Solutions for the Hot Forming Process

MHFS02-EU

PHD solutions for parts to handle:

A & B Pillars

Frame Tunnels

Side-Impact Supports

Roof Rails

Rocker Panels

Reinforcements

PHD is a member of the MAC Distributor Network

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SOLUTIONS FOR INDUSTRIAL AUTOMATION

www.phdinc.com

PHD is Your Hot Forming Solutions Provider

to fit your high temperature applications

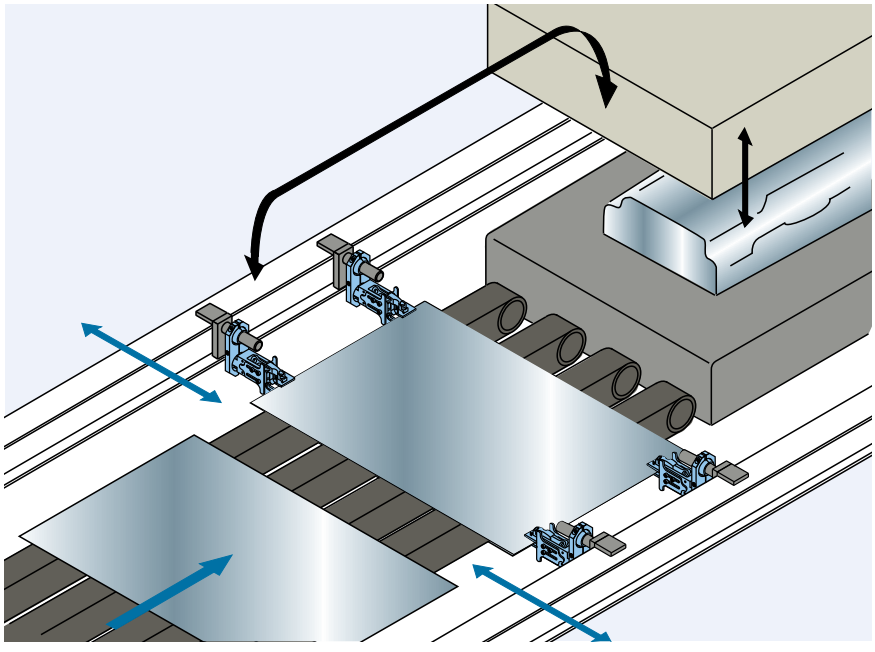
Established in 1957, PHD has provided over 60 years of experience in developing and manufacturing products for automation and parts handling.

PHD has been involved in supporting the automotive industry since it began in business. Twenty years ago, PHD developed specific high end solutions for challenging applications in press shops with the release of the Series GRM Clamp.

The Series GRM Clamp continues to be the industry-leading pneumatic actuator of choice for material handling solutions worldwide. Its simple design and rugged construction have proven customer satisfaction and loyalty since 1998. Three standard sizes (25, 32, and 40 mm bores), 13 standard jaw styles, and countless options and accessories, make the Series GRM Clamp the most versatile and modular clamp in the world.

Each and every aspect of the Series GRM Clamp was influenced by you, our customer. We pride ourselves in providing a product that suits your specific application needs. The Series GRM Clamp is a product that is meant to work for you and not a product that you make work. Contact your local distributor or PHD to learn more about Series GRM Clamps.

- Unique patented design ensures long life, increasing reliability and productivity
- Compact envelope size and light weight increase cycle rate
- Easily configure your clamp based on a large variety of possible solutions through our modular design
- Industry-proven design



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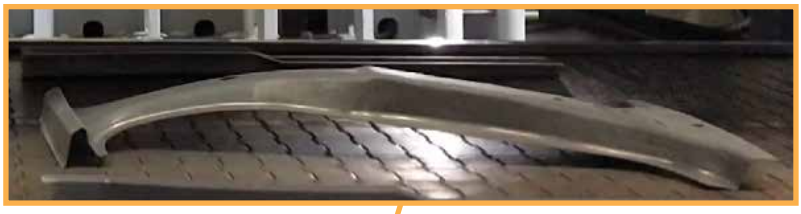
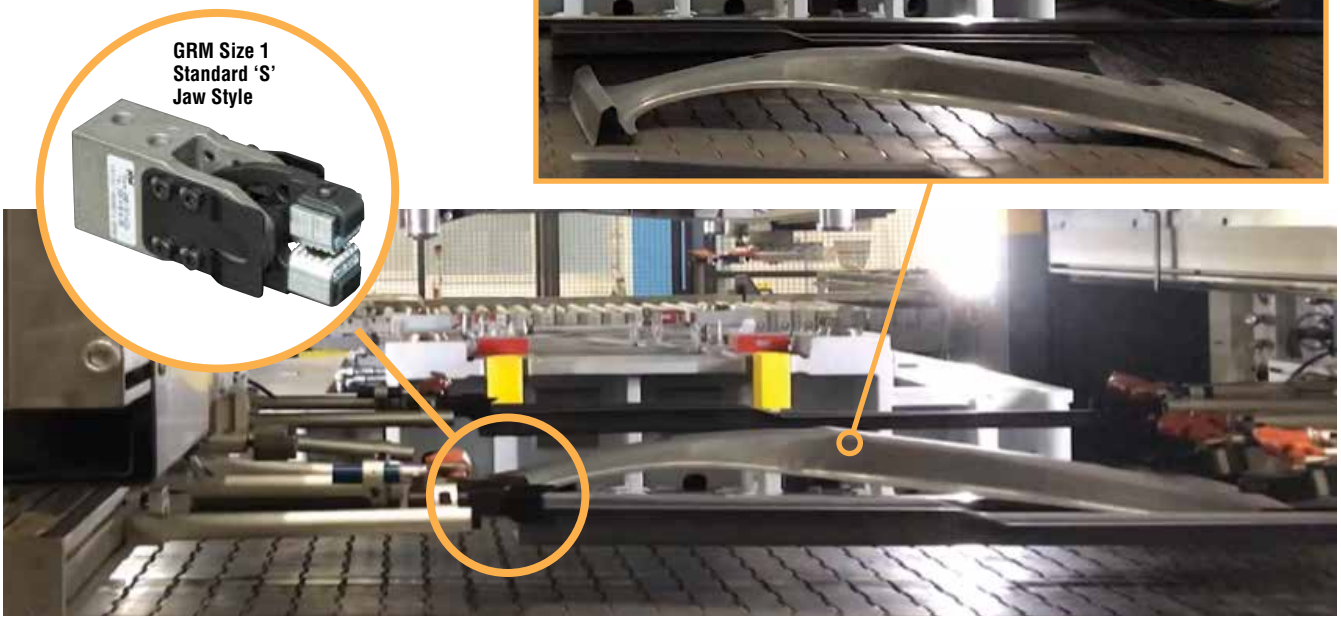
Hot Forming Application

