

Servo-Controlled Press Cushion

**MASTERform™**

INTEGRATED FORMING SYSTEM



Enabling more effective metal shaping and forming since 1964, HYSON Metal Forming Solutions designs and manufactures precision force solutions for critical applications. Our solutions, integrated into mills, presses and stamping tools, help master the complexity of metal forming by providing the **right solutions for your application**. HYSON offers both off-the-shelf and custom-designed products and incorporates the highest level of safety into our solutions.

Our engineering and manufacturing teams paired with our state-of-the-art products help drive:

- Safety
- Repeatable and efficient processes
- Reduced maintenance and repair costs
- Higher quality output

## HYSON Press Solutions

Built upon a long history and experience with force solutions for the Die, HYSON has leveraged that knowledge to engineer and manufacture innovative capital equipment solutions for the press.

By having a thorough understanding of stamping processes, at the same time positioning ourselves to have a front line perspective on future trends and challenges, The HYSON Metal Forming Team is able to develop solutions for tomorrow. As the previous rules and guidelines of the stamping industry continue to change and become obsolete, it is our commitment to provide the solutions necessary to tackle upcoming forming challenges, think outside the box, and rewrite the way metal is formed.

### THE KEY ADVANTAGES OF OUR SOLUTIONS ARE TO PROVIDE:

#### FLEXIBILITY

The ability to change parameters quickly, and to adapt to process and material variations

#### REPEATABILITY

The confidence that you will see the same quality on the 500,000th part that you did on the first

#### CONTROLLABILITY

The ability to control the force dynamically throughout the stroke with a high level of accuracy and response times in milliseconds

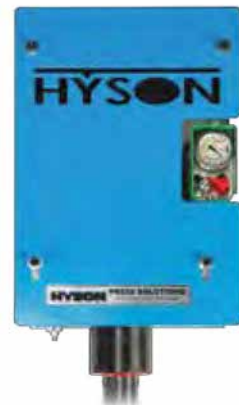
#### NEXT-GENERATION PRESS CUSHION SYSTEM

With the ability to be installed into any press, our integrated forming systems provide an immediate upgrade to stamping equipment



#### PROGRAMMABLE KNOCKOUT SYSTEM

Integrated into press controls, INTELLImax™ Knockout System enables flexible, timed part knock out



# HYSON METAL FORMING SOLUTIONS... FOR THE PRESS

With an extensive and unrivaled portfolio of metal forming solutions, HYSON provides the right solution for the right application. From an air cushion crossover to integrating the most sophisticated forming features on the market, we have a solution that will streamline your forming operations. Solutions are dependent upon your needs and include:

## NITROGEN PRESS CUSHION

### TRUEform™

#### INTEGRATED FORMING SYSTEM

TRUEform™ Integrated Forming System utilizes high-pressure nitrogen gas to deliver accurate force, enabling customers to attain true, high quality formation of stamped parts.

#### FEATURES INCLUDE:

- Self-Contained
- Low Pressure Rise
- Compact Design
- Energy Efficient
- Ram or Bolster Mounted



## HYDRAULIC PRESS CUSHION

### OPTiform™

#### INTEGRATED FORMING SYSTEM

OPTiform™ Integrated Forming System utilizes high-pressure hydraulic fluid to deliver controlled force capable of lock down at BDC and optimizing your forming processes.

#### FEATURES INCLUDE:

- Delay Capable
- Low-Pressure Rise
- High-Force
- Simple Force Adjustment
- Low Contact and Return Force
- Ram or Bolster Mounted



## SERVO-CONTROLLED PRESS CUSHION

### MASTERform™

#### INTEGRATED FORMING SYSTEM

MASTERform™ Integrated Forming System utilizes advanced servo valve technology to precisely control the force, allowing you to master your metal forming process.

#### FEATURES INCLUDE:

- Adjustable Force Profiles
- Delay Capable
- Part Knockout
- Reverse Forming
- Pre-Acceleration
- Bolster Mounted



# REAL TIME FORCE CONTROL

Once HYSON's forming system is integrated into a press, the user has the ability to program, or recall a stored program, and utilize unique force profiles specific to the current part geometry with the HMI. At the heart of the real time force control is the closed-loop feedback system which brings the system to life.

## INTEGRATION

Integrated forming systems can be incorporated into any press, new or old, including hydraulic, mechanical and servo.

