

WORSWICK

DIE CASTING MACHINES



**6 STATION FULLY AUTOMATED GRAVITY DIE CASTING
MACHINE FOR THE PRODUCTION OF CYLINDER HEADS ETC.**

WORSWICK

WORSWICK ENGINEERING LIMITED

Worswick Engineering Ltd manufacture a range of gravity diecasting machines, from single station machines for the production of small parts, up to large rotary multi-station carousel type machines with automatic metal feed, automatic casting extraction and quick die change facilities.

The majority of applications are for the mass production of automotive parts for instance, brake cylinders, engine mountings, thermostat housings, cylinder heads, engine blocks, road wheels and gearbox casings etc. In all cases, the die operation is by hydraulic cylinders, totally relieving the operator of the task of opening and closing the die parts. The control of the die opening and closing is either by means of a mechanical cam system on the simpler smaller machines, or by individual PLC's on each die, which are networked into a central control PLC on the larger machines.

The more complex machines also have the facility to register when a particular die has been placed in position on a machine and keep a log of the production from that die and the other dies mounted on the machine during any period that the machine is in use. All the multi-station rotary machines have facilities for ring mains for gas and air for die pre-heating and many also have the facility of cooling circuits of certain parts of the die when required.

If you have a metal casting requirement and would like to discuss this, please call and we will be pleased to discuss our equipment with you.

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GRAVITY DIE CASTING MACHINES

Multi-station machines with automated, hydraulically powered die and core movements and fully automated hot metal feeding.

MACHINES POUR MOULAGE EN COQUILLE A GRAVITE

Machines à stations multiples avec déplacement des coquilles et des noyaux automatisé et à actionnement hydraulique et alimentation en métal liquide complètement automatisée.

SCHWERKRAFTKOKILLENGIESSMACHINEN

Maschinen mit mehreren Bearbeitungsstationen, automatisierten, hydraulisch angetriebenen Kokillen-und Kernbewegungen und vollautomatisierter Flüssigmetallbefüllung.

MACCHINE DE COLATA A GRAVITA

In queste macchine, a più posizioni, il movimento delle conchiglie ed anime è azionata idraulicamente. L'alimentazione del metallo liquido è completamente automatica.

MAQUINAS DE MOLDEO EN COQUILLA POR GRAVEDAD

Màquinas a puestos multiples con movimientos de coquillas y machos automatizados accionados hidráulicamente y alimentación de metal liquido completamente automatica.





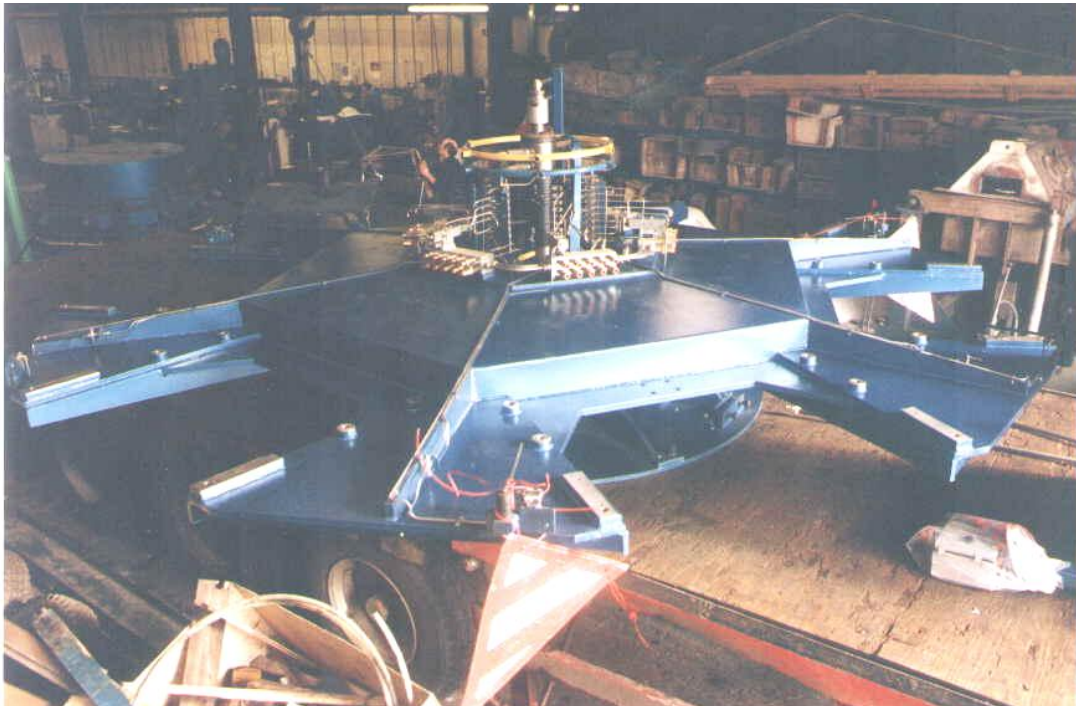
Six station 24 impression gravity die casting machine with automatic twin metal feed.