Hot forming or hot stamping is the process of heating steel to approximately 1742°F [950°C] where it is then formed in water-cooled dies for a certain time. The end result is a part that is two to three times the strength of conventionally stamped parts. Automotive parts that utilize this process may include A and B pillars, frame tunnels, side-impact supports, roof rails, and rocker panels.

PHD has been involved in designing and implementing solutions for hot stamped pressings as the technology was being developed.

PHD has about ten years of experience with respect to the hot stamping process and our expertise enables us to fully understand the challenging requirements of this forming process.





PHD Solutions at Work

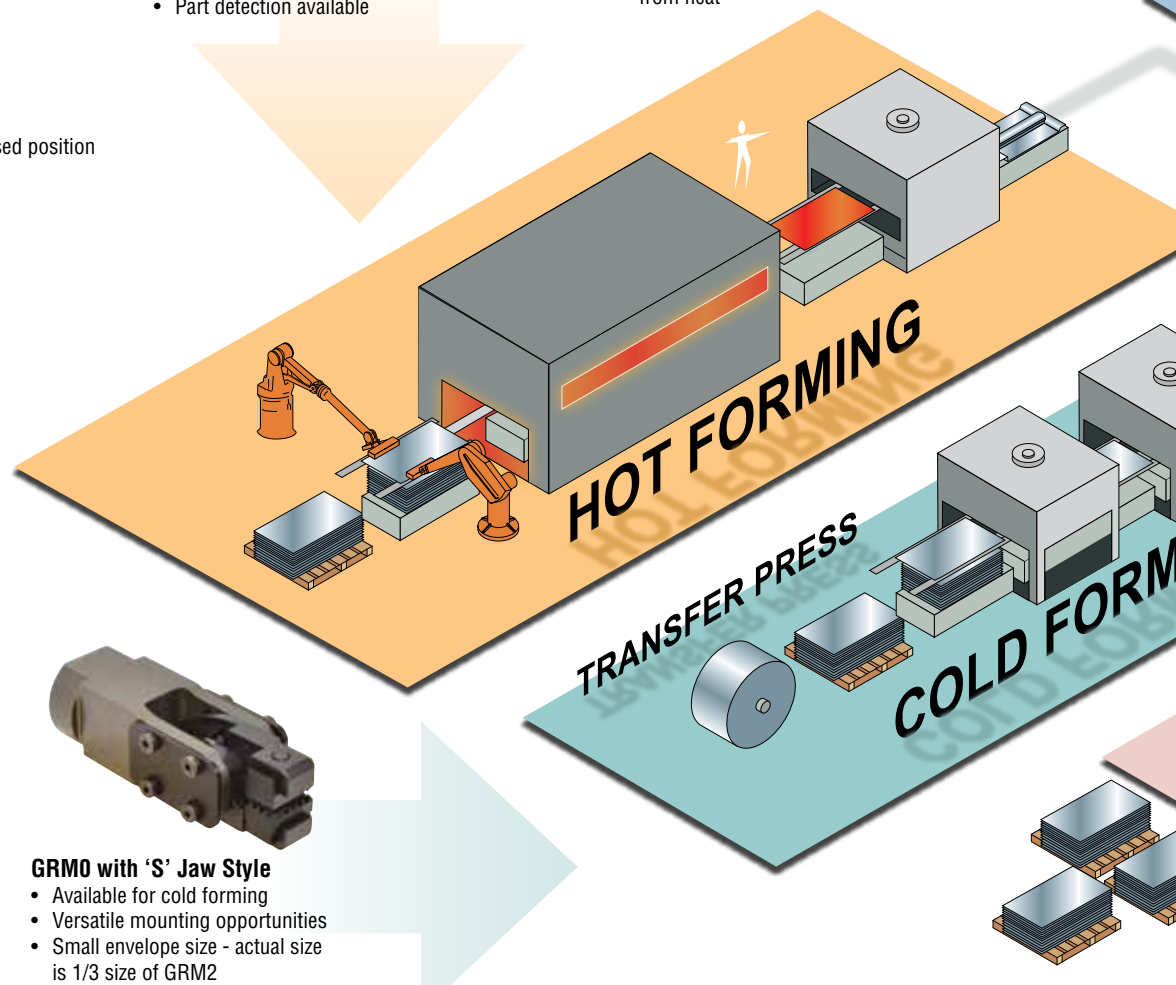
With its wide range of solutions for parts handling, PHD provides the appropriate solution for your hot stamping needs. Our engineers are able to adapt solutions to your specific requirements.