## CONTROLLABLE FORCE PROFILES

The ability to work with trouble areas in the part and provide force at a specific time throughout the stroke at as many points necessary.

## HMI

HYSON's standard force program allows users to set and create force profiles, which can be saved and brought up for later use. The key is being simple and intuitive to use.

## CLOSED-LOOP FEEDBACK SYSTEM

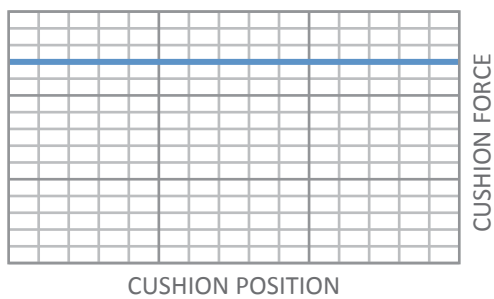
Utilizing a team of transducers to monitor pressure, position, and temperature, MASTER-form™ is able to analyze its performance and make adjustments on the fly constantly giving feedback to the controller up to 200 times per mS.



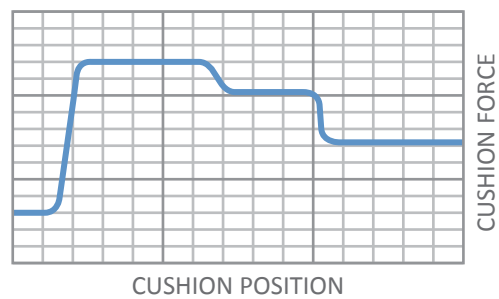


**MASTERform™ PROVIDES UNLIMITED POSSIBILITIES** from straight-forward to waving force recipes and anything in between, enabling high-quality, more consistent part forming.

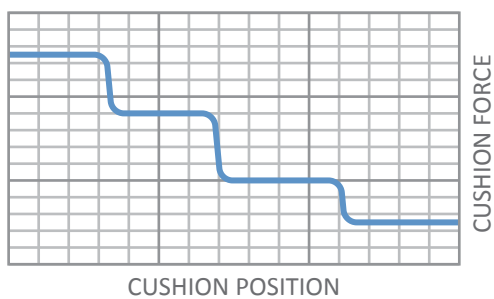
**CONSTANT FORCE RECIPE**



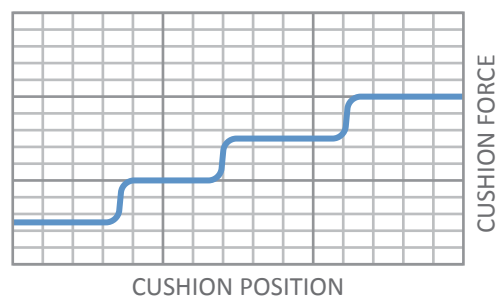
**SOFT CONTACT RECIPE**



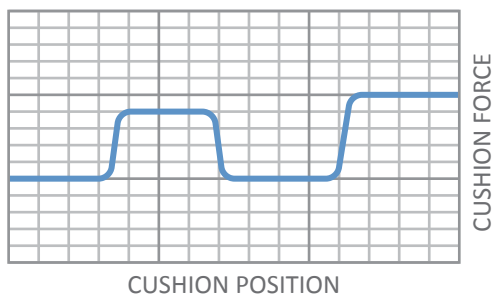
**DECREASING FORCE RECIPE**



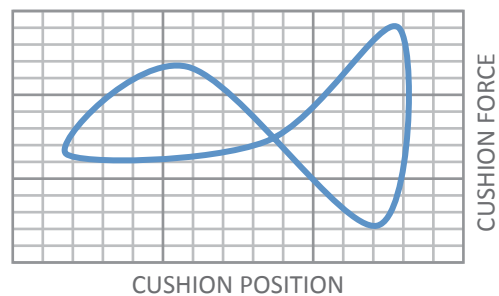
**INCREASING FORCE RECIPE**



**WAVING FORCE RECIPE**



**INFINITE POSSIBILITIES**



# NEXT-GENERATION FORMING SOLUTION

While presses control position and velocity, HYSON's MASTERform™ provides the adjustable FORCE, giving the maximum controllability, flexibility and repeatability possible in a stamping process.

