can be individually set and therefore readjusted at will.

The types of presses and systems illustrated show a small selection from this product range. Bearing in mind the high standards that the market demands, it should be emphasized that DUNKES combined technologies, i.e. blanking and drawing, can be combined in one machine.

Each press is specially manufactured to the customer's requirements. Options such as movable drawing cushions, press frame open at rear, active and passive drawing etc., do not present any problem.
The double-action drawing press function

1 - Blank holder
2 - Ram
3 - Stamp
4 - Holding-down device
5 - Blank
6 - Drawing die
7 - Ejector
8 - Table plate
9 - Sleeves

The 3-fold action drawing press function

1 - Blank holder
2 - Ram
3 - Stamp
4 - Holding-down device
5 - Blank
6 - Drawing die
7 - Ejector
8 - Table plate

The various ram guides

4. Plate housing in open position in the double-sided press

5. 6-fold flat guide in open-fronted press

6. Double-column guided ram plate

8. Clamped linear roller bearing shoes

7. Prism-guided ram at head

9. 8-fold flat guide
DUNKES supplies a complete system ranging from the tool change bay up to loading and removal from each press. Max. tool weight for the tool rack or the tool carriage is 5,000 kg. With the help of a tool change system, resetting times can be reduced to a minimum. Each tool rack system is designed and constructed to individual problem requirements. Flexibility, improved work processes and clear cost allocation through standardization are only some of the advantages of this ultra-modern technology.
Tool Fixtures

Block clamp

Automatically adjustable synchronous block clamp

Clamping rail

Sunk clamp

Swivelling/sunk clamp

Hydraulic clamping-pin locking DUNKES System

Cutting force absorption with depth stop in cylinder

Cutting force absorption in side section
DUNKES hydraulic assembly presses use state-of-the-art pressing technology to meet the precise requirements of our customers. Each machine is designed in accordance with its required function and the permissible costs. Depending on whether the machine is to be used for joining, stamping, riveting, pressing, calibrating, flanging or straightening, an appropriate control system is installed, e.g. NC/CNC or servo-control for the ram/ejector axle, or a simple hydraulic switching system with cam switch gear for the path stop.

1. Open-fronted assembly press with direct pressing force control

2. Open-fronted assembly press with sliding table and pressing force control, pressing force 250 kN

3. Open-fronted table press with NC control, designed for seated operation in accordance with ergonomic principles, pressing force 40 kN

4. Double-sided press with V-sliding table for the assembly and calibration of stator plates, pressing force 4,000 kN
Each machine can be fitted with a programmable control unit from the S5 or S7 series. Loading and unloading may be directly in the workpiece holder or via a sliding table. Quality control by measuring the force/path process and recording this is a further important component of this product range.

5. 4-column assembly press with NC control, pressing force 400 kN

6. Frame-press with 2 controlled cylinders, each 250 kN

7. Double-column press with direct force/path control 250 kN

8. 4-column press with column-guided ram plate, with guard, 630 kN

9. 2-cylinder open-fronted press with joystick and servo-regulated ram axle, 2000 kN
1. Open-fronted press with CNC control and induction heating, 400 kN

2. Double-sided press with column-guided ram plate and sliding table, 2,500 kN

3. Assembly machine for hydraulic bearings including riveting and control unit (40–1,000 kN)

4. Assembly press with 2 cylinders for parallel operations (100 kN each)

5. Open-fronted press which may be switched over to joystick control with sliding table, 160 kN

6. 4-column press with motorized rotating drive under the table, 250 kN
7. Open-fronted table press on stand with direct force/path control, 100 kN

8. Open-fronted table press with light barrier, 63 kN

9. Open-fronted press with adjustable table, 40 kN

10. Open-fronted press with light barrier, sliding table and force/path control, 400 kN

11. Open-fronted press with joystick control and servo-regulated ram axle, 3.150 kN

12. Double-sided press with sliding table and column-guided ram plate, 250 kN

13. Horizontal automated assembly press, 630 kN
Fully automatic operation, production islands or cellular production are made possible by the flexible manufacturing methods of DUNKES systems. Important criteria for each production solution are the information supplied by the customer, e.g., tool change, pieces/min., material flow, automatic loading and unloading, programming input for workpiece and tool-specific data, etc.