Machine a couler en coquille de 6 postes et 24 compressions avec double alimentation métal automatique.

Druckgußmaschine mit 6 Stationen, 24 Formen und automatischer zweifach-Metallzuführung.

Macchina per pressofusione, sei stazioni, 24 impressioni a gravità con doppia alimentazione automatico del metallo.

Màquina de fundición layectada por gravedad de seis estaciones y 24 impresiones con dispositivo de alimentación de metal doble automática.



A 5 METRE DIAMETER TURNTABLE WITHOUT DIES.

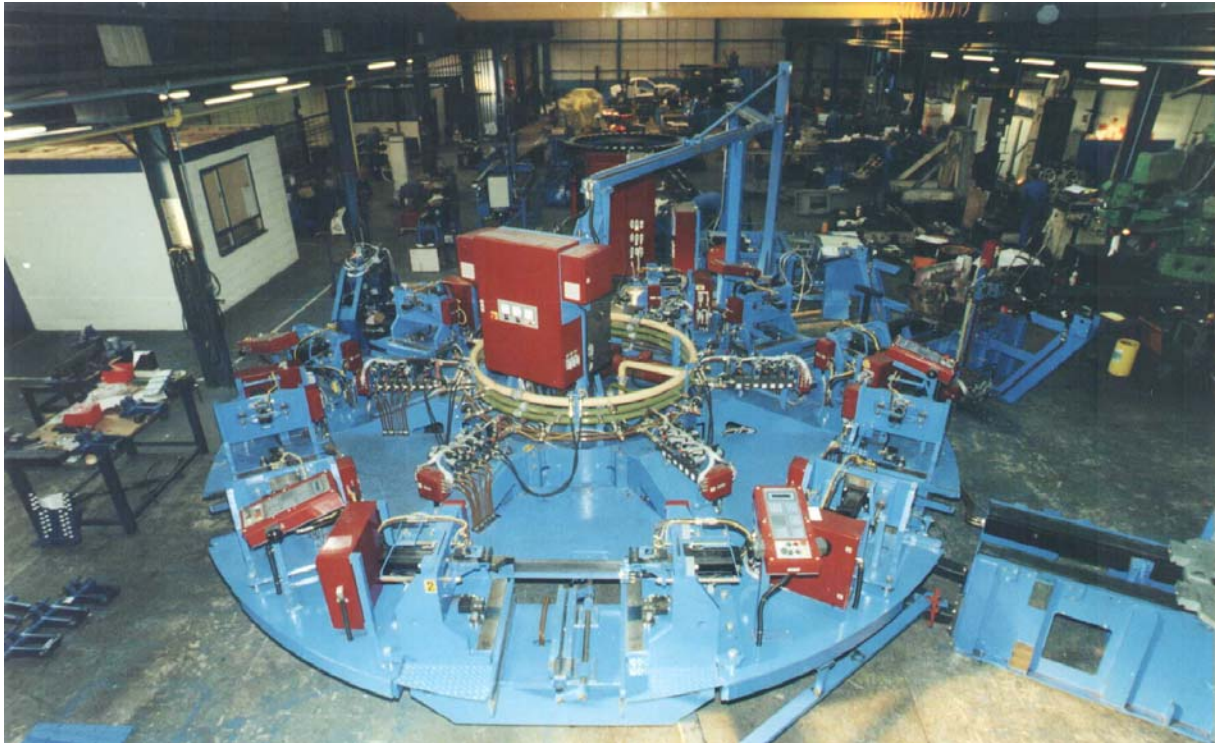
TABLE TOURNANTE DE 5m DE DIAMETRE SANS COQUILLES.