GRM sizes 1, 2, and 4
- High clamp forces
- Mechanically locks in closed position
- Flexibility
- Durability

GRM1 with Unique Body and Unique Jaws
- Custom-built hot forming clamp
- Designed to suit space restrictions on jaw movement
- Part detection available

GRM2 with Jaw Extension & Heat Shield
- High performance at panel temps exceeding 1742°F [950°C]
- Rear manifold moves plumbing away from heat source
- Heat dissipating shields minimize radiant heat transfer
- Specially coated tips to insulate jaws from heat

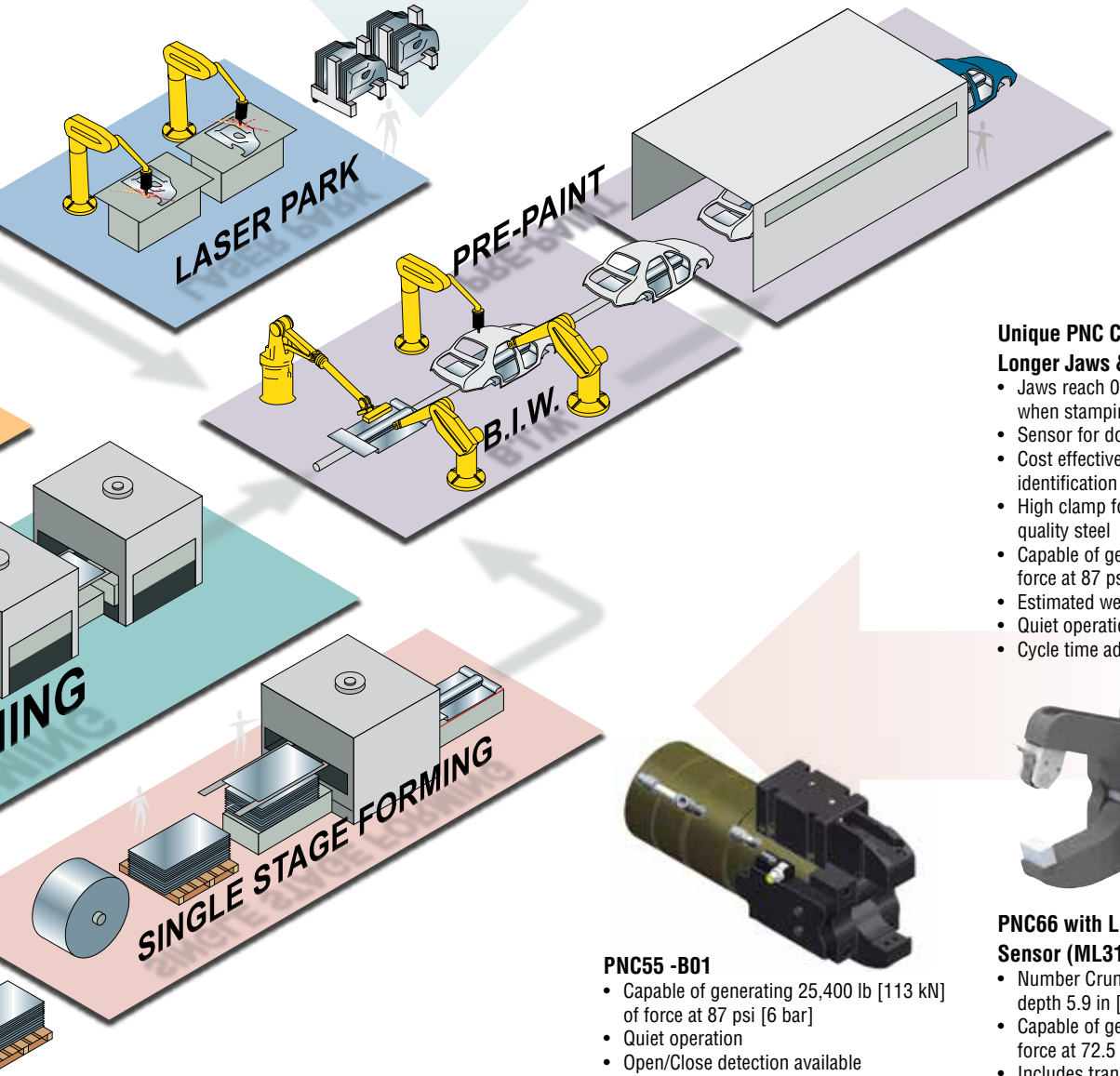
GRM0 with 'F' Jaw Style
- Suitable for sheet metal handling and cold forming
- Versatile mounting opportunities
- Small envelope size - actual size is 1/3 size of GRM2
- Light weight
- Big benefit at small build space



GRM0 with 'S' Jaw Style
- Available for cold forming
- Versatile mounting opportunities
- Small envelope size - actual size is 1/3 size of GRM2
- Light weight
- Big benefit at small build space

Magnetic Gripper (86560)
- Ideal for destacking/stacking
- Cold forming applications
- Compact size
- Cycle time advantage

PB Swing Clamp
- Space saving alternative to conventional “arm over clamp”
- Defined rotational and linear stroke
- 4 sizes available



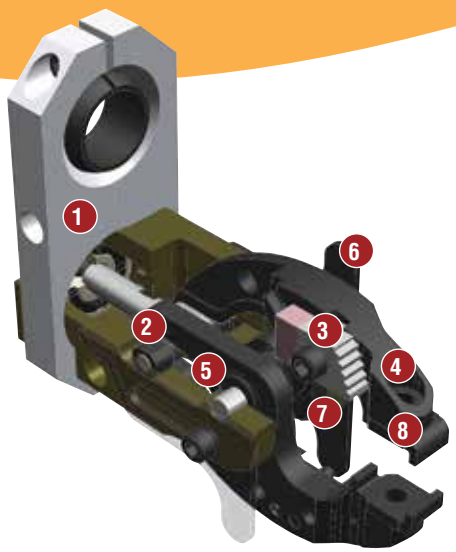
Unique PNC Clamp with Longer Jaws & Special Sensor
- Jaws reach 0.630 in [16 mm] further into part when stamping
- Sensor for double sheet detection available
- Cost effective solution for stamping identification characters into parts or material
- High clamp force produces characters in draw quality steel
- Capable of generating 40,915 lb [182 kN] of force at 87 psi [6 bar]
- Estimated weight 121 lb [55 kg]
- Quiet operation
- Cycle time advantage