FEATURE	CHALLENGE										
	LIMITED FORCE	PART TEARING	PART WRINKLING	SPRING BACK	PART INVERSION	HIGH PRODUCTION TIMES/ MULTIPLE FORMING STATIONS	REVERSE TONNAGE PRESS WEAR	TRAPPED PART IN LOWER TOOL	INITIAL SHOCK LOAD	SET-UP TIMES	SERVICE AND TROUBLE-SHOOTING
ADJUSTABLE FORCE		●	●	●		●			●		
MORE FORCE	●										
DELAY FUNCTION					●		●				
PRE ACCELERATION									●		
REVERSE FORMING						●					
BOTTOM KNOCKOUT								●			
USER-FRIENDLY PROGRAMMING		●	●	●		●		●		●	●
HEALTH MONITORING											●



## SOLUTION

Dynamic force throughout the stroke allows for the flexibility to control the forming process, reducing part quality problems, increasing productivity, and allowing the system to work with the material.

Using high-pressure components capable of operating parameters of 275 bar/4000psi will allow for more force in the same space as other technologies.

Designed to decrease press wear and extend press life, the system can delay at BDC to avoid reverse tonnage back into the part and the press.

In order to reduce initial press shock, the cushion can be programmed to begin the move prior to the tool contacting the material, and then allowing the press to catch up.

When the press is dwelling or in a stationary position and at BTD, the servo cushion is capable of increasing force to provide a secondary forming operation, allowing for better press utilization.

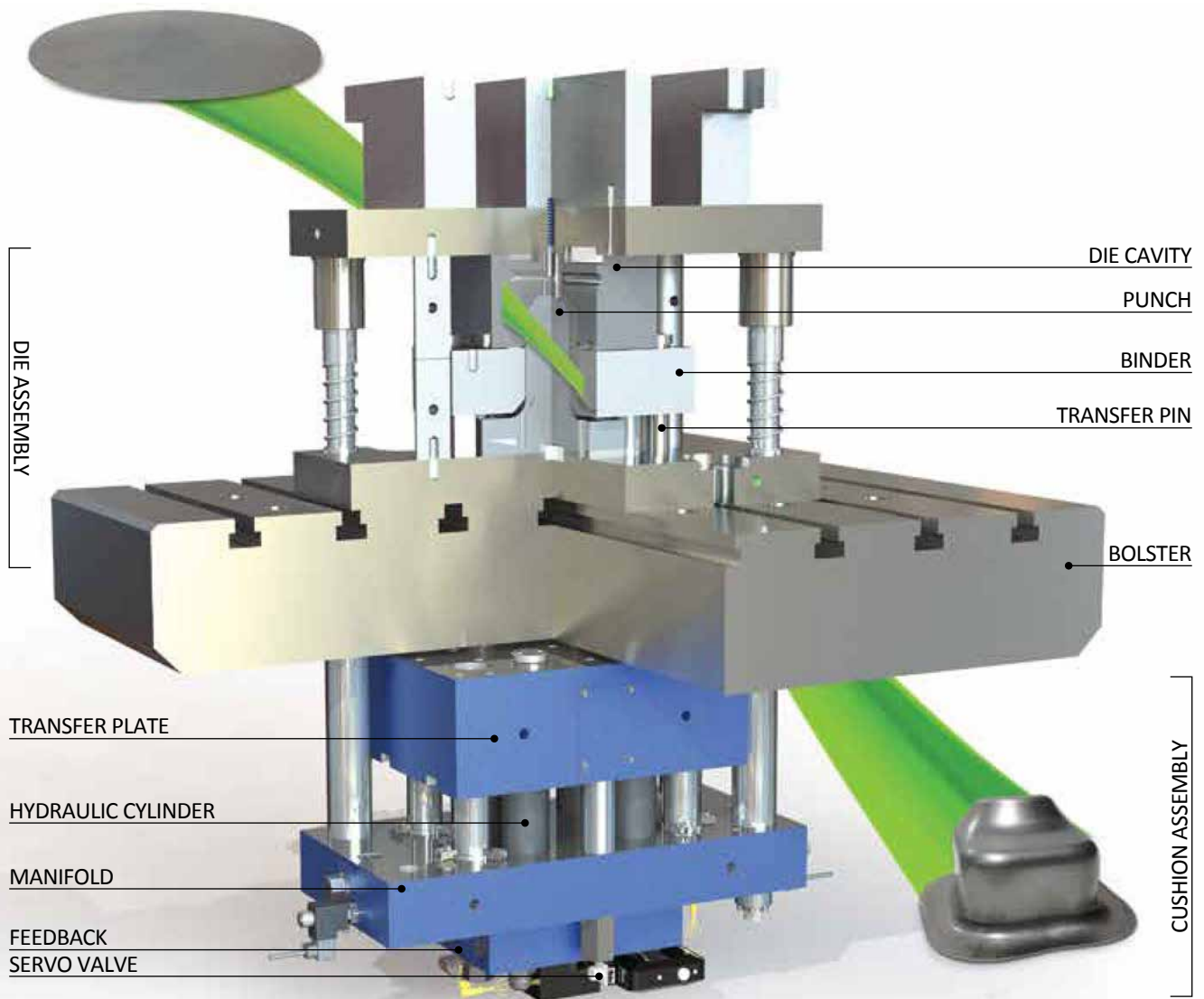
Providing a burst of energy after BDC, the cushion is capable of knocking parts loose from the lower tool, allowing better integration with transfer, automation and robotic equipment.

