

PM4

PRECISION STRAIGHTSIDE PRESSES

2,225 - 5,350 kN

250 - 600 US Tons Capacity

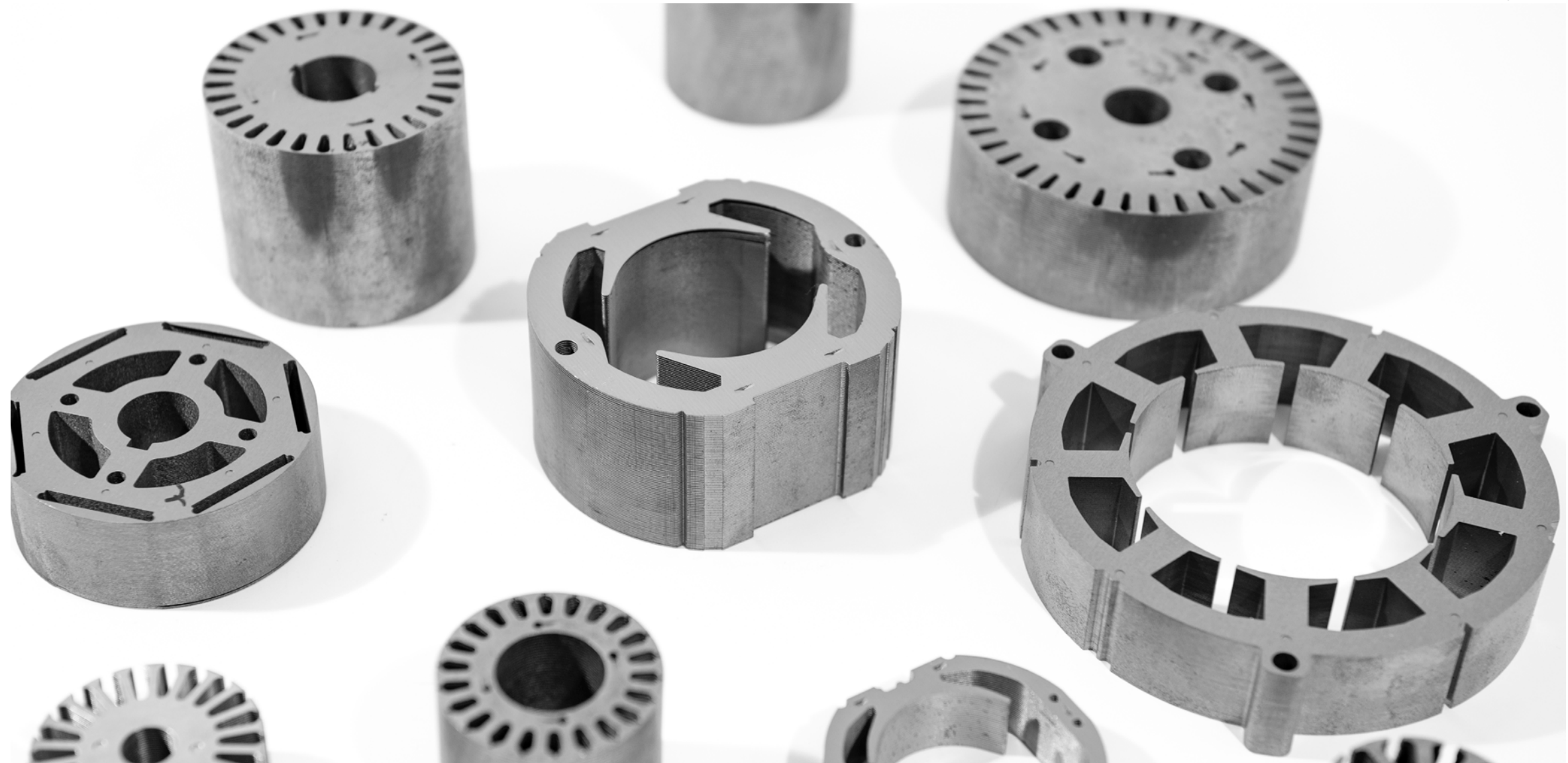


PRODUCT OVERVIEW

Minster Series PM4 presses provide the ultimate in consistent accuracy for automated high speed blanking operations in the 250 to 600 ton range.

Valuable lamination dies last longer in a Minster PM4 because of its unique design. The massive frame, full eccentric shaft with six main bearings, along with the heavy iron connections and massive steel wrist pins combine to provide a machine that is more stable at high lamination speeds with reduced punch penetration.

MINSTER



1 In-Die staking results in Shutheight stabilization, a deep slide with long gib guiding, hydraulic quick lift slide and consistent slide bottom-dead-center repeatability.