PNC55 -B01
- Capable of generating 25,400 lb [113 kN] of force at 87 psi [6 bar]
- Quiet operation
- Open/Close detection available
- Double sheet detection available
- Versatile numbering heads or retainers available
- Reliable and durable
- Cycle time advantage

PNC66 with Long Jaws and Positioning Sensor (ML317577)
- Number Cruncher® with extended jaws, jaw depth 5.9 in [150 mm]
- Capable of generating 24,280 lb [108 kN] of force at 72.5 psi [5 bar]
- Includes transducer for double sheet detection
- Quiet operation
- Reliable and durable
- Shown with optional numbering head and anvil
- Cycle time advantage

GRM Sizes & Jaw Styles

Greater Clamping Forces, Flexibility, Durability, & Low Cost



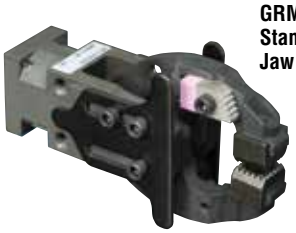
Locks closed!

GRM Size 0 Standard 'S' Jaw Style

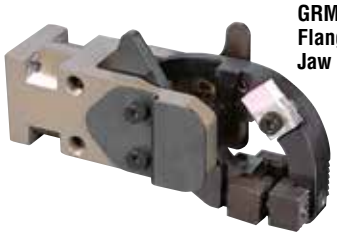
GRM Size 0 Flange 'F' Jaw Style

GRM Size 1 Standard 'S' Jaw Style

GRM Size 1 Flange 'F' Jaw Style



GRM Size 2 Standard 'S' Jaw Style



GRM Size 2 Flange 'F' Jaw Style

GRM Clamp Features

1. Fixed or spherical mounting brackets for side or rear mounting
2. Cam design locks clamp in the closed position ensuring part retention if air pressure is lost
3. Adjustable rotation stop allows for multiple jaw openings in one clamp (Sizes 2 and 4)
4. Interchangeable hardened-steel jaws minimize costly inventory and maximize wear resistance for long life
5. Field repairable in 10 minutes using metric hex wrenches
6. Adjustable hardened-steel impact plates eliminate damage to body from panel impact
7. Wide and deep jaw throats accommodate difficult clamping applications
8. Self-locking internal threads throughout eliminate need for thread locking adhesives or additional locking components

UNIT SIZE COMPARISON 1

SERIES & JAW STYLE	SIZE	TOTAL GRIP FORCE		MAX. ENVELOPE SIZE						MAX. WEIGHT	
				LENGTH		WIDTH		HEIGHT			
		lb	N	in	mm	in	mm	in	mm	lb	kg
GRMxS	0	135	600	4.074	103.5	1.512	38.4	2.430	61.7	0.53	0.24
	1	225	1001	4.724	120.0	1.771	45.0	3.170	80.5	0.97	0.44
	2	225	1001	6.453	163.9	2.336	59.3	5.444	138.3	2.10	0.95
	4	500	2224	8.799	223.5	2.662	67.6	6.894	175.1	4.20	1.91
GRMxF	0	135	600	4.466	113.4	1.512	38.4	2.171	55.1	0.53	0.24
	1	180	801	5.721	145.3	2.106	53.5	3.211	81.6	1.23	0.56
	2	225	1001	6.699	170.2	2.291	58.2	4.438	112.7	2.10	0.95
	4	500	2224	9.110	231.4	2.941	74.7	5.885	149.5	4.30	1.95
GRMxG	2	225	1001	6.713	170.5	2.336	59.3	6.616	168.0	2.30	1.04
	4	500	2224	8.996	228.5	2.662	67.6	8.201	208.3	4.20	1.91

NOTES:
1) Total grip force is based on 87 psi [6 bar] air pressure.
2) Refer to B08 and B10 options in Accessory Options section of GRM catalog for increased grip force.
3) Maximum envelope size of base unit without options.
4) Maximum weight of base unit without options.

UNIT SIZE COMPARISON 2

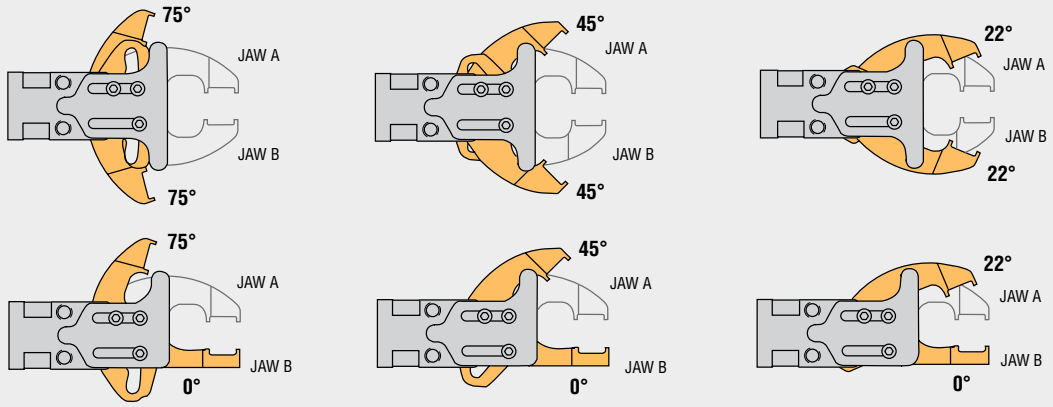
SIZE	CYLINDER PARAMETERS(1)				CYCLE TIME OPEN OR CLOSE(2)	PRESSURE LIMITS		TEMPERATURE LIMITS			
	BORE Ø		MAX. STROKE					STANDARD		-G11 OPTION	
						min	max	min	max	min	max
	in	mm	in	mm	sec						
0	0.787	20.0	0.512	13.0	0.15	30 psi [2 bar]	100 psi [7 bar]	-20°F [-30°C]	180°F [82°C]	-20°F [-30°C]	392°F [200°C]
1	0.984	25.0	0.715	18.2	0.20						
2	1.260	32.0	0.914	23.2	0.19						
4	1.575	40.0	1.228	31.2	0.14						

NOTES:
1) Refer to B08 and B10 options in Accessory Options section of GRM catalog for other cylinder parameters.
2) Based on 87 psi [6 bar] air pressure.