1. Double-column blanking press with automatic tool-change rack and workpiece handling, 1.600 kN
   1a) Press in working position
   1b) Tool transfer from rack to tool change facility

2. Double-sided blanking and drawing press with transfer device, 4.000 kN
   2c) Double-rack system
DUNKES engineering gives support from beginning to end, starting with an analysis of the current situation through to installation of new plant. Our extensive experience in all branches of industry means that not only the full creativity but also a quality and cost-conscious attitude of our staff is there to assist you. Automation from reputable suppliers such as handling systems, transfer and conveyor systems can be purchased and installed by us. We lay great importance on the knowhow of such sub-contractors during the planning of any project.

You as a customer have the advantage of only having to deal with one company which reduces service costs and increases service efficiency.
CONTROL SYSTEMS

DUNKES has years of experience of using programmable control systems applying a wide variety of technologies. The guiding principle behind these control systems is that they must be user-orientated, with minimal training requirements, and economic in the sense that they can be used for any type of press.

The basis is a simple control replacing the traditional limit switch path. Moreover, a CNC control with disk drive is also used.

1. PC control, type PC 5000

1a) Diagram of force-path relationship with envelope curve

1b) Extract from program window with control sequence for the example "drawing program"

2. CNC control, type CNC 50

10) Extract from program window with control sequence for the example "drawing program"
At the most sophisticated level we supply powerful open micro-processor controls with user-friendly graphic display. This is based on the operating system Windows 95. All path, speed, and force curves are illustrated graphically. As a quality control measure, envelope curves can be inputted for the force-path curve. The control programming is carried out using icons. In contrast to conventional wiring, this system uses optical fibres. Other possibilities of meeting the requirements for user-friendliness and integration in existing data networks include, for example, a 2 or 4-line display in conjunction with a store-programmable S5/S7 control as well as quality control using force-path control devices.

3. 2/4-line display with PLC, type OP17 / OP7

5. DUNKES path control, type DWS 5

4. CNC control, type CNC 1000

6. Force-path control for quality control, in the product range assembly presses/ riveting machines
For years DUNKES has supplied internal high pressure machines on the basis of 3 or 4 columns to the manufacturers of complex-formed hollow bodies.

Beginning with prototyping and ending up with the manufacture of the finished product, the customer is supplied with the necessary press technology, high-pressure technology, and the required number of auxiliary axes.

We have our own prototype forming machine on the basis of which we can offer you process simulation, a feasibility study, method planning, and a manufacturing process optimization which will give you the necessary information for your buying decision.

With the use of the DUNKES IHF-process control PC 5000, you will benefit from the efficiency, the possible data collection and evaluation. Software developed specially for IHF forming guarantees an ideal basis for the creation of numerous processing programs.

Instead of a compact control system with limited application which has to be adjusted to the need of each customer, there is a modular system which, by the simple adjustment of individual components, can easily be matched exactly to customer requirements. In this way, a high degree of modularity and reusability is achieved, which guarantees a high quality standard.

Data processing in the signal processor system takes place with the help of a specially developed real-time operating system core. This guarantees the pseudo-parallel processing of a wide variety of control sequences and PLC functions, without having to do without the advantages of a high-level programming language. Modularisation and object-oriented programming are both part of the standard package of available programming aids.
The performance is rounded off by a modern in-circuit-debugging system which permits fast and reliable development of software systems which were hitherto impracticable. The industrial PC used in conjunction with the worldwide successful operating system Windows TM satisfies many needs such as networking, high-resolution graphic displays, mass storage and the connection of standard peripheral items such as printers and drives.