2 A reverse load rating (two to four times that of a standard press) and reduced punch penetration as a result of the overall rigidity of the PM4 allows for blanking of high strength material at higher speeds with greater uptime and die life.

3 The Minster PM4 is designed to handle full tonnage dies that range from 50% to 100% of the die space area. Dies even smaller than 50% of the die area can be run on the PM4 if they require less than full tonnage of its die area.

4 Utilization of high tensile cast iron, which has over three times the dampening capability of steel, helps to reduce the vibration in the tooling and extend tool life.

5 Hydrostatic gibbing is used to maintain the parallelism between the PM4 slide and bolster. When subjected to an off-center load, the pressure in the hydrostatic pads automatically adjusts to resist the off-center force.

6 The quick lift feature on the PM4 provides the operator with an additional 3" (75 mm) to inspect and troubleshoot the die. In addition, this feature provides a quick method of releasing die jams, eliminating the need for hydraulic tie rod nuts without adjusting shutheight.

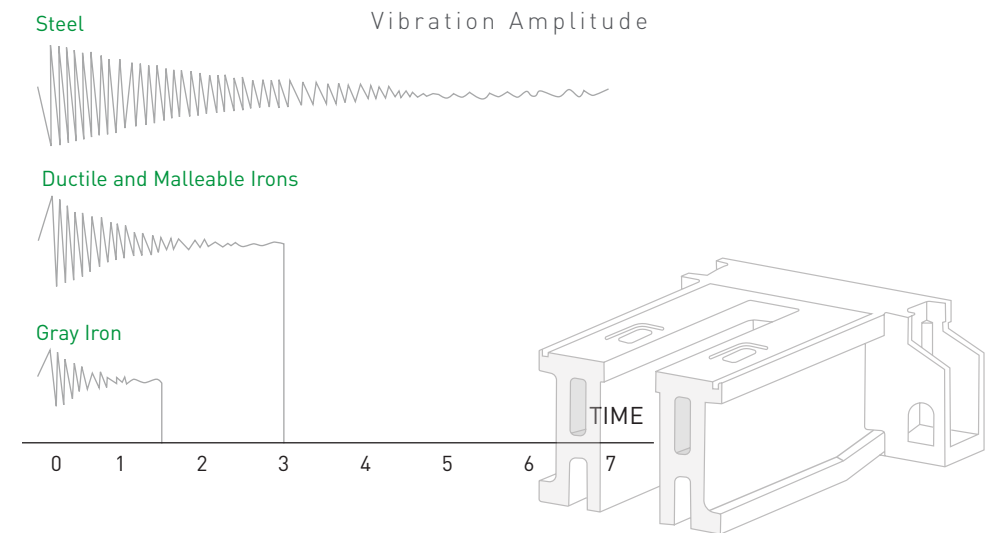


STANDARD FEATURES

Massive Frame Construction

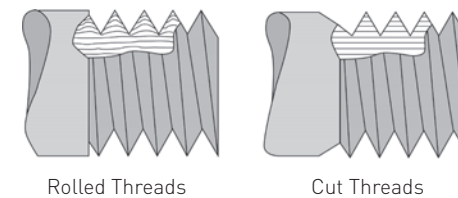
The PM4 boasts a massive four-piece, preloaded frame utilizing high tensile cast iron for the ultimate in vibration and noise dampening. The ultra-low deflection cast bed includes two double walls which reduce front-to-back deflections by 33% over industry standards for general purpose presses. This gives the user the flexibility to run small, full tonnage dies on a large press while maintaining part quality and extending die life.

Iron has 2.5 to 4.5 times the dampening capability of steel. Therefore, the PM4 utilizes castings in all of its beds, slides, uprights and crowns to dampen vibration and noise created in high vibration and high snap-thru applications.



Large Tie Rods

All PM4 presses have large tie rods with rolled threads. Rolled threads are capable of handling up to three times the load of standard cut threads. This added capability is essential in the event of an overload situation.



Wide Upright Openings

Large upright openings allow feeding of wide material.

Minster Patented VibCoach

Production Vibration Severity Monitoring System provides a continuous "real-time" identification of the long term die & press reliability level. The VibCoach is recommended for presses with normal operations above 200 SPM and can be used with any die operating within the press. VibCoach advises the press operator or production supervisor of any changes in production vibration severity caused by changes in production speed, material, and/or die setup. The VibCoach includes the StatusAlert™ console mounted light tower which provides a quick visual indication of the vibration reliability level during production.