DREHTISCH OHNE KOKILLEN MIT EINEM DURCHMESSER VON 5m.

UNA PIATTAFORMA GIREVOLE DEL DIAMETRO DI METRI 5 SENZA STAMPI.

UNA MESA GIRATORIA DE UN DIAMETRO DE 5m SIN COQUILLAS.

MULTI STATION DIE CASTING MACHINE



6 Station Cylinder Head Casting Machine during construction

The turntable machine can consist of up to 8 stations, each station of which can be fitted with its own PLC which is responsible for the complete control of that particular die. The advantage of this feature is that the die does not have to wait until it comes round to a master station to be manipulated. Each die has its own individual control and cooling time memory such that, as and when each individual cooling cycle has finished, the die will split and open at the optimum time enabling the casting to be ejected in a much more controlled and reliable way. A further advantage of having individual control of the die by fitting a cylinder for every single axis of movement of the die, is that each die can be switched to manual control and each operating cylinder can be cycled individually as required by the operator. During normal operation all die movements are automatically computer controlled and cycled, requiring only confirmation by the operator that the die is clean and fitted with a core package to allow the machine to index to the next position.

The core packages can be loaded automatically, the loading robot giving the machine a signal to confirm that core loading is complete and that the robot is clear of the die. When the newly cored up die is moved into position underneath the pouring robot the necessary interlock signal will be passed to instruct the robot to collect metal in order to pour a new casting. In this case the die can be recognised by a six channel BCD

