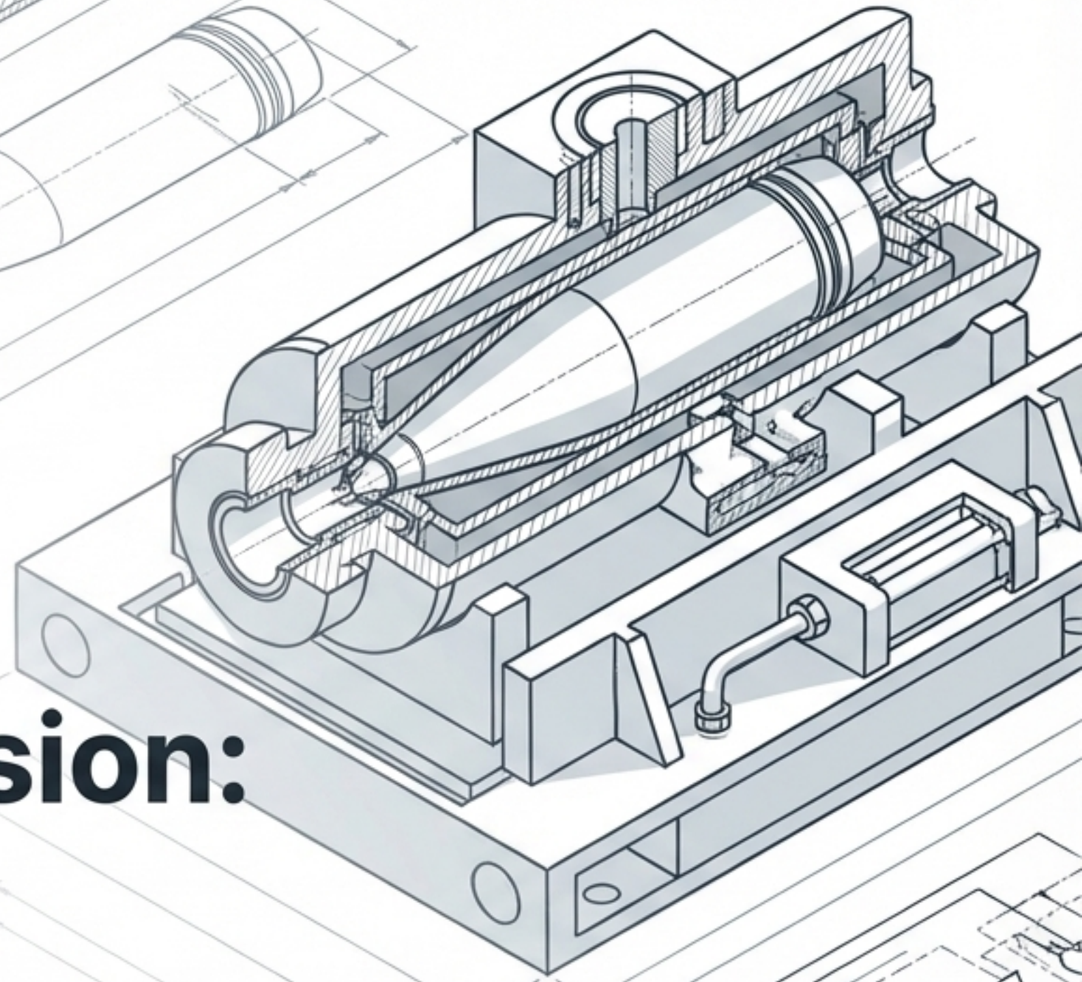
NEOMETRIX DEFENCE

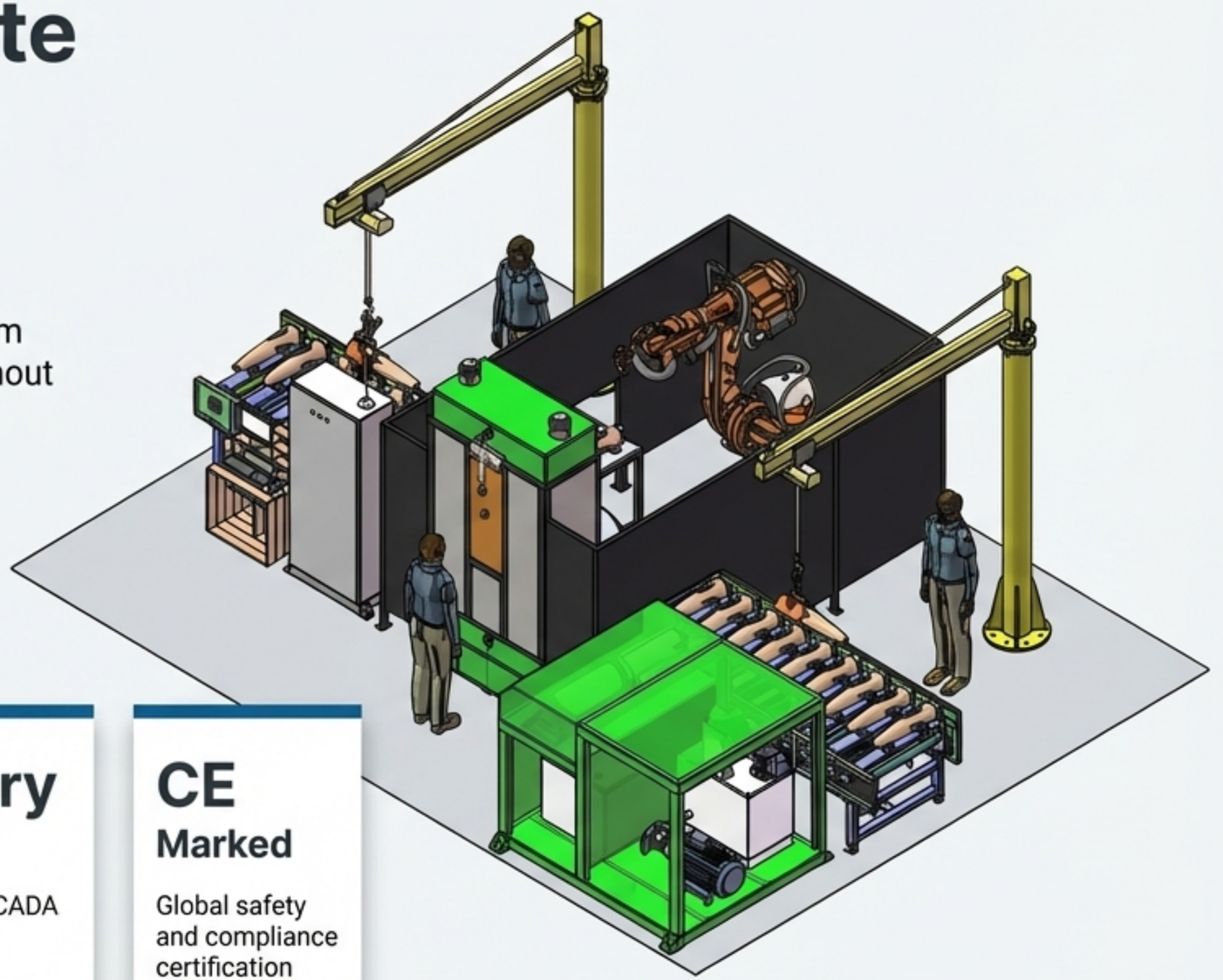


Uncompromising Precision: Automated Bomb Shell Hydraulic Pressure Testing

1800-Bar Hydrostatic Testing & Deformation Analysis for 105mm–155mm Artillery Ammunition.

Engineered for absolute safety, accuracy, and Industry 4.0 scale.

Modern defense manufacturing requires a testing ecosystem that eliminates human error and maximizes throughput without compromising safety. The Neometrix Automated Pressure Testing Machine is a fully autonomous, closed-loop hydrostatic testing cell.



1800 Bar
Max Capacity

100-tonne hydraulic holding press

50
Shells / Hour

High-speed, ABB-robotic automation

Industry