STANDARD FEATURES

Patented Minster Hydraulic Clutch and Brake Unit

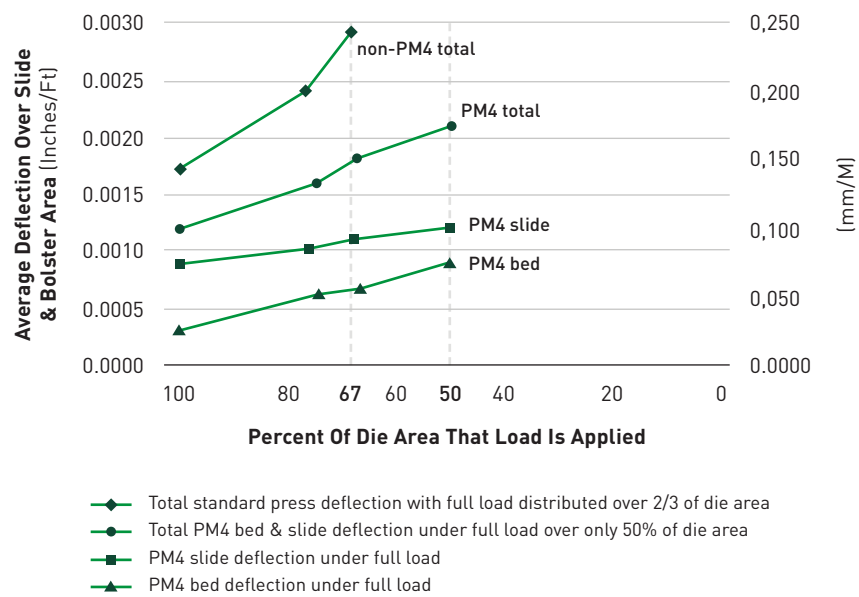
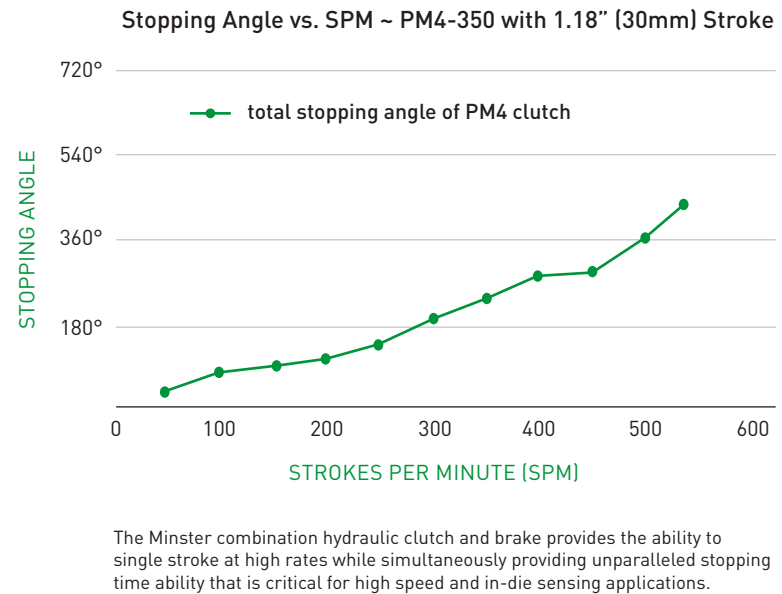
Minster's combination hydraulic clutch and brake produces the maximum torque possible providing for faster starting and stopping. A patented segmented drive disc design provides safe and reliable operation, variable clutch torque and easy maintenance.

Segmented friction material allows for easy replacement without removal of the clutch and brake discs. In addition, Minster's clutch and brake unit requires no adjustment, resulting in less downtime and higher production rates.

Lower Deflection & Greater Flexibility

Standard presses are designed to have a bed deflection of 0.0015" to 0.002" per foot (0,125 to 0,167 mm/m) when full-rated tonnage is distributed over two-thirds of the bed. In addition, the slide deflection of a standard press will be approx. 1.5 times more than the bed deflection.

As shown, the PM4 has been designed with extremely low deflection providing the ability to run tighter punch-to-die clearance, as well as the flexibility to run small, full tonnage dies on a large press while maintaining part quality and die life.