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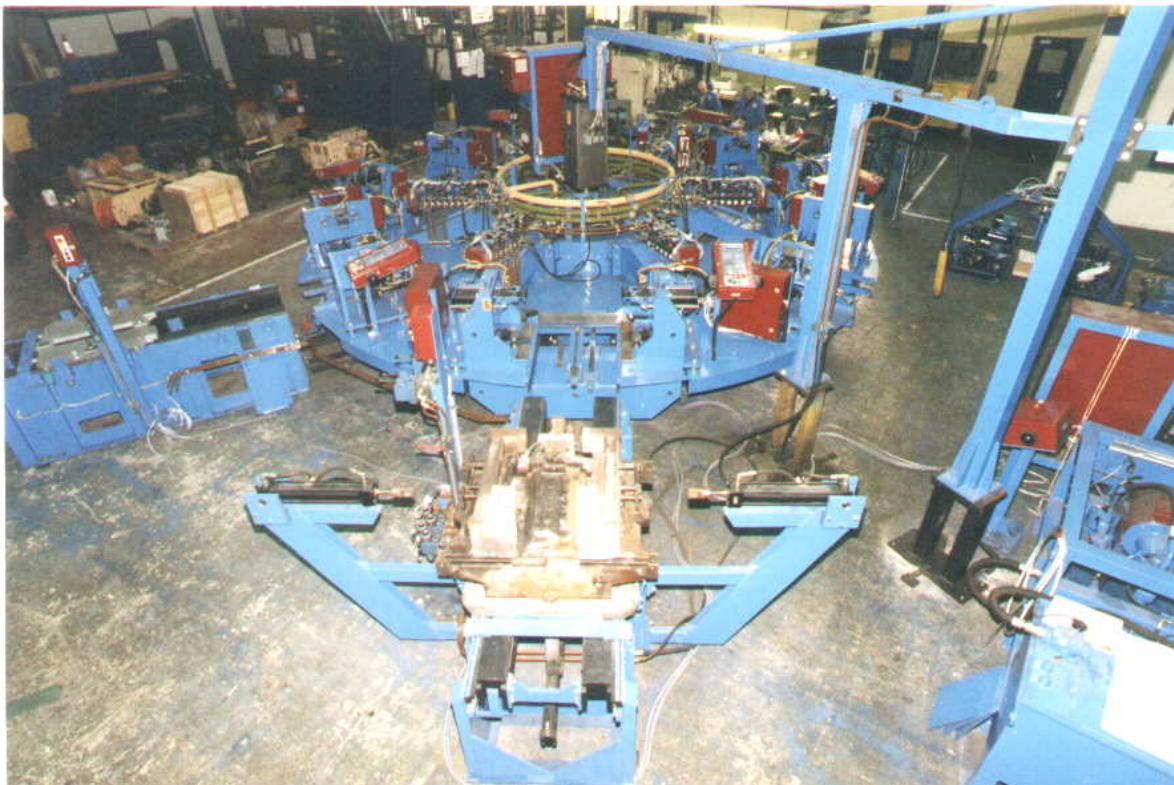
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arranged sensor which can, if necessary, indicate to the pouring robot different pouring cycles or charge weights, such that the robot could automatically calibrate itself for a change of dies fitted to the machine. At the same time that the pouring cycle takes place at the pour point, the following positions cool and their individual cooling time is timed out to allow controlled ejection and at the final position, the computer controlled 'X-Y' gantry for the casting removal is interfaced with the casting machine to remove the newly produced casting and place it onto a casting removal conveyor. The casting extraction gantries can either place the casting on the casting removal conveyor in the same orientation as it was extracted from the die or turn it through 90° as required. The castings can also be tilted through 90° at the inspection station of the gantry so that the lower face of the casting can be visually examined. When all stations have indicated that they are in a safe position and ready for indexing, the table will move one position and the whole cycle starts again.

The machines can also be fitted with two walking beam type conveyors which will load or unload dies to allow hot die changing facilities such that a pre-prepared, coated and pre-warmed die can be fitted to the machine within one index to replace one on which the die coating has been damaged or worn out, thereby substantially reducing down time during the production process.

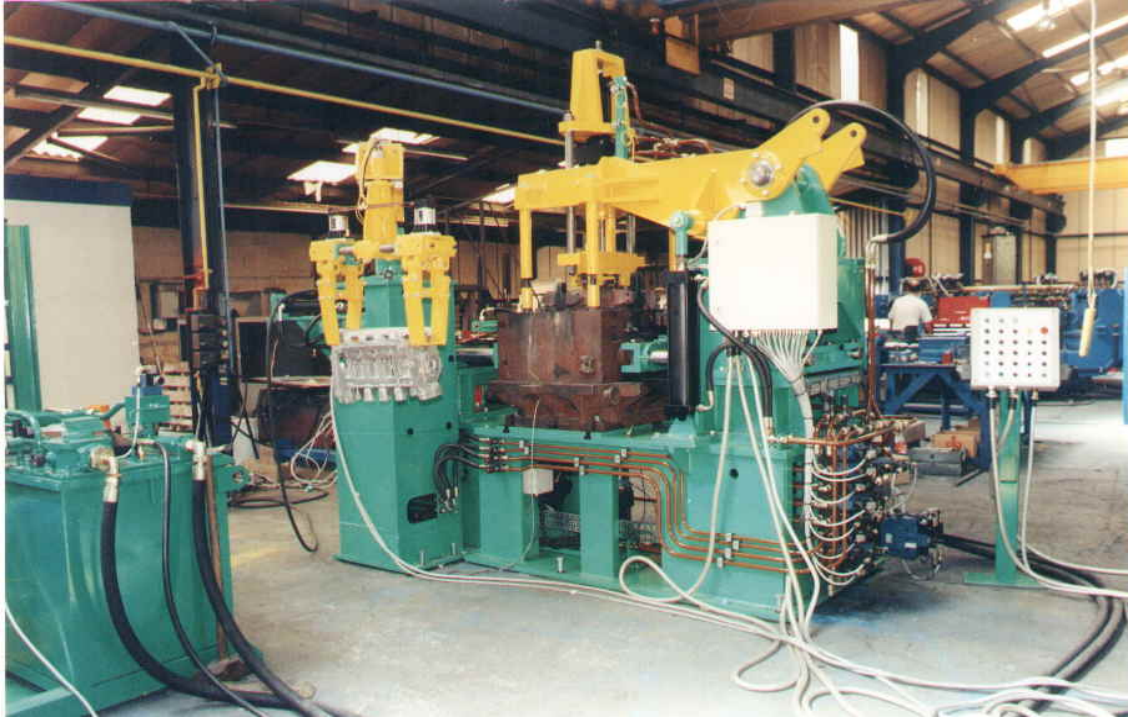
On machines which produce components which are twinned together, the casting removal gantry can place the casting directly into a cropping machine which will automatically remove the feeder bar and thereafter the casting is placed onto the removal conveyor for further operations.