2. Simulation of IHF-process (tension build-up)

3. Forming process with after-thrust and counter pressure

4. Extract from the programming window PC 5000

IHF-prototyping by PC-control

Flexibles IHU-Prototyping durch PC-Anlagensteuerung

Techniques

1. Localized bulging of forming parts

2. Symmetrical and circumferential widening of forming parts

3. Offsetting of forming parts with extended longitudinal axis

4. Calibrating tight bending radii

5. Widening of forming parts with bent longitudinal axis

6. Jointing and forming

7. Forming combinations

8. Punching

9. Pressing flanged pipes

Application

taps and fittings
bicycle components
vehicle components
exhaust pipes
gear components
transmission components
chassis components
framework
chassis components
motor parts
elbowed parts
taps and fittings
metal fittings
bodies and chassis
taps and fittings
metal fittings
suction pipes
tank system components
exhaust systems
connections
motor parts
sandwich constructor
taps and fittings
bodies and chassis
framework
spaceframe
bodies and chassis
gear components
transmission parts
motor parts
The DUNKES powder presses are used for the manufacture of formed parts from powder / granulates. Either 2- or 4-column frames or rigid frames are used. Extremely accurate ram control (round or eightfold flat) in conjunction with proportional control for the upper and lower pistons ensure very high reproducible accuracy for the moulding process.

1a) Frame and tool with automatic clamping

1b) Filling station

1c) Frame without tool showing hydraulic tool clamps

1. 2-column powder press for diamond powder, 250 kN
The deviation of upper and lower pistons is, related to the stroke, approx. ±0.1 mm!

CNC or PC control technology are used to program and store all necessary data. Additional components for a powder press such as the filling station for the granulates, hydraulic tool clamping, or activating the pressing start by means of a light-barrier, provide further ways of reducing cycle or down times. The feed shoe at the rear of the press is integrated in the press process control. When changing tools, this feed shoe moves automatically. This means that a tool change can be carried out in a relatively short time without disassembling the filling device.

The filling height of the powder/granulates is programmed using the CNC control. After filling, the mould is automatically skimmed off using specially developed software. This means that skimming can take place without any additional compression of the powder/granulates in the mould. The thickness of the pressed part is controlled after the pressing process by an automatic readjustment of the filling height, which is incorporated in the next pressing cycle. Needless to say, there is an intelligent, self-correcting control which guarantees a consistent product quality.

Massive Forming

As an alternative to the deep-drawing technology of sheet metal there is also the possibility of manufacturing high-precision parts using extrusion technology, e.g. out of close-to-end-shape aluminium.

Using this technique there is a work-hardening of up to 50%. A further advantage of this method is that it is more economical than machining, and less material is required.

The DUNKES range of presses offers specially for this technology hydraulic presses which possess the necessary characteristics such as optimum frame rigidity, hydraulic knock-out axis in table and ram, as well as oversized eightfold controlled ram for high precision. Programming is carried out by means of the various types of DUNKES control systems. Together with associated manufacturers of tools and of the method of forward/backward extrusion we can supply you with all necessary know-how and a complete package.
Dunkes try-out presses make state-of-the-art solutions available to the user. Optimal ram movement is achieved using overlong guides either in the form of round or eightfold flat guides. Depending on the requirements, and bearing in mind the necessary reproducible ram switch-off accuracy, either a proportional valve technique or a power-assisted positioning control is used. Parameters for tilting, table deflection, drawing-cushion force distribution and ram force movement enable the running-in phase of the production start to be significantly reduced.
There are 2 control options: either a CNC/NC control or a classical path control. In the case of try-out presses for follow-on composite tools with eccentric forces, 2-cylinder presses are used. All the accessories and extras from the whole range of presses such as hydraulic drawing cushions, mechanical depth stop with cutting force absorption, parallel operation, hydraulic tool clamping, movable table, sensitive handlever control (joystick), etc., are also available for these presses depending on the exact requirements.

2. Double-sided out press for follow-on composite tools with eccentric forces, 2-cylinder, with power-assisted positioning control, 2-hand and handlever control (joystick) including cutting force absorption and parallel operation (2,500 kN)

3. Detail transfer tool
DUNKES supplies the diecasting industry with hydraulic trimming presses of the open-fronted or 4-column types. These presses are either in individual work places or integrated into diecasting booths. Tool and pressing data are programmed using a NC control with store-programmable control, type S5 or S7. Accessories such as cast part removal, light-barrier control, tilt-table, hydraulic tool clamping or tool change aids can be incorporated as required.
DUNKES offers a special solution in the whole field of straightening technology for round, flat and profiled materials. It makes no difference whether the items to be straightened are simple and round or have a complex profile which must also be torsioned. As a standard procedure, the straightening presses are delivered as handlever-controlled, semi- or fully automatic machines. DUNKES straightening technology exceeds even today’s high-quality demands for true-running, straightness and torsion.