Eight-Point Hydrostatic/Hydrodynamic Gibbing For Precision Slide Guiding

The PM4 slide guiding system incorporates both hydrostatic and hydrodynamic bearing technology. This combination of technologies provides:

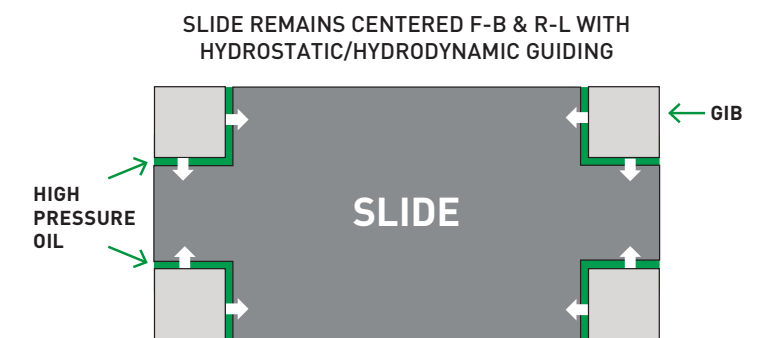
- Greater resistance to off-center loading than either standard oil film or roller bearing guided gibs.
- Extreme overload capacity for shock loading.
- Centering of slide in a static condition.

Hydrostatic Gib Monitoring

This system will top stop the press if the gibs' clearance is closed-in due to a set up problem or other issue. The hydrostatic gib monitoring system is comprised of twelve pressure transducers positioned in the lubrication circuit to sense the gib pressure on both the main and auxiliary gibs.

The Basics of Hydrostatic / Hydrodynamic Technology

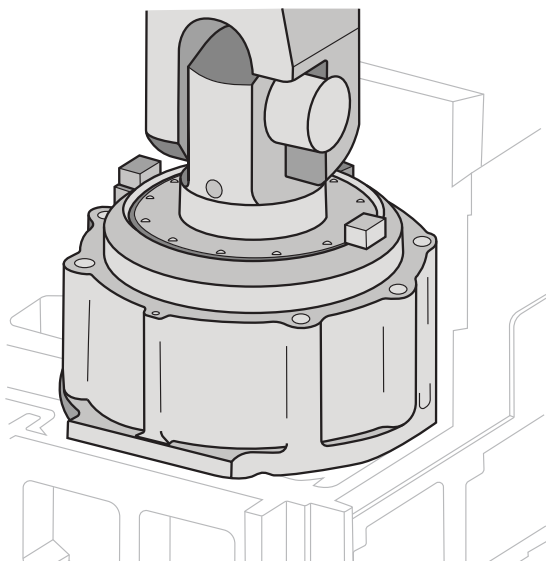
Twelve, separate, hydrostatic pads are machined into the extra-wide gib surfaces of the PM4. When an off-center force attempts to tip the slide, the oil pressures at these pads change independently to offset the force and maintain exceptional slide parallelism.



STANDARD FEATURES

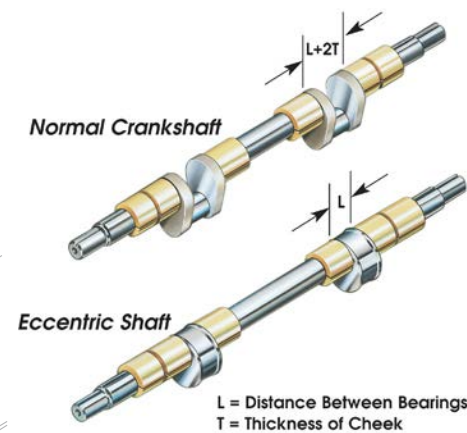
Full Wrist Pins

Full wrist pins, supplied with high-pressure oil, provide superior snap-thru ratings with reduced wear and deflection. The high tensile stiffness of this design results in improved bottom-dead-center repeatability along with reduced die punch penetration which are critical during high tensile blanking operations. In a snap-thru condition, a wrist pin is subjected to pure shear forces while the connection is only subjected to simple tension forces. Comparatively, when a ball and socket design is subjected to snap-thru, in addition to the shear and tension forces, the ball bushing and retainer are also subjected to bending moments which create a more severe stress situation.



Eccentric Shaft

Minster's one-piece forged eccentric crankshaft is precision ground, holding high throw-to-throw accuracies that provide superior dynamic parallelism and increased die life in close tolerance dies. Eccentric shafts provide more accuracy and higher rigidity than eccentric gears or crankshafts, and they have approximately 33% more load bearing area and less deflection than a standard crankshaft. This design significantly increases the press's ability to handle snap-thru forces as compared to a crankshaft or eccentric gear design.



Reverse Load Rating

The combination of the PM4's hydrodynamic drive bearings, forged eccentric shaft, heavy ductile connections, full wrist pins, and slide adjustment screws with hydraulic locked buttress threads, provide the PM4 with a reverse load rating two to four times that of standard presses. This high rating minimizes punch penetration and provides increased capability for blanking and piercing applications.

Hydrodynamic Drive Bearings

Advantages of Hydrodynamic Bearings:

- Indefinitely long life with full film lubrication.
- High load capacity.
- Load capacity and stiffness increase w/speed.
- Extreme overload capacity for shock loading.
- High vibration dampening.
- Replacement involves only limited disassembly.