4.0

Siemens PLC/SCADA integration with 250ms DAQ

CE
Marked

Global safety and compliance certification

Universal ammunition compatibility across calibers and configurations.

Parameter	Details
Caliber Range	105mm to 155mm (e.g., M107, M795, ERFB).
Dimensions	Lengths from 250mm to 1000mm; Diameters from 100mm to 200mm.
Weight	Accommodates empty shells up to 40kg (50kg filled).
Shell Types	High Explosive (HE), Base Bleed (BB), Smoke, Illumination, Smart Munitions.

Inter Rapid Changeover System

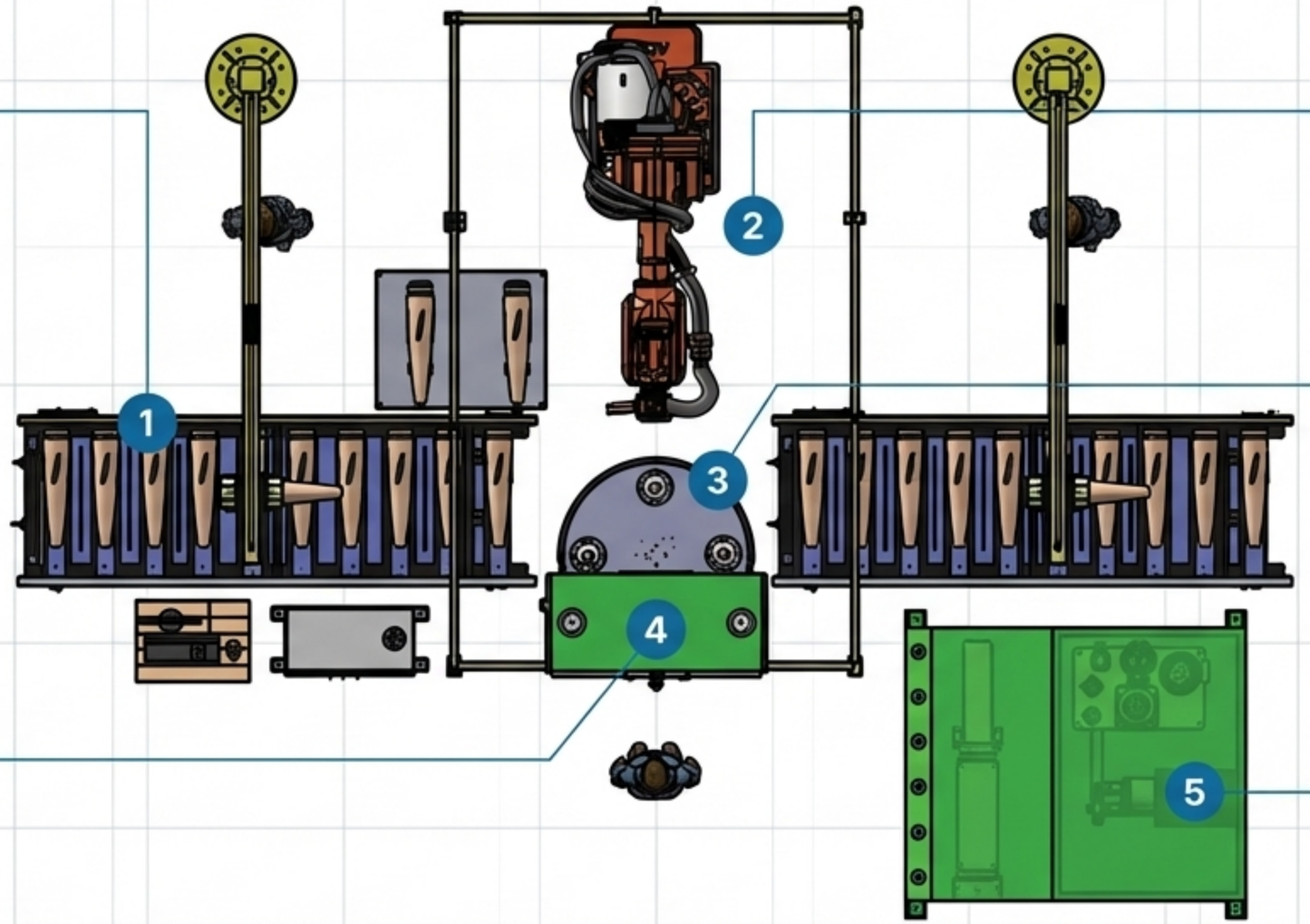
Roboto Dedicated tooling (Hardened EN31 sealing heads and EN8 holding cups) allows operators to switch production lines between shell variants in just 45 to 60 minutes.