The HYSON program features an easy-to-use interface which will allow the user to have complete control over the functionality of the cushion.

The health monitoring module will allow for determining maintenance items such as temperature, oil cleanliness and filter replacement. In addition, the system is capable of remote connecting to troubleshoot and make program updates over the internet from anywhere in the world.

# THE PERFECT TRANSFER OF FORCE

As the press ram travels from top dead center towards bottom, the die closes and the die cavity starts to make contact with the binder. As the part is being formed, the binder engages the transfer pins which allows the cushion to apply a counter force into the process. Due to the advanced servo valve and feedback mechanisms within the MASTERform™ system, the transfer of force is controllable, flexible, and repeatable.







## HYDRAULIC POWER UNIT

HYSON's standard power units have been designed to optimize the performance of each integrated forming system. Housed within the power unit are key components such as:

- Electrical cabinet
- Reservoir
- Heat exchanger
- Pump
- Motor
- Accumulator



## HMI – TOUCHSCREEN INTERFACE

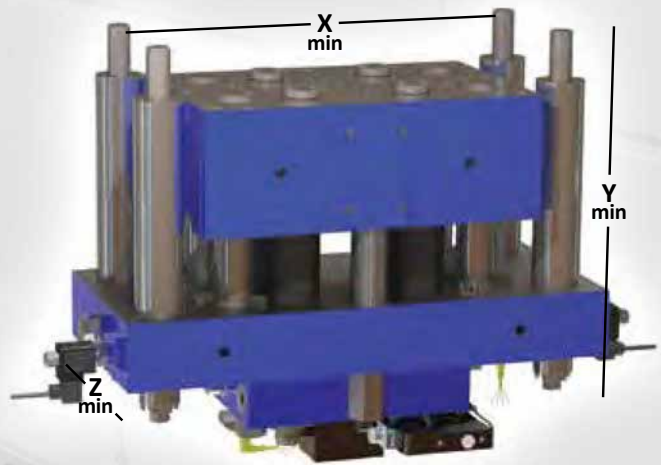
HYSON's standard Human Machine Interface is the system component which:

- Allows the user to interact with the technology
- Provides real-time adjustment
- Includes software that is simple and intuitive to use

Included with the HMI are:

- 203mm / 8-inch touchscreen monitor
- Emergency stop button
- HYSON designed standard cushion program