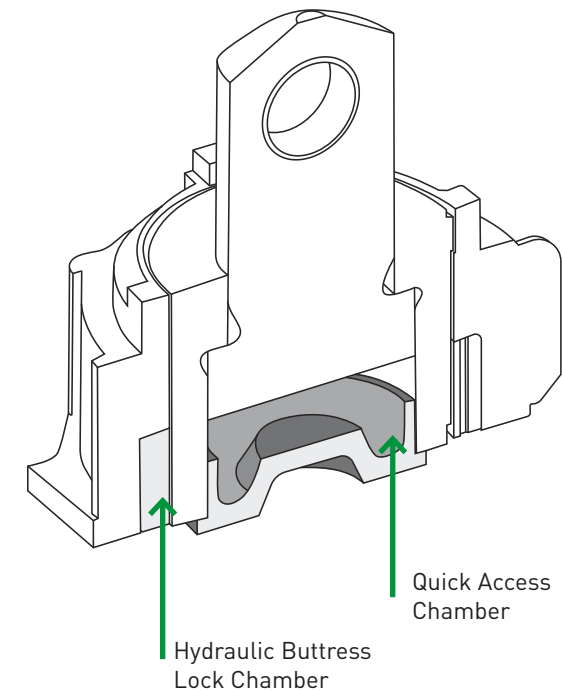
Roller Bearing Weaknesses:

- Statistically predictable limited life.
- Shock load capacity no greater than static load capacity.
- Severe overloads produce brinelling.
- Replacement involves extreme disassembly.

Quick Access Feature

The Quick Access feature on Minster PM4 presses enables easy access to the die. Advantages of this feature include:

- Allows the user to raise the slide 3" (75mm) providing quick and easy access to thread material, inspect the die or release material.
- Eliminates the need for hydraulic tie rod nuts.
- After use, mechanical stops ensure the slide is returned to the exact shutheight position and parallelism that it maintained prior to use. This is not possible with a screw-type mechanism.
- Allows the user to select a press with the minimum stroke length for the application without sacrificing the operator's ability to inspect or change tooling. Utilizing a shorter stroke length minimizes the slide velocity resulting in reduced impact loading, reduced tool vibration, increased tool life and increased production speeds.
- The pressurized quick lift chamber provides a preload exceeding the press tonnage.



Hydraulic Locking

Clearance in the slide adjustment screw and nut mechanism are eliminated by compression of the nut diameter with high pressure oil. This reduces vibrations resulting from snap-thru forces during blanking, improves die life, and eliminates the possibility of the slide adjustment "creeping" under load.

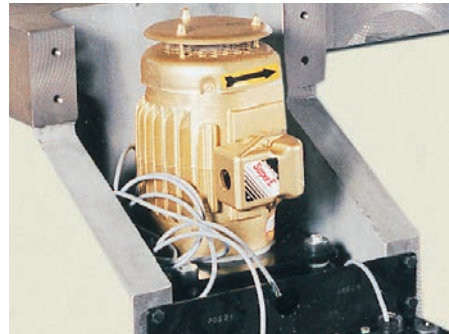
Motorized Slide Adjustment

The slide adjustment on the PM4 is driven by a hydraulic motor connected to hardened worm shafts with zero backlash couplings and is supported on anti-friction bearings. The adjustment mechanism includes a shock mounted electronic resolver to display and adjust shutheight on the press console.

STANDARD FEATURES

Monitored Lubrication With Variable Frequency Regulation

All main and connection bearings have full film lubrication with pressurized oil supplied to each bearing from within the crankshaft. This system is designed to stop the press in the event of reduced oil pressure thereby preventing damage to the machine. A variable speed lube pump motor with pressure transducer feedback maintains constant oil pressure through plant ambient and press temperature variations. The consistent oil film gives the ultimate dynamic bearing stiffness and longevity resulting in better bottom-dead-center repeatability and longer die life.



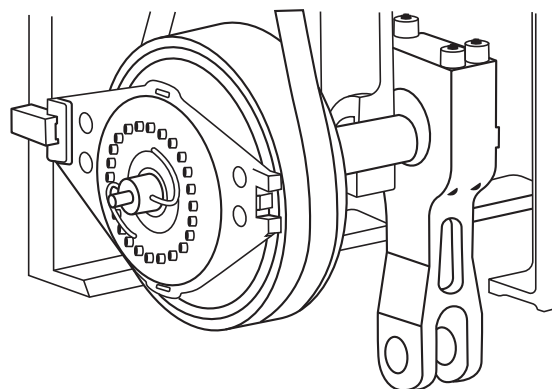
Lube motor pump assembly mounted in right hand rear press bed leg.