A compact, fully integrated 5m x 6m automated testing footprint.

1

1. Infeed/Outfeed Conveyors

Operator load zone.



2

2. Handling Robot

150kg payload ABB integration.

3

3. 4-Station Indexing Table

The core process engine.

4

4. 100-Tonne Press

The hydrostatic test chamber.

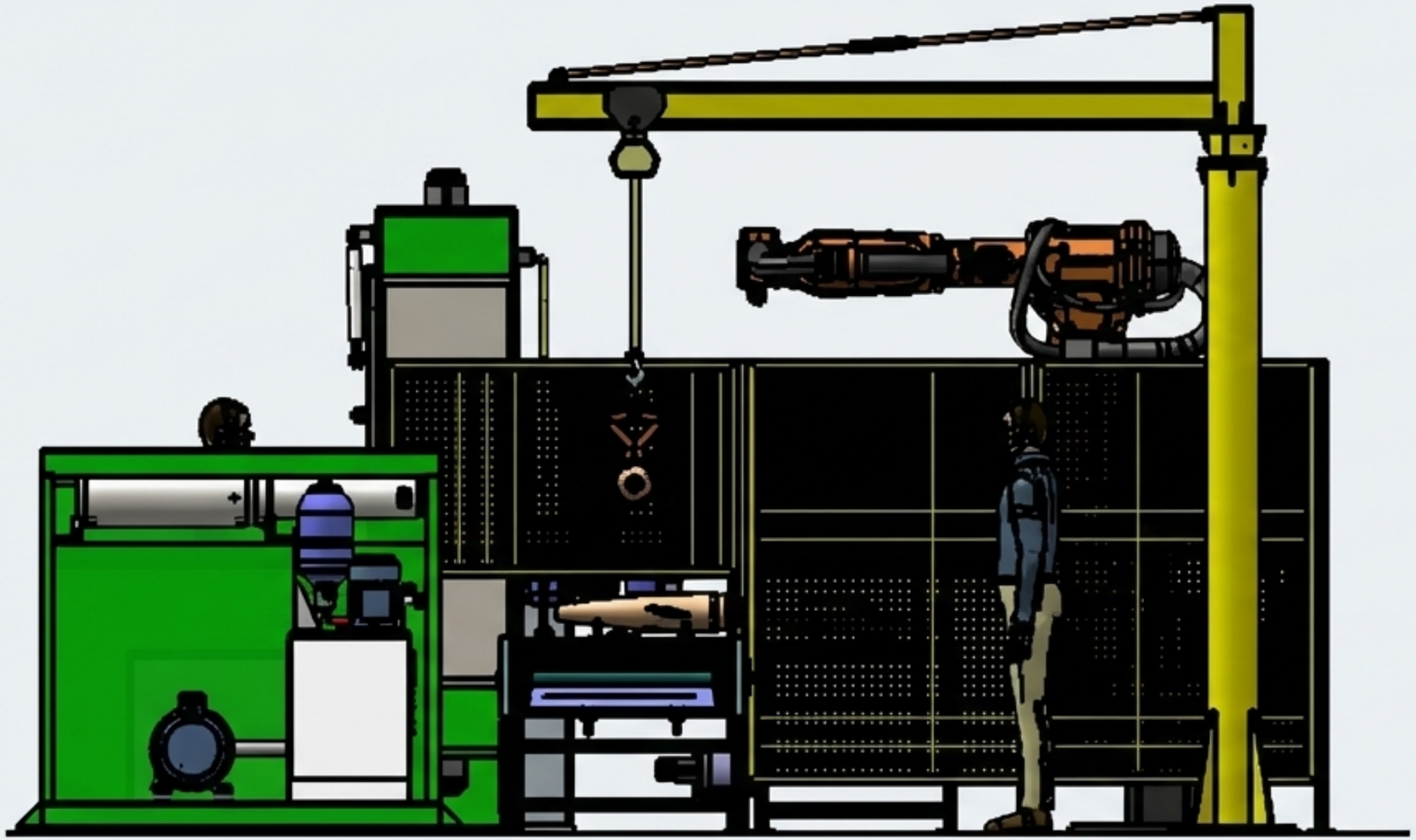
5

5. Control & Power

55kW Main Hydraulic Power Pack, Chiller, and PLC Control panels.

Station 1: Autonomous robotic handling ensures continuous, safe operation.

Operators simply use a jib crane to place raw forged or machined shells onto the input conveyor. From there, the system takes complete control.