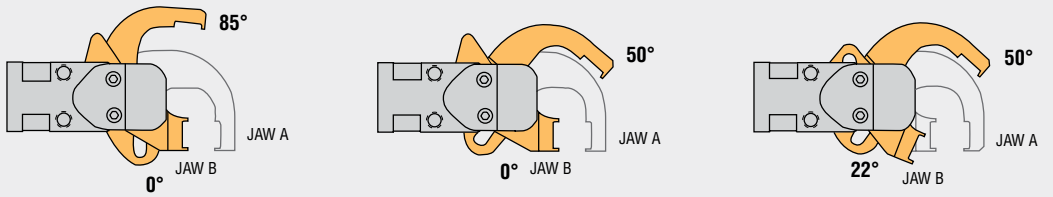
GRM Jaw Openings

GRM2 for illustrative purposes. Other jaw styles and rotations available.

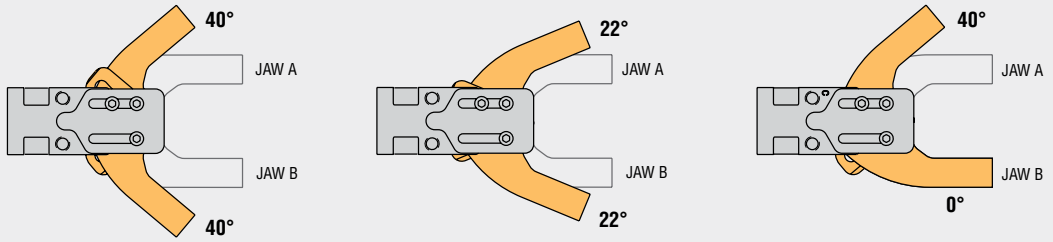
STANDARD (S JAW)



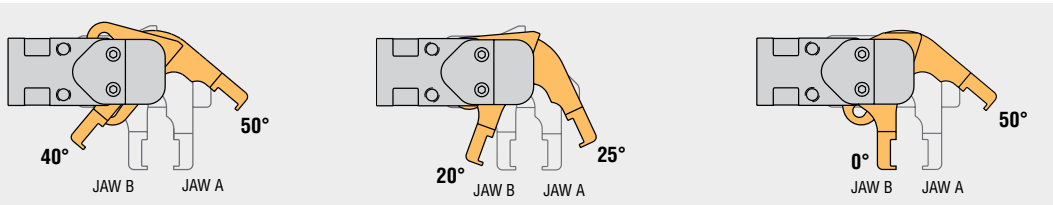
FLANGE (F JAW)



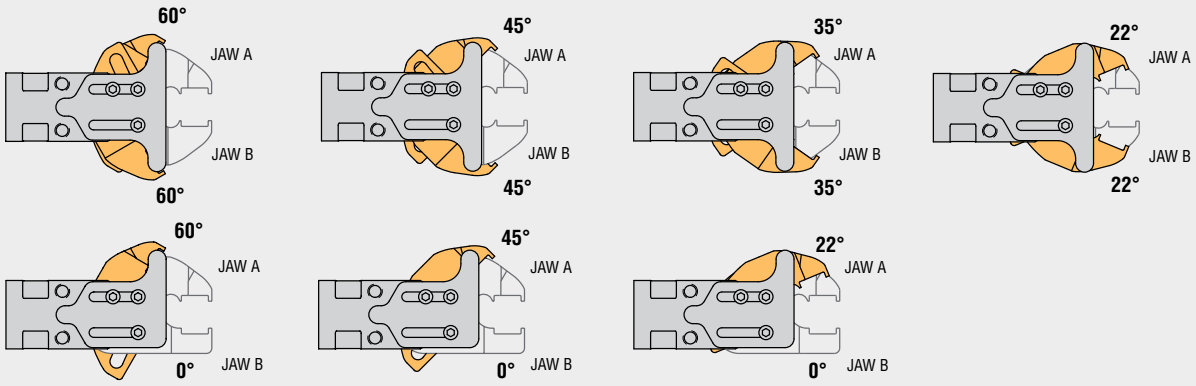
TOOLABLE (G JAW)



HOOK (K JAW)



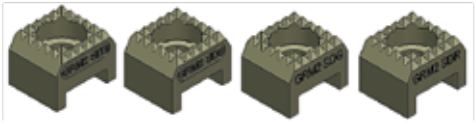
SHORT (R JAW)