Hydraulic motor pump assembly mounted in left hand rear press bed leg.

Flywheel Drive Arrangement for Maximum Efficiency

The Minster PM4 Series presses are flywheel type presses running at higher speeds for punching, notching, and blanking operations on lamination materials. The clutch and brake unit is mounted on the eccentric shaft and the flywheel rotates on anti-friction bearings.



Drive Motor

The PM4 variable frequency main drive motor is totally enclosed, fan cooled, variable speed and provides proven durability and increased torque response to offer these benefits:

- Simplified control unit for easy troubleshooting
- Interchangeable controller
- Belt pull will not affect internal motor bearings

Dynamic Balancing

The Dynamic Balancing System on the PM4 greatly reduces the effect of the slide inertia forces caused by running at high speeds. This reciprocating balancer helps maintain precise slide bottom-dead-center repeatability resulting in less die wear and greater part accuracy. It also allows the press to run at higher speeds and reduces press vibration.

Crankshaft Extension

Minster provides as standard, one crankshaft extension opposite the drive side of the PM4. This extension is available to drive the user's auxiliary equipment such as feeds, scrap cutters, or mechanical die indexers.

Production Management Control (PMC)

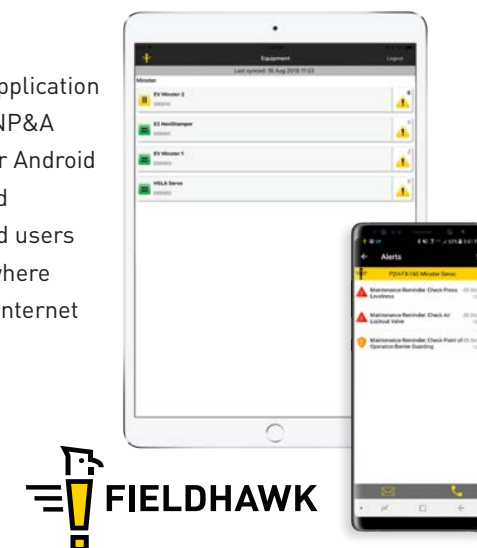
Incorporates all press functions including:

- Full machine diagnostics detailing all press and feed line faults.
- Multiple selectable languages.
- Open architecture which allows for greater convenience in planning and maintenance.
- PLC and color touch screen technology; all press and feed line functions can be monitored for efficient diagnosis of production line faults.

Available popular options include: die protection, load monitoring as well as automatic shutheight and counterbalance controls.

FieldHawk - Industry 4.0

FieldHawk is a cloud-based mobile application designed to communicate with your NP&A stamping press lines from your iOS or Android mobile devices. Cloud-based, secured communications allows all authorized users to check machinery status from anywhere you can get phone service and/or an internet connection, thus reducing downtime.



Additional Standard Features

- Die Area Guarding
- Control Pedestal Located on Feed Side
- Pedestal-Mounted Control Station
- Pedestal-Mounted Run Station
- Press Stop Control Buttons Mounted on Each Upright
- (2) Press Top Stop Control Buttons (One each on front and rear)
- 16-Pole Programmable Limit Switch
- Non-Reversing Drive Motor Starter

OPTIONAL FEATURES

Adjust-In-Motion

- Allows micro-adjustment of the shutheight while running.
- Accurate change feedback
- Helps maintain bottom-dead-center repeatability.

Automatic Shutheight Adjustment

Will automatically set the shutheight to the predetermined tool storage value, reducing setup time. Manual shutheight adjustment can still be achieved via the operator's input on the control.

Available Popular Options:

- Coil line interconnects
- Additional part blow-off valve
- Sliding set-up station
- Additional tool storage
- Die protection with auto tune technology
- Load Monitoring
- Automatic shutheight and adjust-in-motion control



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- Electrical Vehicle (EV)
- Lamination
- Container Cupping
- Container End-Conversion
- Container Shell
- Gap/D-Frame