Payload 150kg

150kg ABB Robot.

Sorting Logic Inter

Automatically routes tested shells to the output conveyor (Pass) or rejection table (Fail).

Availability Alert Red

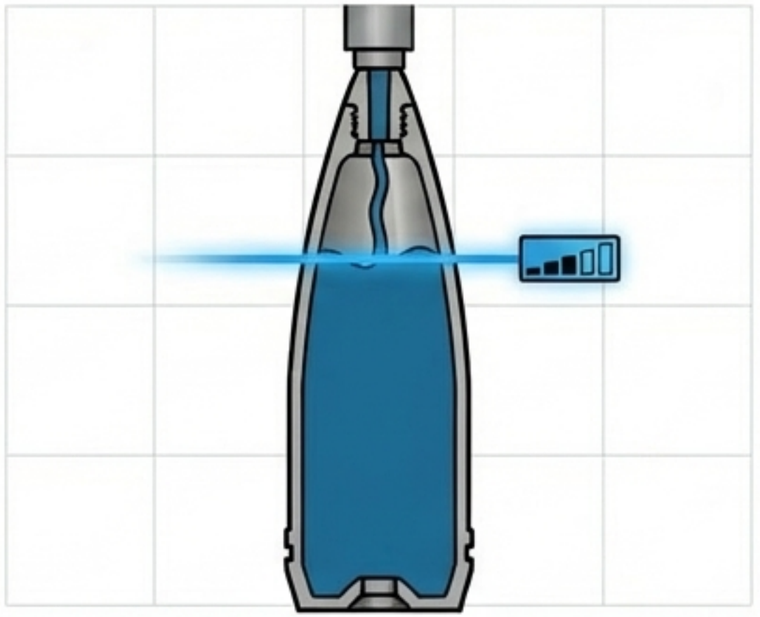
Engineered for 98% uptime in 24/7 (3x8 hour) operations.

Station 2: Volumetric dual-flow fluid filling eliminates air pockets.

Accurate hydrostatic testing requires an incompressible environment. The Neometrix system utilizes a calculated dual-flow filling sequence based on specific shell geometry.

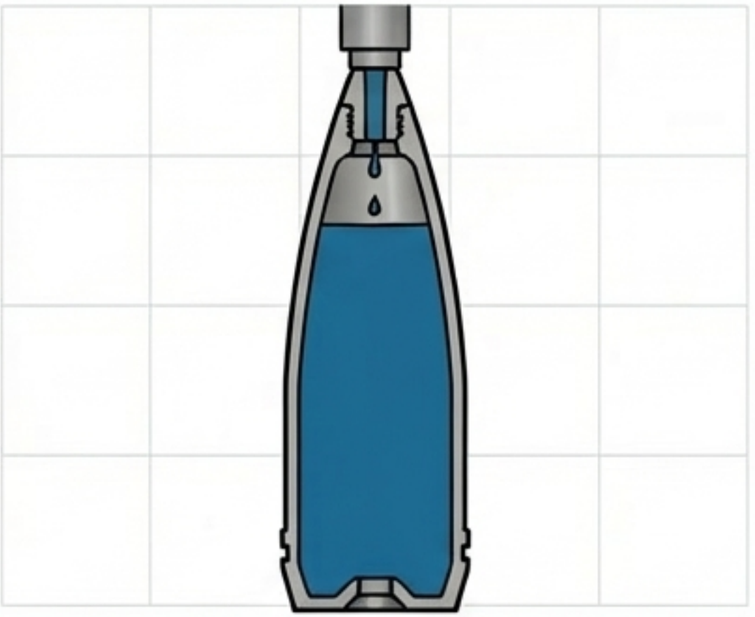
1. High-Flow Initiation

Rapidly fills the bulk of the 1L to 7.5L cavity to optimize the 60-second cycle time.



2. Volumetric Threshold

PLC detects the poured volume and triggers a switch to low-speed flow.