GRM Tips & Mountings

PHD offers the industry's widest selection of tips and mounting options

Single No Scratch Socket

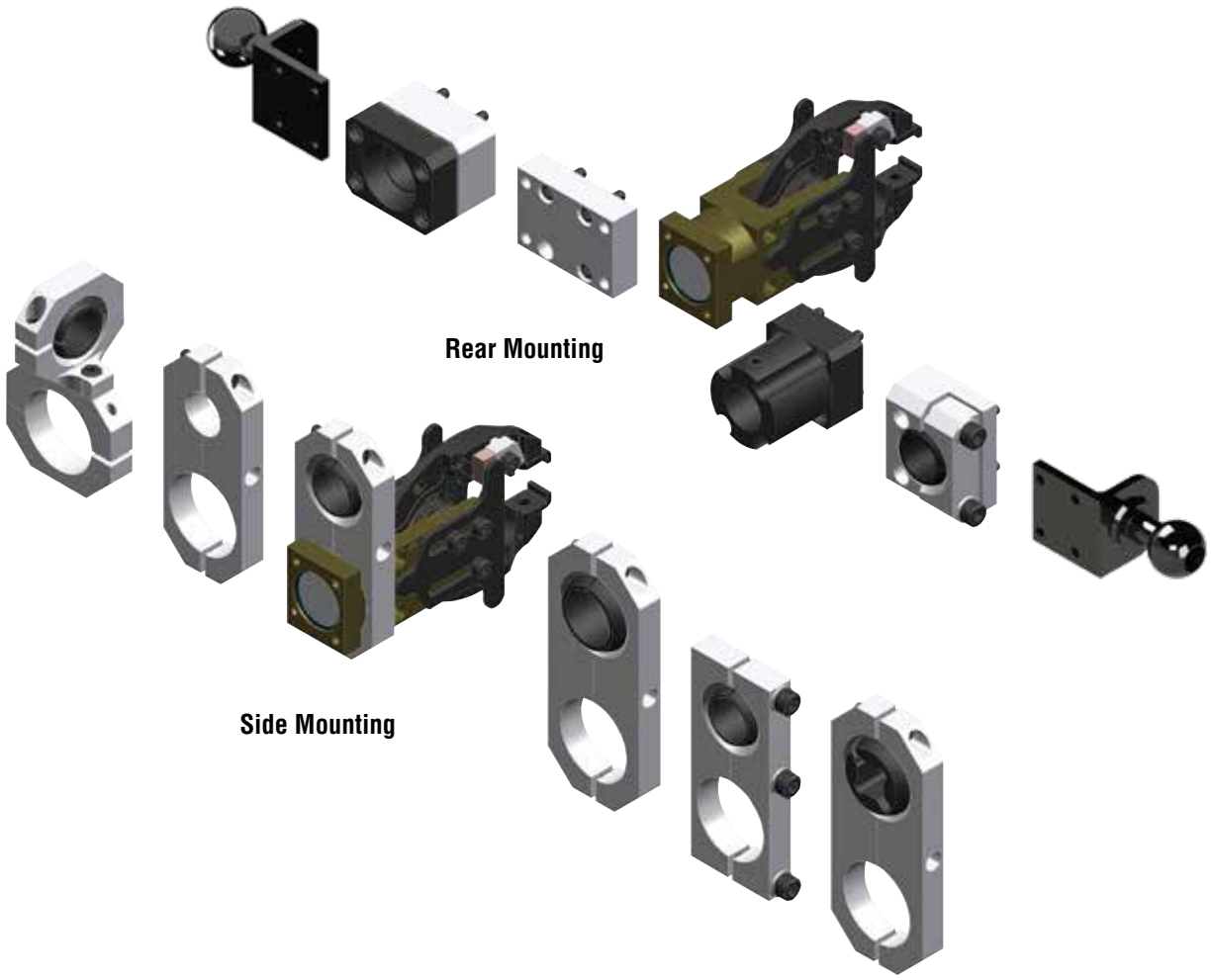


Single Diamond Point (High Temp)

Single No Scratch Ball

Double Cone Point (High Temp)

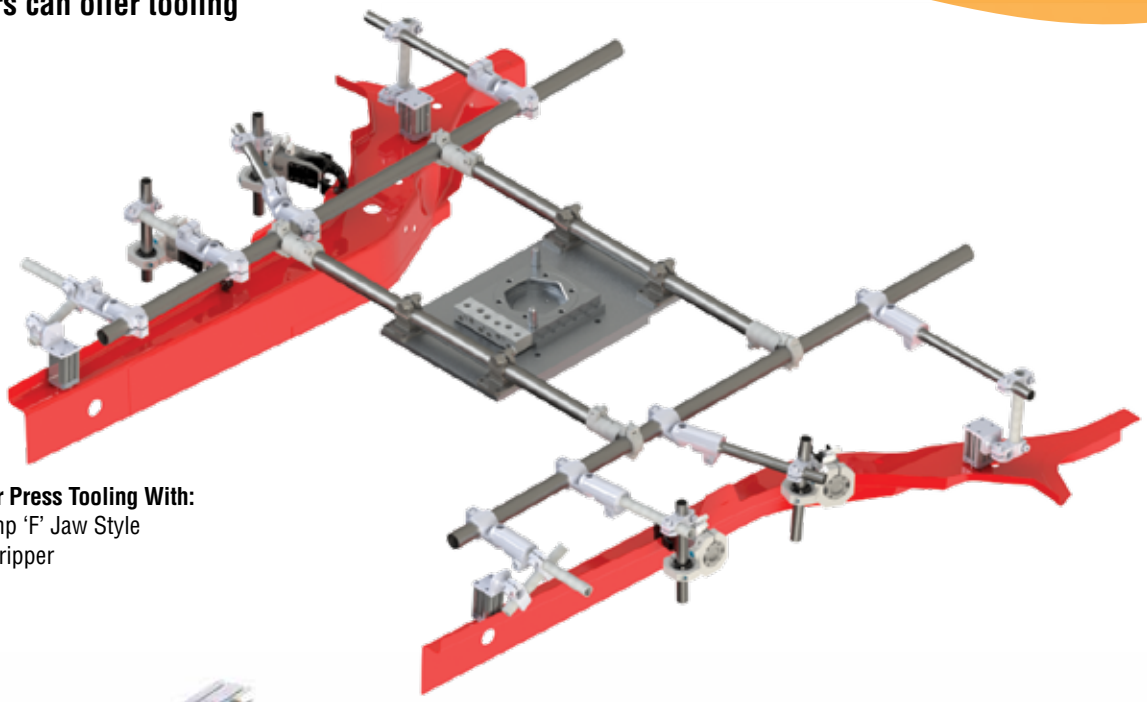
High Temperature Ceramic Coated Tip Options