AUTOMATION

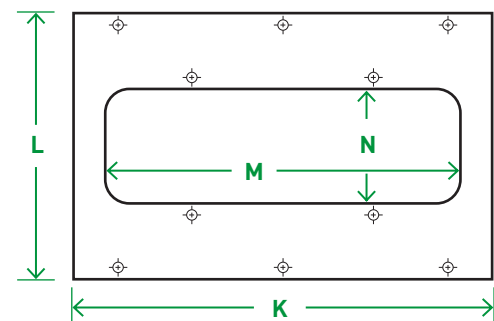
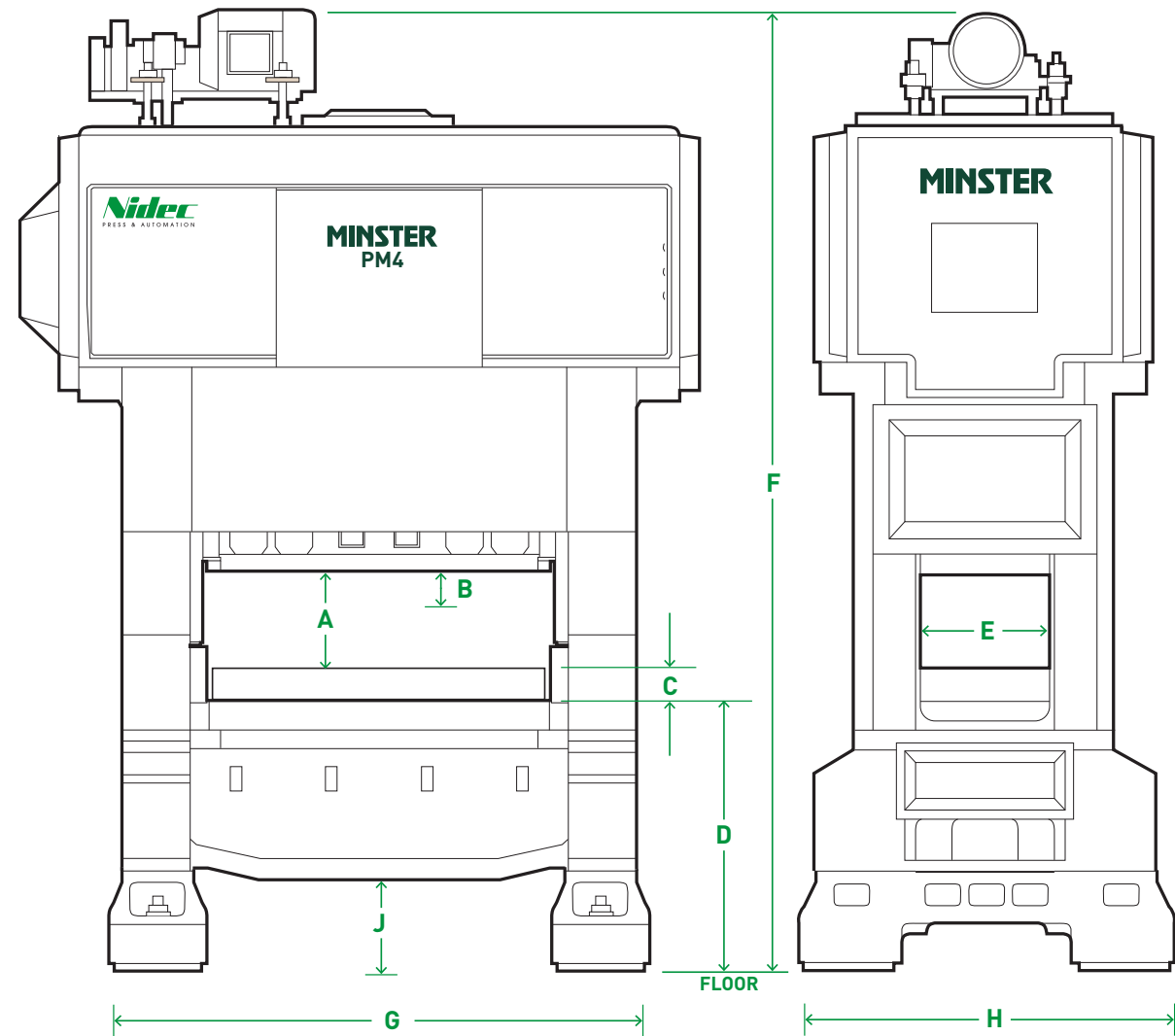
- Press Tending / Robotics
- Integrated Transfers
- High Speed Servo Feeds
- High Speed Gripper Feeds
- Heavy-Duty Coil Lines

GLOBAL SERVICE NETWORK

- Field Service
- Remanufacturing
- Spare Parts
- Technical Service
- Training
- Planned Maintenance
- Inspection & Audit
- Relocation
- Upgrade Services
- Engineering Services