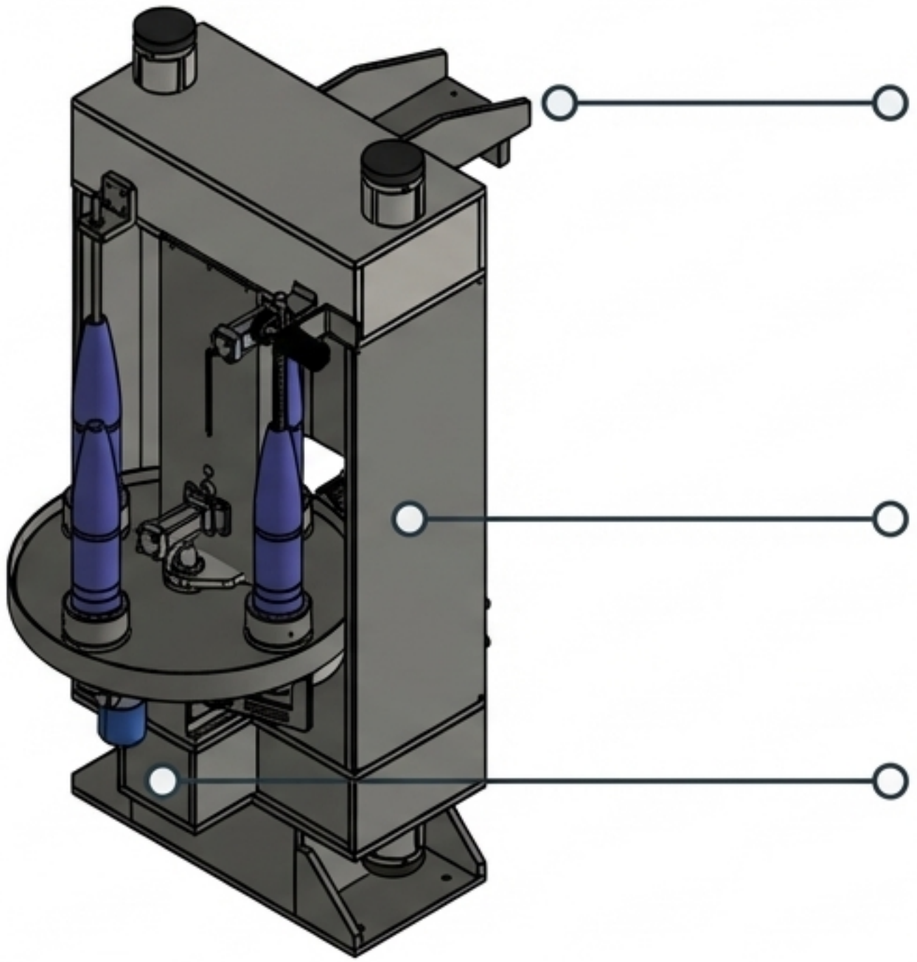


3. Precision Top-Off

Low flow rate brings the coolant-based water to the face of the eye, preventing splashing or foaming that could trap air and skew pressure readings.

Station 3: The 100-Tonne holding press and custom interface tooling.

A high-capacity hydraulic system precisely positions and secures large-caliber munitions for rigorous testing sequences, ensuring complete air removal and pressure integrity.



Air Purge Mechanism

Water continues to pump while an air exhaust vent remains open. Only when complete air removal is confirmed does the vent close for pressurization.

Custom Tooling

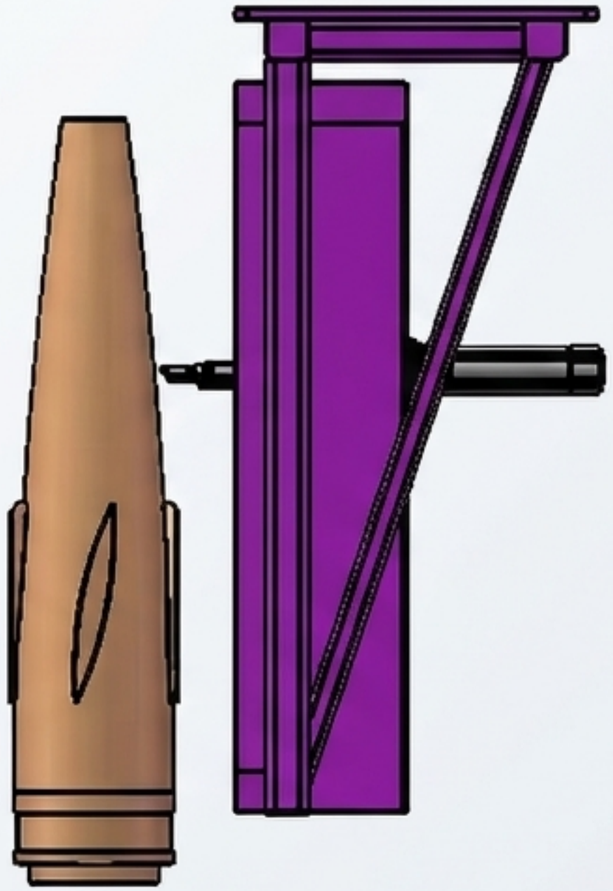
Shells rest securely in four hardened EN8 holding cups.

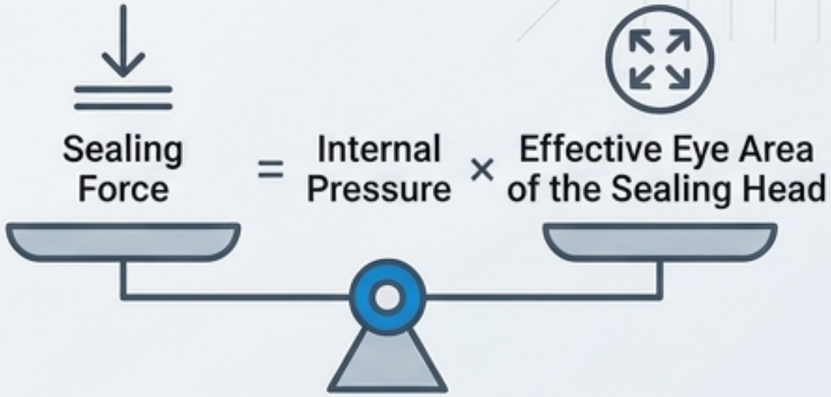
Hydraulic Lifting Cylinder

Raises the 50kg filled shell vertically into the test position.

Pressure-balanced sealing technology prevents structural shell damage.

Traditional clamping can deform the shell mouth. The Neometrix system utilizes dynamic metal-to-metal sealing that actively balances mechanical force against internal hydrostatic pressure.





Dynamic Equilibrium

At **10 Bar**, the lifting cylinder applies a **10 Bar** proportional counter-force.

At **1400 Bar**, the force scales linearly in real-time.

Result: Zero leakage, zero collateral shell damage.

Hydrostatic Pressurization: Delivering 1800 Bar of controlled force.

Driven by a 1:6 ratio hydraulic intensifier, the machine ramps up water-side pressure at approximately 125 Bar per second, holding the precise setpoint with less than a 5 Bar variance.

Test Range

200 to 1400 Bar

(Structurally rated for 1800 Bar overloads).

Hold Time

Programmable 10 to 60 seconds.