1. Hydraulic straightening press for profiled material with torsion deviation measurement station and horizontal straightening unit 630 kN/1,000 lb torsional moment 250,000 N/m.

2. Straightening press with sensitive handlever control, motor-driven straightening carriage, motor-driven rotary drive and automatic loading station, 1,600 kN.

3. Horizontal straightening press with sensitive handlever control including roller blocks for profiles, 3,150 kN.
STRAIGHTENING PRESSES

The machines are designed and manufactured in accordance with ergonomic criteria and thus optimize working conditions. In the case of higher straightening forces, the machine is fitted with power-assisted control for the ram axis in conjunction with a handlever (joystick), as this is better and easier to work with. The power-assisted control helps with very accurate positioning.

4c) Control panel for straightening press

4a) Detail of the motor-driven roller-support

4b) Hydraulic drive/tension rod construction

4. Straightening press with power-assisted ram axis, joystick control with rotary and traversing drive, 10,000 kN

5. Straightening press with power-assisted ram axis, motor-driven rotary and traversing gear, 3,150 kN
6. Straightening press with handlever control, motorized rotary and traversing drive, 1,000 kN

7. Detail semi-automatic straightening press with NC control, motorized rotary and traversing drive, 250 kN

8. Straightening press with torsion device, fitted to front, 100 kN

9. Detail straightening press with rotary drive, control panel, 630 kN
Dunkes supplies the rail industry with the necessary special presses for mounting and dismounting wheels using a range of different pressing forces. As a quality guarantee, these presses are fitted with PC or NC control.

The actual force/path process during mounting is measured and recorded. All movements are incrementally controlled, hydraulically or by means of a motor. The tool replacement parts are designed in accordance with the specific workpiece requirements. Great attention is paid to simple handling and optimum loading and unloading. This means that resetting times are reduced to a minimum. The presses have either one or two cylinders. The self-locking device on the threaded spindle ensures that the centre bearing or thrust bearing can be fixed in any position and thus moved incrementally.

The whole concept and engineering of such a machine incorporates the very latest technology, and offers scope for optional extras such as automatic control during the pressing process, i.e. axle measurement with centric positioning, measurement of the distance running wheel to axle, measurement of the distance between both running wheels, or extras such as a crane device for the loading and unloading of the wheel set, or a tool store with lifting aids to minimize tool-change times etc.
DUNKES engineering offers more than just the necessary pressing technology for rational production at the highest quality level. Whether specifying the requirements, commissioning a new press or designing a whole production system, the total know-how vested in the individual product groups comes into play. The technical expertise of the individual departments and teams lead to state-of-the-art solutions for our customers’ problems. After machines have been delivered, installed and commissioned, the customer is supplied with operating instructions incorporating the latest didactic principles, and which in themselves constitute a new milestone in customer/supplier relations.

Each machine, needless to say, comes with the necessary CE certification and the required declaration of conformity. It is hardly necessary to add that DUNKES is certified to ISO 9001 standards, is defined as a specialist enterprise in accordance with § 19 WHG, and voluntarily submits to external audits each year.
DUNKES has over 35 years experience of building universal wobble riveting machines and of riveting know-how. The basic range consists of a series of wobble riveting machines in the form of table machines with differing riveting forces, and of riveting units used in automation and with remote control.

The advantage of the wobble riveting process is that because of short riveting times, there is a clear flow direction and/or clear movements. The necessary riveting tools can be built up simply, in other words, with low tool costs. The wobble riveting technology permits high quality riveted joints in rigid or movable version. Quality can be checked by the use of a force/path control device.

1a) Measuring device for force/path indication

1b) Layout of flanging unit, pressure gauge, displacement pickup

2. Wobble riveting machine with slat table and force/path control (20 kN)

3. Rotary riveting machine with 6 tions, mechanic controlled rotor table, testing point for riveting height force/path control and tool clamps (20/40 kN riveting force)
In the case of automatic processes, the rivet height tolerance can be checked before riveting. This can be monitored either in the form of a bar chart or with a force/path diagram.