Information from any die blocks and 'X-Y' gantry can be called up on a hardened touch screen 486 computer terminal fitted into the operator station such that he can interrogate any of the inputs and outputs on any of the dies whilst the machine is tuning and also look at the parameters set for the 'X-Y' gantry and the actual position of the gantry at any point. This has the advantage that several menus of gantry positions can be stored, and a change in component production can be set by simply changing the menu to the pre-calibrated values already stored in the computer. Up to four pre-set gantry pick-up points can be stored with the possibility of re-programming any of them for a new product. Also the screen will indicate any alarms that are triggered during the operation of the machine and maintain a history of them for later interrogation or for uploading to a supervisory computer system.



View of a quick die change facility

SINGLE STATION GRAVITY DIE CASTING MACHINE



Single Station Machine with Top Core Assembly
& Casting Removal Device



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CONSTRUCTION & OPERATION

The base of the machine consists of a substantial steel plate mounted on a support structure so that the top of the plate is approximately .75 metres above ground level. The top of this plate is machined and has two traverse T slots, two traverse keyways, each offset from the centre line of the die by an equal amount and two location keyways running the length of the machine, one on either side of the die centre point. At each end of this base plate is a die side operating mechanism, consisting of a large hydraulic cylinder and two guide bars, all fastened to a die attachment plate, which have the facility for two horseshoe clamps to attach this plate to the die sides when required. An identical assembly is positioned on the other end of the die base in order to operate the other die side. On one end of the die assembly is mounted a top core lifting assembly, which consists of a large arm, mounted on a substantial horizontal pivot shaft, and which operates through approximately 110° by means of hydraulic cylinders mounted on the opposite end of the arm to the top core assembly.

The top core assembly is mounted onto an auxiliary bracket on the end of the tilt arm, which has the facility to be lifted or lowered by approximately 200mm in order to pull the core and also to allow it to be lowered in a truly vertical axis, rather than the radial motion produced by the tilt arm lowering. The tilt arm is fitted with four push out studs, which locate on suitable positions on customer's existing die, and is used to assist the extraction of the top core assembly and to stop the hydraulic force of the top core assembly lift cylinder transferring their force to the tilt arm.

On the opposite end of the die base to the top core lifting assembly is a casting pick out unit, which consists of a radial arm mounted on a large pivot shaft, on which it can also be raised and lowered. At the opposite end of the pick out unit is a set of pneumatically operated jaws, which have removable bolt on arms and are manufactured to suit the casting to be made. In addition one 'flip' cylinder is supplied, for rotating a small piece on the side of the main die assembly and facilities are supplied for the connection of a second cylinder on the opposite end of the main die assembly.

A large cylinder under the die bed is supplied for ejection of the casting. A second angled cylinder under the die bed for attachment to the core pin plate of the die is also supplied.

The machine is supplied complete with all cylinders, hydraulic valves and hydraulic power pack of a suitable capacity and is supplied with a control system.