Intensifier Specs

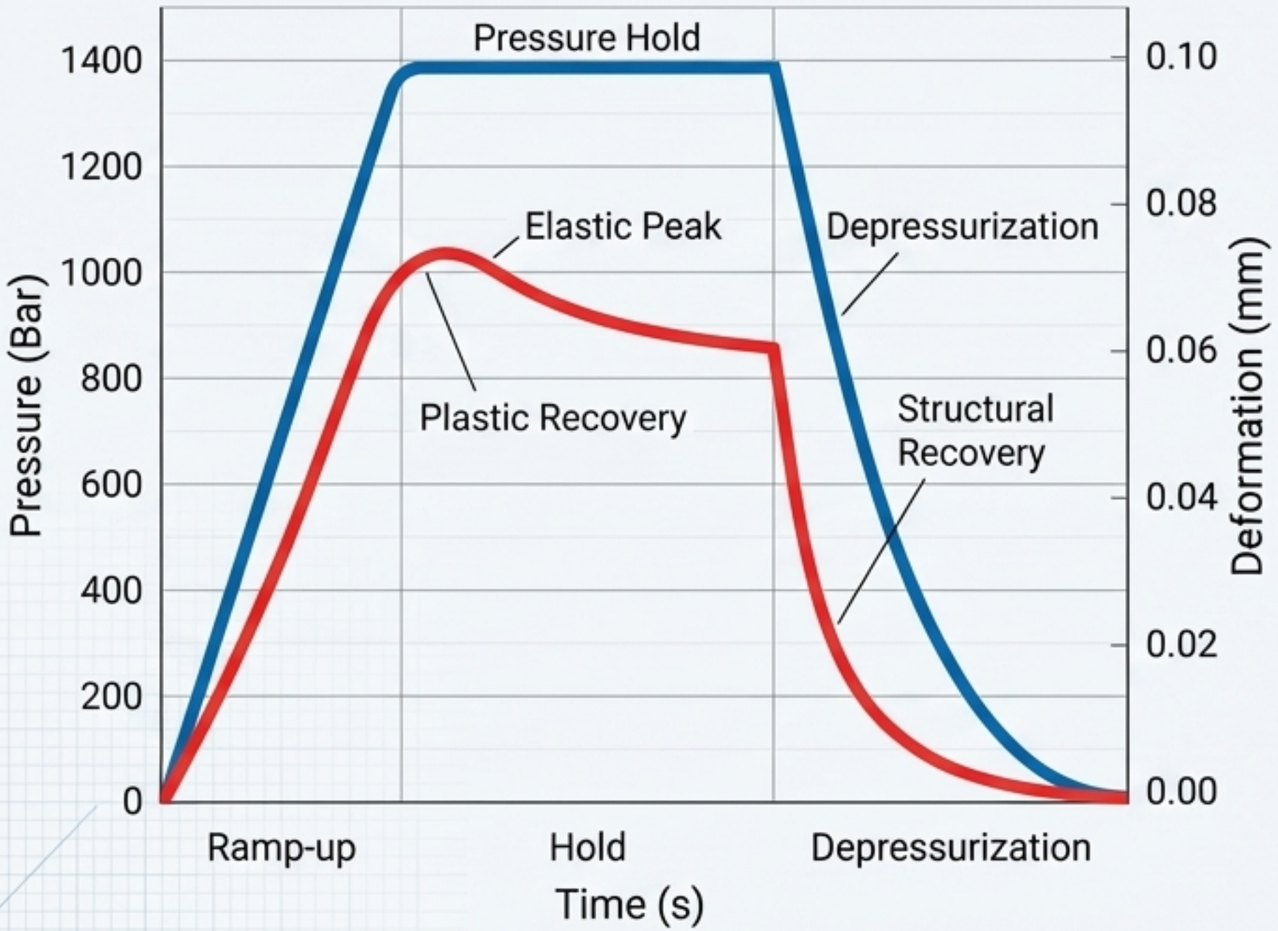
MS on hydraulic side, SS on water coolant side.

Control Loop

Proportional pressure relief valves stabilized by continuous PLC feedback.

Sub-millimeter deformation monitoring and compliance evaluation

Passing the test requires more than just holding pressure; the shell must retain its exact geometric integrity.



Key Evaluation Points

Elastic Deformation

LVDT sensors monitor expansion continuously during the high-pressure hold time.