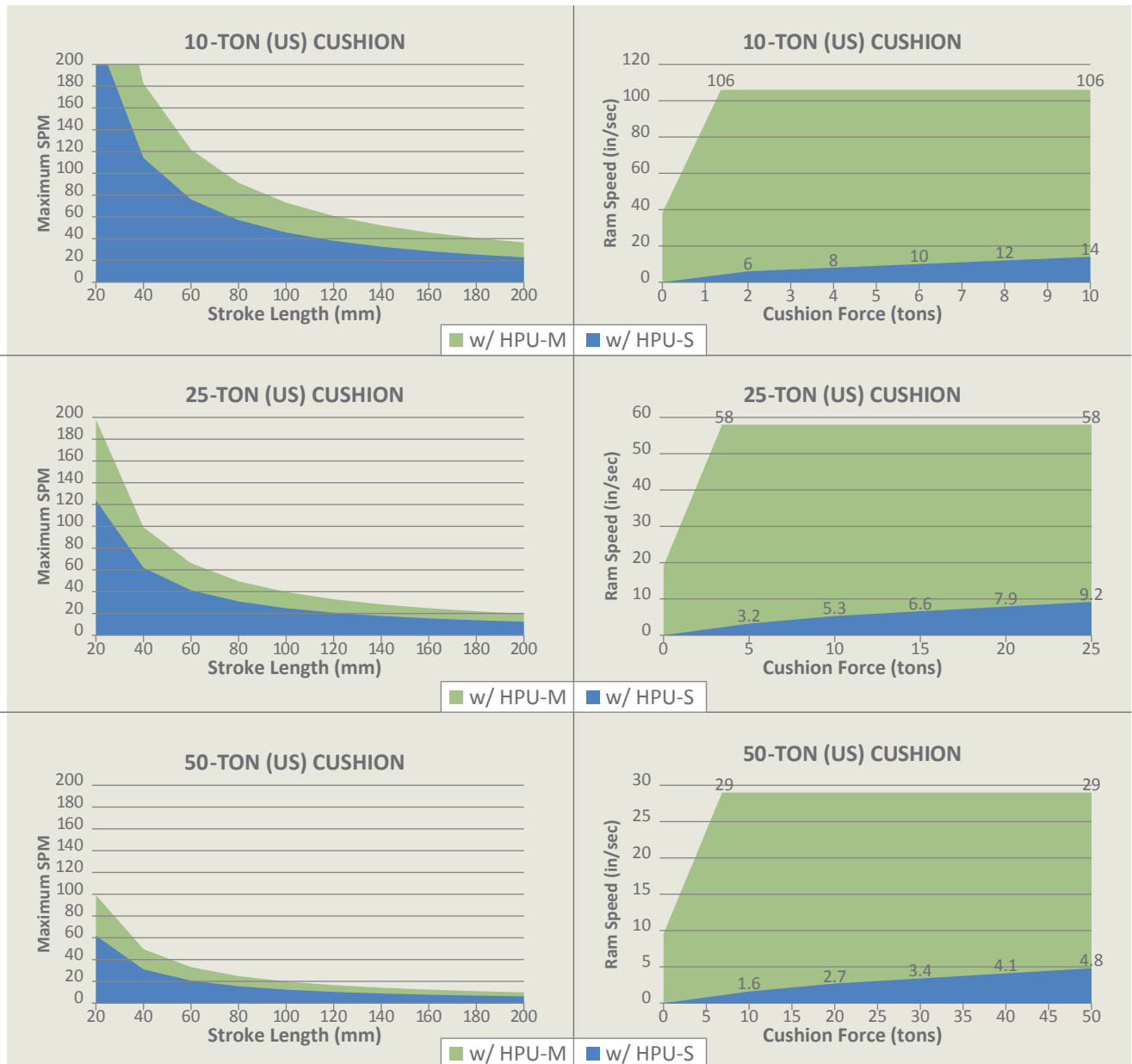
HMI is ready to mount to the press frame as standard, or purchase the optional pedestal stand.



When using the graphs below. If the intersection falls within the blue region a small HPU can be used. If the intersection falls within the green a medium HPU will be needed. Anything outside the blue or green will not be able to utilize standard HPUs.

### SERVO CUSHION

### OPERATING RANGE



# SYSTEM FEATURES

HYSON's MASTERform™ Integrated Forming System is one of the most flexible solutions in the market. It allows customers to have more control over their process, provides solutions to overcome pains, reduces costs, and enables metal formers around the globe to have a true competitive advantage.

## STANDARD FEATURES

There are 15 standard features that come with each and every one of the systems . . . with the option to upgrade 8 of them.

**4 POINTS OF FORCE ADJUSTMENT** - Ability to change force through the stroke

**1000 RECIPES** - Amount of part recipes controller can store

**HYSON STANDARD SOFTWARE** - Software to control and monitor parameters of system

**203mm (8-INCH) HMI** - Screen size of user interface touchscreen

**HMI MOUNTED ON PRESS** - Mounting brackets included to secure to press

**1 ZONE OF FORCE** - Number of zones of force

**LANGUAGE - ENGLISH** - Language of program and interface

**BASIC REMOTE MONITORING SYSTEM** - Ability to monitor critical system components, as well as allowing remote connectivity anywhere in the world