SPECIFICATIONS & DIMENSIONS



	PM4-250	PM4-350	PM4-450	PM4-600
Drive Type	Flywheel Drive	Flywheel Drive	Flywheel Drive	Flywheel Drive
Tons Capacity	2,225 kN @ 1.6mm 250 @ 0.06in off bottom	3,100 kN @ 1.6mm 350 @ 0.06in off bottom	4,000 kN @ 1.6mm 450 @ 0.06in off bottom	5,350 kN @ 1.6mm 600 @ 0.06in off bottom
Slide Stroke vs. Speed	STROKE 30 mm 1.18 in	MAXIMUM SPEED 100-535	STROKE 30 mm 1.18 in	MAXIMUM SPEED 100-525
	35 mm 1.38 in	100-490	35 mm 1.38 in	100-475
	40 mm 1.57 in	100-450	40 mm 1.57 in	100-425
Quick Access Slide Travel	75 mm ~ 2.95 in	75 mm ~ 2.95 in	75 mm ~ 2.95 in	75 mm ~ 2.95 in
E Upright Opening	700 mm ~ 27.5 in	700 mm ~ 27.5 in	1,054 mm ~ 41.5 in	1,200 mm ~ 47.5 in
KxL Area of Bolster and Slide (R-L x F-B)	2,200 x 1,100 mm 86.6 x 43.3 in	2,200 x 1,205 mm 86.6 x 47.5 in	2,550 x 1,400 mm 100.5 x 55.1 in	3,050 x 1,500 mm 120.0 x 59.0 in
		3,050 x 1,205 mm 120.0 x 47.5 in	3,050 x 1,400 mm 120.0 x 55.1 in	
MxN Opening in Bolster (R-L x F-B)	1,900 x 380 mm 74.8 x 15 in	1,900 x 350 mm 74.8 x 13.78 in	2,250 x 470 mm 86.6 x 18.5 in	2750 x 520 mm 108.25 x 20.5 in
		2,750 x 350 mm 108.2 x 13.78 in	2,750 x 470 mm 108.2 x 18.5 in	
Opening in Bed (R-L x F-B)	1,950 x 370 mm 77.0 x 14.5 in	1,950 x 380 mm 77.0 x 15.0 in	2,300 x 520 mm 90.6 x 20.5 in	2800 x 570 mm 110.25 x 22.5 in
		2,800 x 380 mm 110.2 x 15.0 in	2,800 x 520 mm 110.2 x 20.5 in	
Flywheel Energy	22 In. Tons @ 100 SPM .063" (*1.6mm) off bottom	22 In. Tons @ 100 SPM .063" (*1.6mm) off bottom	28 In. Tons @ 75 SPM .063" (*1.6mm) off bottom	38 In. Tons @ 65 SPM .063" (*1.6mm) off bottom
Max. Upper Die Weight	1,000 kg ~ 2,200 lbs	1,000 kg ~ 2,200 lbs	1,200 kg ~ 2,640 lbs	2,200 kg ~ 4,840 lbs
Main Bearing Diameter	215 mm ~ 8.5 in	215 mm ~ 8.5 in	240 mm ~ 9.5 in	280 mm ~ 11.0 in
A Shutheight Range on Bolster (S.D.A.U.)	275-450 mm 10.83-17.72 in	375-550 mm 14.76-21.65 in	275-475 mm 10.83-18.70 in	330-590 mm 13.0-23.23 in
			375-575 mm 14.76-22.64 in	
B Shutheight Adjustment	175 mm ~ 6.88 in	175 mm ~ 6.88 in	200 mm ~ 7.87 in	260 mm ~ 10.25 in
C Bolster Thickness	180 mm ~ 7.09 in	180 mm ~ 7.09 in	200 mm ~ 7.87 in	230 mm ~ 9.06 in
D Floor to Top of Bed (with Spring Mounts)	1,550 mm ~ 61.0 in	1,550 mm ~ 61.0 in	1,955 mm ~ 77.0 in	2,085 mm ~ 82.0 in
J Bed Clearance to Floor (with Spring Mounts)	585 mm ~ 23.0 in	585 mm ~ 23.0 in	840 mm ~ 33.0 in	785 mm ~ 31.0 in
F Overall Height (with Spring Mounts)	5,970 mm 235 in	6,070 mm 239 in	7,150 mm 282 in	7,800 mm 307 in
			7,250 mm 286 in	
G Floor Space (R-L)	3,505 mm ~ 138.0 in	3,505 mm ~ 138.0 in	4,090 mm ~ 161.0 in	4,595 mm ~ 181.0 in
H Floor Space (F-B)	2,415 mm ~ 95.0 in	2,415 mm ~ 95.0 in	2,750 mm ~ 108.3 in	3,100 mm ~ 122.0 in
Approximate Weight	68,500 kg 151,000 lbs	68,500 kg 151,000 lbs	120,200 kg 265,000 lbs	158,800 kg 350,000 lbs
		78,000 kg 171,000 lbs	129,500 kg 295,000 lbs	



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