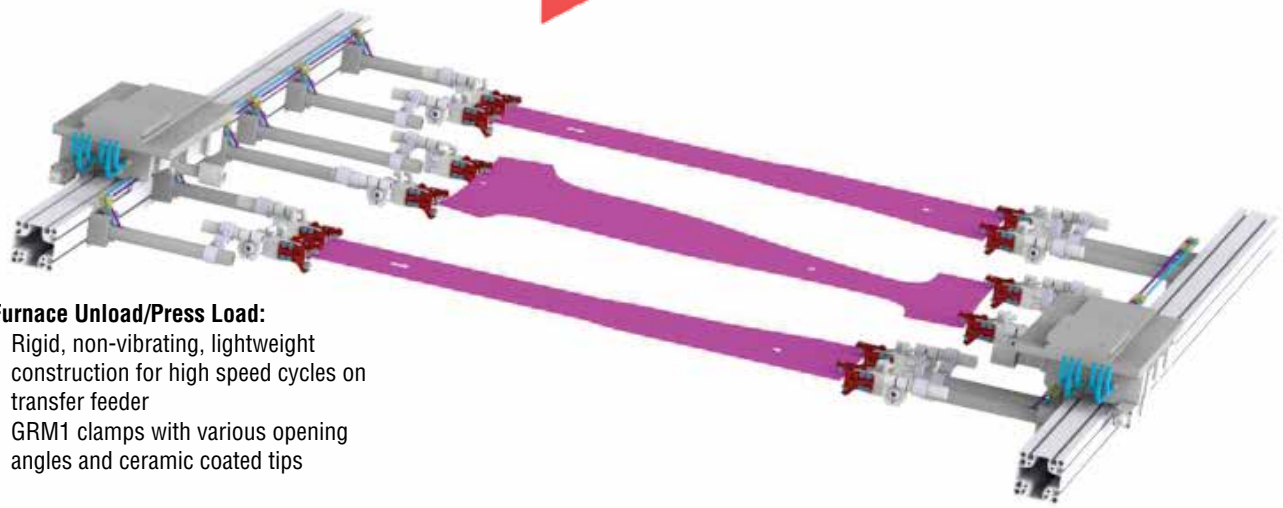
Rear Mounting

Side Mounting

PHD and their MDN distributors can offer tooling



Take Out After Press Tooling With:
- GRM1 Clamp 'F' Jaw Style
- Magnetic Gripper



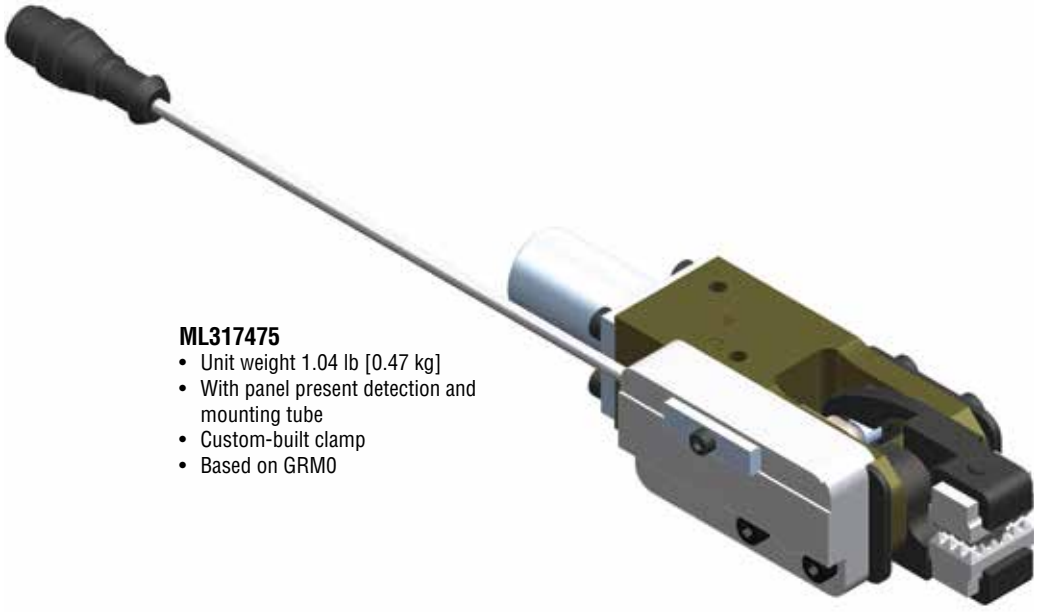
Furnace Unload/Press Load:
- Rigid, non-vibrating, lightweight construction for high speed cycles on transfer feeder
- GRM1 clamps with various opening angles and ceramic coated tips

Press Unload/Take Out:
- Rigid, non-vibrating, lightweight construction for high speed cycles on transfer feeder
- GRM1 clamps with various opening angles and ceramic coated diamond shaped tips and separate shovels

Sensing

PHD specializes in part sensing for stamping applications. We offer solutions for double sheet and panel present detection.

Consult PHD Unlimited Unique Solutions® for more sensing possibilities.