**DELAY AT BOTTOM DEAD CENTER** - Cushion will remain in retracted position until programmed time of return

**LINEAR FEEDBACK** - Provides position feedback of the cushion

**PRESSURE FEEDBACK** - Provides pressure feedback of the cushion

**TEMPERATURE FEEDBACK** - Provides temperature feedback of the cushion

**AUTOMATIC FILL AND BLEED CYCLE** - During maintenance, the hydraulic circuit removes trapped air

**STANDARD COOLING** - Air over oil heat exchanger to keep fluid at 120°F

**ROBUST GUIDANCE SYSTEM** - Guidance system designed to withstand loading of transfer plate;  
Onboard remote diagnostics and troubleshooting

# TECHNICAL SPECIFICATIONS

The cushion portion of the forming system fits inside the press and is customizable. X & Z provide minimum area, actual size is based on customer requirements and press bed opening. Y dimension is based on guidance and loading of the system.

## 10-TON (US) MASTERform™

HPU	WIDTH X (mm) min	DEPTH Z (mm) min	STROKE (mm)													HEIGHT Y (mm) min
			16	19	25	32	38	50	63	75	80	100	125	175	200	
Small	343	254	472	480	490	505	518	541	566	592	602	645	691	790	841	
Medium	381	254	599	607	617	632	645	668	693	719	729	767	818	917	968	

## 25-TON (US) MASTERform™

HPU	WIDTH X (mm) min	DEPTH Z (mm) min	STROKE (mm)													HEIGHT Y (mm) min
			16	19	25	32	38	50	63	75	80	100	125	175	200	
Small	437	254	472	480	490	505	518	541	566	592	602	645	691	790	841	
Medium	437	254	599	607	617	632	645	668	693	719	729	767	818	917	968	

## 50-TON (US) MASTERform™

HPU	WIDTH X (mm) min	DEPTH Z (mm) min	STROKE (mm)													HEIGHT Y (mm) min
			16	19	25	32	38	50	63	75	80	100	125	175	200	
Small	559	254	505	511	523	536	549	574	599	622	632	673	724	823	874	
Medium	559	254	632	638	650	663	676	701	726	749	759	800	851	950	1001	



## UPGRADES

**8 POINTS OF FORCE ADJUSTMENT**

**2000+ RECIPES**

**CUSTOM PROGRAMMING**

**304 OR 381mm SCREEN (12 OR 15-INCH)**

**PEDESTAL MOUNTED HMI**

**MULTIPLE ZONES OF FORCE**

**LANGUAGE OTHER THAN ENGLISH**

**PREMIER REMOTE MONITORING SUBSCRIPTION**

## ADVANCED UPGRADES

### **PAD RETRACTION SYSTEM**

Allows quicker set-up time during die change by retracting cushion pad

### **REVERSE FORMING**

Allows ability to perform secondary forming operation at Bottom Dead Center

### **BOTTOM KNOCKOUT**

Provides burst of energy to knock parts loose from lower die

### **PRE-ACCELERATION**

Programmable speed and timing to lessen the initial shock at contact

# METAL FORMING TECHNOLOGY CENTER

The first center of its kind in Northeast Ohio, HYSON's Metal Forming Technology Center is a platform for metal forming advancement, innovation, collaboration and development. Opened in February 2015, the Metal Forming Technology Center was created to focus on the advancement of forming ultra and advanced high strength materials, and help enable efficient and reliable forming of complex shapes.

The center is equipped with the latest forming technology, including a 300-ton (US) Servo Press, HYSON's 50-ton (US) MASTERform™ Integrated Forming System and INTELLImax™ knockout system. The Center not only serves as a central hub for customer try-outs, but also for academic, steel and OEM collaboration and research.

With the launch of this center, HYSON is helping lead the development of next-generation force products that help solve forming issues, improve customer's processes and enable the future of lighter and safer metals with more efficient forming.

Customers, OEM press manufacturers, steel mills, die shops and metal stampers interested in partnering with HYSON on the advancement of metal forming and utilizing the MFTC should contact their local sales rep or our inside sales team.





## AS A DESIGNER AND MANUFACTURER OF PRECISION FORCE SOLUTIONS

HYSON focuses on enabling more efficient and reliable forming of critical metal products and complex parts in the following industries:



**AEROSPACE**



**MILITARY**



**AUTOMOTIVE**



**LAWN & GARDEN**



**APPLIANCE**



**MEDICAL**



**METAL FORMING SOLUTIONS™**

**HYSON Metal Forming Solutions™**  
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