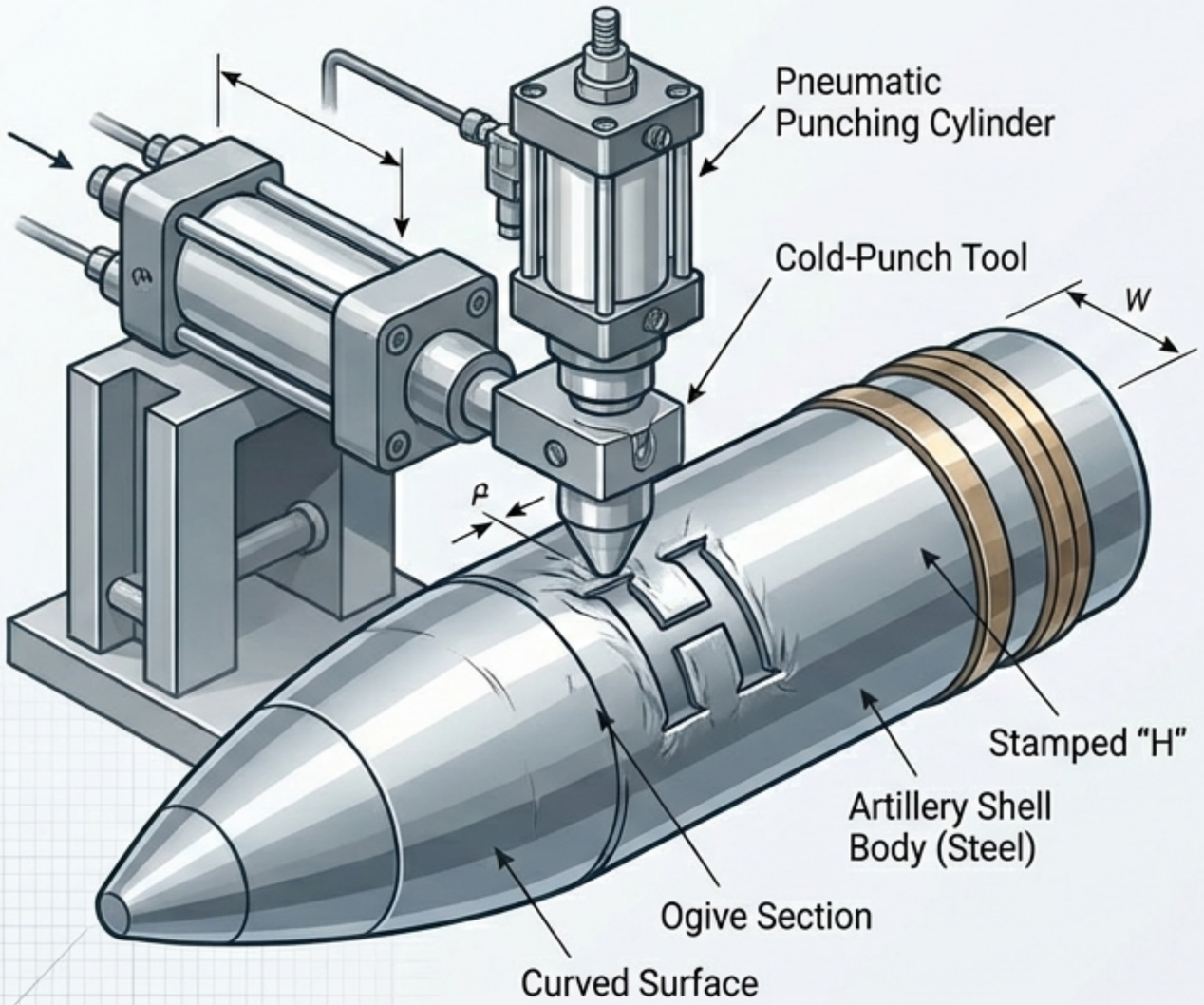
Plastic Deformation

Sensors confirm the shell returns to its exact original dimensions upon pressure release.

Pressure Drop Tolerance

System flags a failure if pressure drops below recipe-defined thresholds during the dwell time.

Controlled depressurization and automated compliance marking.



Process Flow

1. Hydraulic Release

An air-actuated valve opens, releasing internal pressure safely without hydraulic shock.

2. LVDT Verification

PLC verifies deformation limits are acceptable.

3. Automated Cold Punching

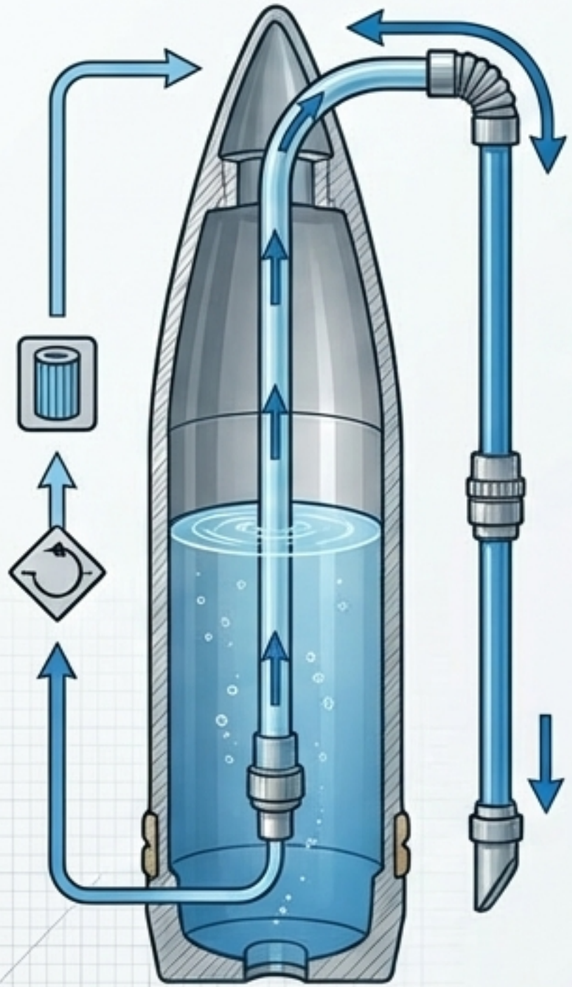
The directional control valve activates the punching cylinder.

4. Marking Specs

A 4mm high, 0.4mm thick "H" is stamped up to 1mm deep (ISO 3098-1 standards) at an adjustable Z-axis height.