The DUNKES CNC riveting machine is used when a large number of rivets at close centres are required. Loading and unloading is not dependent upon time. A NC control enables the required riveting forces, times, and reproducible path switch-off points to be programmed. The data are stored on disks. The advantage of this system compared with multi-spindle heads is that no expensive individual riveting tools are required.
1. DUNKES wobble riveting machine as standard range (5 kN - 40 kN)

2. DUNKES wobble riveting unit as standard range (5 kN - 40 kN)

3. DUNKES open-fronted wobble riveting machine with adjustable table (20 kN)

3a) Wobble riveting unit disassembled; the machine can thus be used as a pneumatic press

4. Open-fronted wobble riveting machine with multi-spindle riveting head and tool changer (100 kN)

5. Horizontal riveting machine with hydraulic riveting units (100 kN each)
The wobble riveting method allows a wide variety of types of rivet heads to be used, even in inaccessible positions. Under normal circumstances, either a 5°/3° or a 2° inclination of the rivet axle is used. Compared with the purely press-riveting system, the riveting force used here is about 1/10th. This largely eliminates deformation of the rivet waist in the hole. The rivet axle is driven pneumatically, or, in the case of higher riveting forces, hydraulically. Optional extras such as sliding tables for loading and unloading, automatic rivet feed, quality check using force/path control, rotary table or transfer options can be supplied as required.
DUNKES has a comprehensive basic range of pneumatic presses for many different kinds of applications. The main point of difference is whether the ram start is activated using the 2-hand system, a joystick or a foot pedal. An advantage of DUNKES joystick control is that the ram is moved absolutely synchronously to the joystick. Optional extras include adjustable table and mechanical depth stop for reproducible reversing accuracy. In the case of straightening presses, the straightening equipment is designed for the operation requirements in accordance with ergonomic principles. These extras enable specific customer requirements to be met exactly. The range of pneumatic presses with constant and direct force is an economic extension to the hydraulic presses at the lower end of the force range.

1. Pneumatic table press with hydraulic dampening unit for the ram axis. 2-hand operation (40 KN)

2. Pneumatic open-fronted press with adjustable table, sensitive handlever control, can be switched to 2-hand operation

3. Pneumatic sensitively controlled straightening press with light-column measurement indicator (20 kN)

- Pressing
- Stamping
- Calibrating
- Punching
- Straightening
- Pressure riveting
- Bending
- Assembling
- Jointing
- Caulking
- Trimming
- Flanging
Whether it is a question of complex automation to improve the manufacturing process, or a concentration on rationalizing production, we always make every effort to offer our international cliente a specific solution to their individual problems.

These specialized solutions require extreme creativity, know-how derived from our core competence and the experience gained by successfully manufacturing, delivering and commissioning over 10,000 machines.

Flexibility, progressive thinking and state-of-the-art technical solutions are important guarantees for the full satisfaction of our customers. We would be pleased to supply first class references from all sectors of industry such as automotive, consumer durables, automotive supplies, machine tools, rail transport, electrical, steel processing, medical, optical, sintering etc.

It goes without saying that we also offer services such as the transport of heavy plant, assembly on site, commissioning, and after-sales service with our skilled personnel.
How to find us...

On the A8 motorway approaching from the Munich/Karlsruhe/Stuttgart/Airport direction:

Drive past the Kirchheim/Teck exit as far as the Kirchheim/Teck-West exit to the Nürtinger Straße, past the DEA and Shell-petrol station. Past the underpass join the left junction to the Zähringerstraße and afterwards the junction to the industrial area Heimenwiesen. Please consider the direction of the narrow!

From the B10 direction Stuttgart/Esslingen/Plochingen

Via the trunk route B313, exit Königen, Wendlingen. From Wendlingen join the Stuttgartter Straße to Kirchheim- Ötlingen. Shortly past the centre of Ötlingen join the Wielandstraße to the industrial area Heimenwiesen. Please consider the direction of the narrow!

By train

Via the ICE or the IC as far as Stuttgart central station. Afterwards take the local train Esslingen/Plochingen to Wendlingen/Neckar.

We wish you a nice journey.