ML317475
- Unit weight 1.04 lb [0.47 kg]
- With panel present detection and mounting tube
- Custom-built clamp
- Based on GRM0

ML316277
Switch Kit Only for ML314617
- Switch kit weight 0.33 lb [0.15 kg]
- Panel present detection for ML314617
- Sensor to be provided and installed by customer/distributor

ML316564
Switch Kit Only for GRM0, Flange Jaw Style
- Switch kit weight 0.24 lb [0.11 kg]
- Panel present detection for ML316187
- Sensor to be provided and installed by customer/distributor

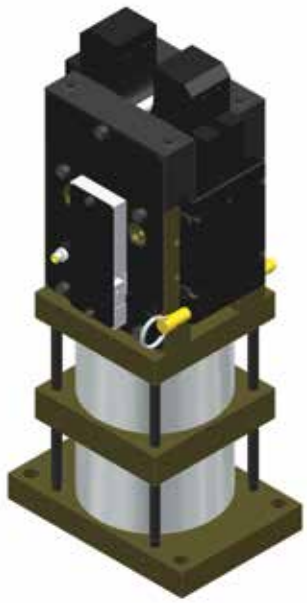
Part Numbering

PHD offers the Series PNC Number Cruncher® Clamp for numbering parts before they go into the furnace. Series PNC66 and Mongo have the appropriate force to effectively number high tensile steels processed in hot forming.

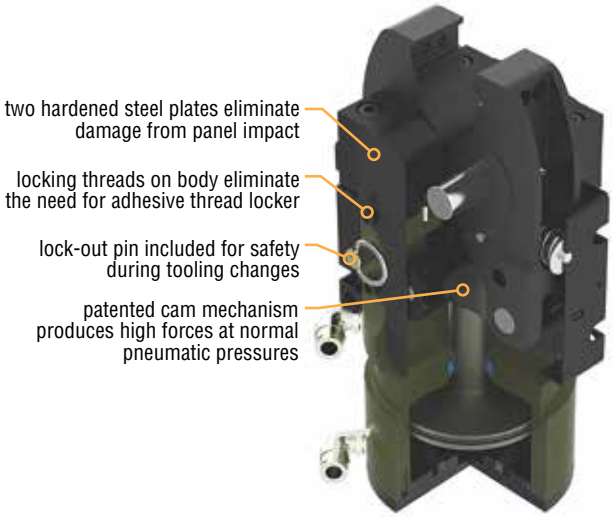
NUMBER® CRUNCHER

Series PNC66
- Provides cost-effective solution for identification stamping
- Capable of generating 48,330 lb [215 kN] of force at 87 psi [6 bar]
- Quiet operation
- Robust construction

PNC66 with Long Jaws and Positioning Sensor (ML317577)
- Number Cruncher® with extended jaws, jaw depth 5.9 in [150 mm]
- Capable of generating 24,279 lb [108 kN] of force at 72.5 psi [5 bar]
- Includes transducer for double sheet detection
- Quiet operation
- Robust construction
- Shown with optional numbering head and anvil



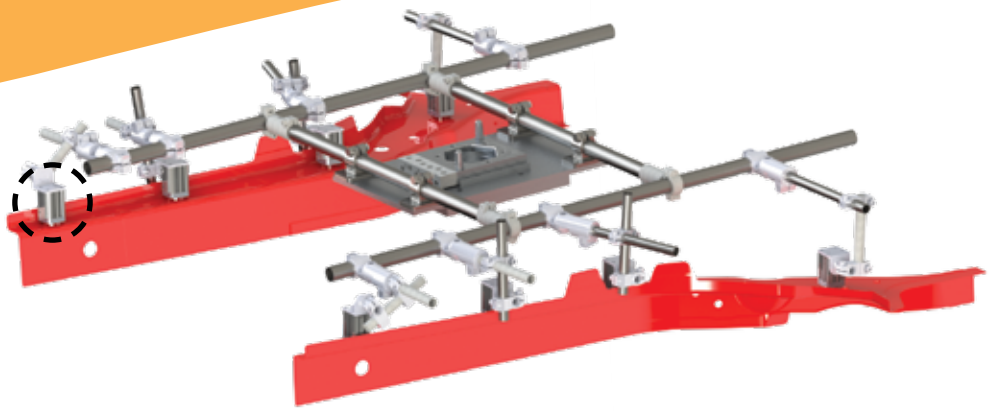
PNC Mongo (ML316161)
- Capable of 65,194 lb [290 kN] force at 65.2 psi [4.5 bar]
- Estimated weight 154.3 lb [70 kg]
- Optional open/close detection
- Quiet operation
- Robust construction



Comparison of unique PNC “Mongo” with automatic numbering head (left) and Series PNC55 (right)

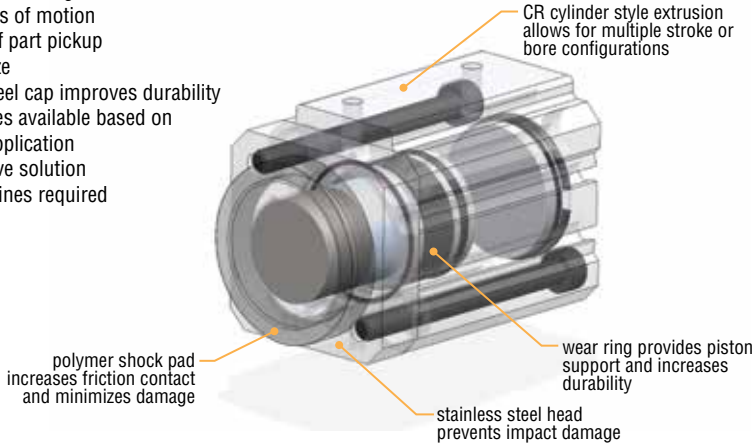
Magnetic Gripper

For Cold Forming Applications



Magnetic Gripper 86560

- No expensive tooling
- One less axis of motion
- Variability of part pickup
- Compact size
- Stainless steel cap improves durability
- Multiple sizes available based on customer application
- Cost-effective solution
- No electric lines required



REBUILD
REPAIR
RECYCLE

Rebuild or repair your GRM Clamps for significantly less cost than the original price. Ask your distributor about PHD's Rebuild Program.

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DISTRIBUTOR SUPPORT

We are a proud member of the MAC Distributor Network (MDN). MDN is a customer focused network of global manufacturers and distributors providing worldwide sales and exceptional service. With partners located worldwide, we are equipped to provide you a wide variety of value-added support and ongoing assistance.

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