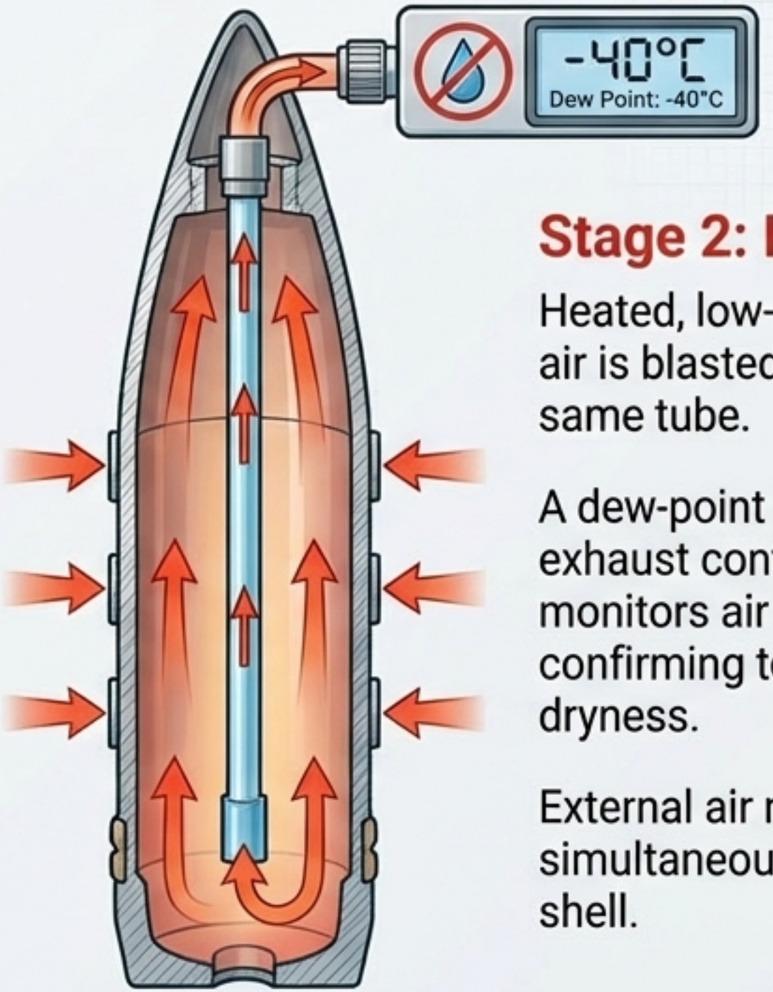
Station 4: Fluid recovery and dew-point monitored hot air drying.

Moisture is the enemy of raw forged interiors. Station 4 ensures the shell is completely dry to the naked eye and touch before robotic unloading.



Stage 1: Draining

An adjustable drain tube inserts to the cavity bottom. Coolant is drained, filtered, filtered, and recirculated in a closed-loop system.



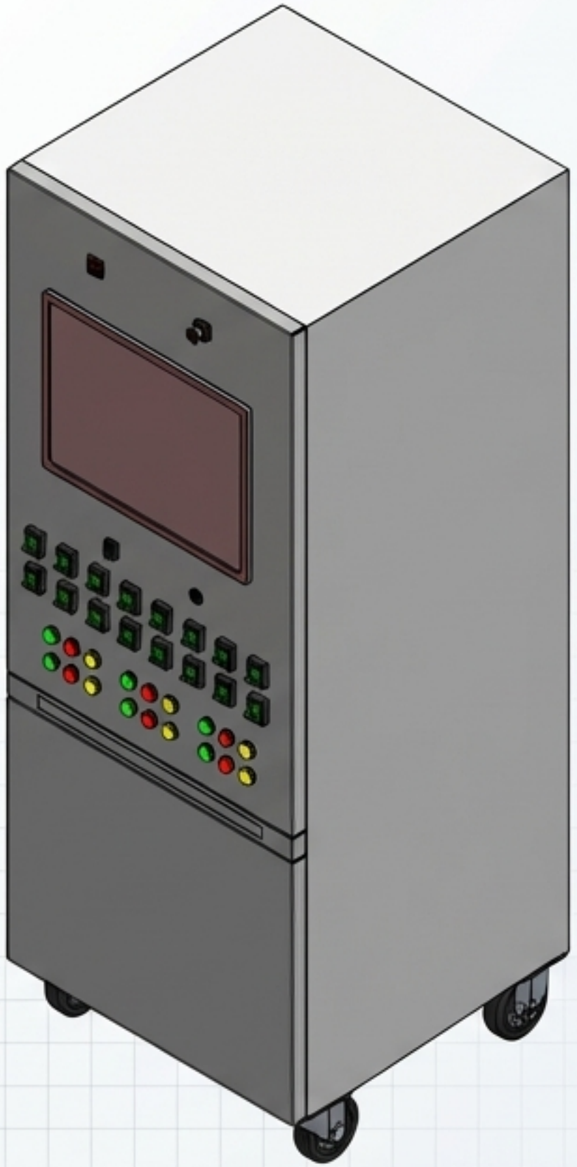
Stage 2: Hot Air Purge

Heated, low-relative-humidity air is blasted through the same tube.

A dew-point meter at the exhaust continuously monitors air output, confirming total internal dryness.

External air nozzles simultaneously dry the outer shell.

Industry 4.0 Architecture: Siemens PLC, SCADA, and 250ms DAQ.



Centralized HMI

10” to 12” touch interface for recipe creation, part selection, and parameter control.

High-Speed DAQ

Data acquisition system logs pressure and time metrics at 250ms frequencies.

Digital Audit Trails

SCADA software generates real-time pressure/deformation curves, exporting .CSV files directly to enterprise networks or USB.

Autonomous Operation

Requires only one operator to supervise the entire synchronized line.

Seamless facility integration and multi-layered safety protocols.

Designed for immediate ‘Plug and Play’ deployment with comprehensive operator protections.

Utility Requirements

- Power: 415V, 3-Phase, 50Hz, 100Amp (55kW Rated Power).
- Pneumatics: 6 to 8 bar compressed air.
- Fluid Quality: Tap water filtered to 5µm with NAS Class 6 oil cleanliness.

Safety Interlocks

- IP55 Rated Rittal standard panels.
- Robot fencing with safety interlocks and proximity sensors.
- Clog switches for pump protection & dynamic level/temperature monitoring.
- Automatic system halt on any abnormal condition.

Engineered for the world's most demanding defense programs.

Proven across global defense organizations, integrating industrial-grade accuracy with military reliability.

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