NEOMETRIX

AUTOMATED HYDRAULIC CONTROL VALVE TEST BENCH

NEOMETRIX

INTELLIGENT AUTOMATION TECHNOLOGY

AUTOMATED HYDRAULIC CONTROL VALVE TEST BENCH

In Mobile And Industrial Hydraulics, A Valve Is Not “Just A Component”—It’s The Control Authority Of The Whole Machine. Flow Metering Accuracy Decides Whether An Excavator Feels Smooth Or Jerky; Leakage Decides Whether A System Holds Load Safely; Response Time Decides Whether A Closed-Loop Controller Behaves Or Hunts; And Pressure Drop Decides Whether You Lose Power To Heat Instead Of Useful Work. Neometrix’s Automated Hydraulic Control Valve Test Bench Is Built As A Universal, Automated Test Rig For Validating A Wide Range Of Mobile Sectional Valves And Industrial Electrohydraulic/Proportional Valves, Combining High Hydraulic Power, Multi-Channel Instrumentation, And Software-Driven Test Sequencing With Data Logging.

- High-Power Testing
- Automated Validation
- Broad Compatibility

SYSTEM OVERVIEW

ABOUT THE SYSTEM

- Automated Test Sequencing
- Advanced Data Logging
- High Pressure Capability
- Dynamic Performance Testing
- Multi-Valve Compatibility

What Makes This Platform Valuable For Both Production And R&D Is That It Supports The Full Lifecycle Of Valve Validation: Incoming Inspection, Calibration/Tuning, Performance Characterization, Endurance Verification, And Troubleshooting After Field Feedback—All Using Repeatable Sequences And Archived Datasets. This Is Especially Important When You Need To Compare Valve-To-Valve Variation Across Batches, Validate A New Spool/Sleeve Combination, Or Prove Compliance To A Customer Specification With Test Records That Can Be Reviewed Months Later.

TECHNICAL DETAILS

TECHNICAL SPECIFICATIONS

System Type	350 KW Automated Valve Test Stand For Mobile And Industrial Valve Testing
Max Power Consumption (Reference)	40 Nm Constant
Main Electrical Supply	3-Phase, 440 VAC
DAQ Supply	Single Phase, 220 VAC
Operating Fluid	Hydraulic Mineral Oil VG-32
Operating Temperature Window	~20°C To 75°C
Reservoir Capacity	~1200 L
Cooling	Plate Type Oil Cooler
Motors	Multiple Main And Secondary Motors
Pumps	Multiple Variable And Fixed Displacement Pumps
Filtration (Reference)	Pressure, Return, And Drain Filtration As Per Manual
Test Capability Envelope (Reference)	Up To ~400 LPM And ~420 Bar (Application Dependent)
Valve Families Supported	CMA, CLS180, SiCV, Two-Stage Proportional Valves (Pilot + Main), Size-3 And Size-5 Electrohydraulic Valves With Suitable Fixtures And Routing, The Bench Can Be Tuned For Virtually Any Hydraulic Control Valve Architecture—Directional, Pressure-Control, And Flow-Control—Covering Cartridge, Subplate, And Manifold-Mounted Designs (Including Common Variants Such As Relief, Reducing, Sequence, Counterbalance/Load-Holding, And Priority Flow Control Valves).

These Are General Technical Specifications, Can Be Customized As Per User's Needs *

NEOMETRIX

KEY FEATURES

- Suitable For Single Valves And Multi-Section Mobile Valve Banks.
- Multi-Channel Data Acquisition With Full Time-History Logging For Traceability.
- Flexible Fixtures And Plumbing Support Cartridge, Subplate, And Manifold Valves.
- Electrical Testing Includes Pull-In Current And Drop-Out Voltage Verification.
- Automated Test Sequencing Ensures Repeatable, Operator-Independent Valve Validation.
- Supports Flow, Pressure Drop, Leakage, Hysteresis, And Dynamic Response Testing.
- High Hydraulic Capability Enables Testing Up To ~400 LPM And ~420 Bar.
- Multi-Pump, Multi-Motor Architecture Allows Stable Low-Flow And High-Load Testing.

Our EOL Test Bench Supports A Wide Range Of Hydraulic Valves, Including Twin-Spool, Cartridge, Pilot, Main, And Electro-Hydraulic (EH) Valves—Covering Directional, Pressure, Flow, And Flow-Control Architectures With Appropriate Fixtures.

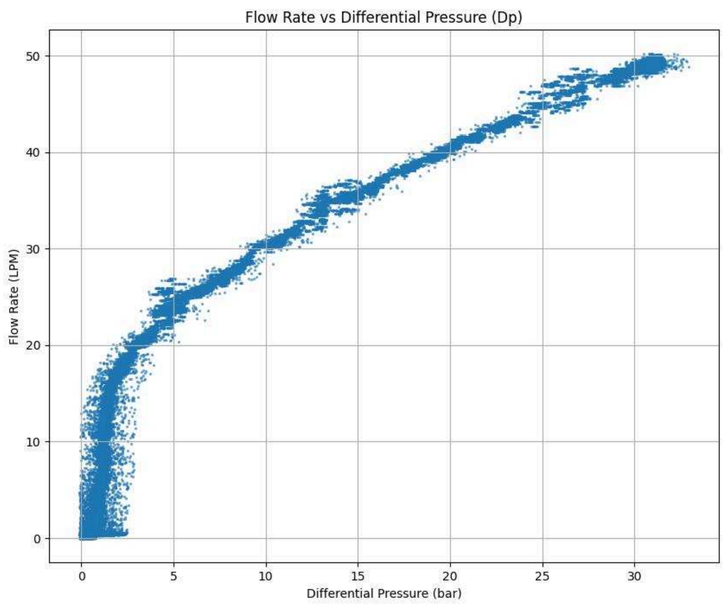
TEST SUITE DETAILS

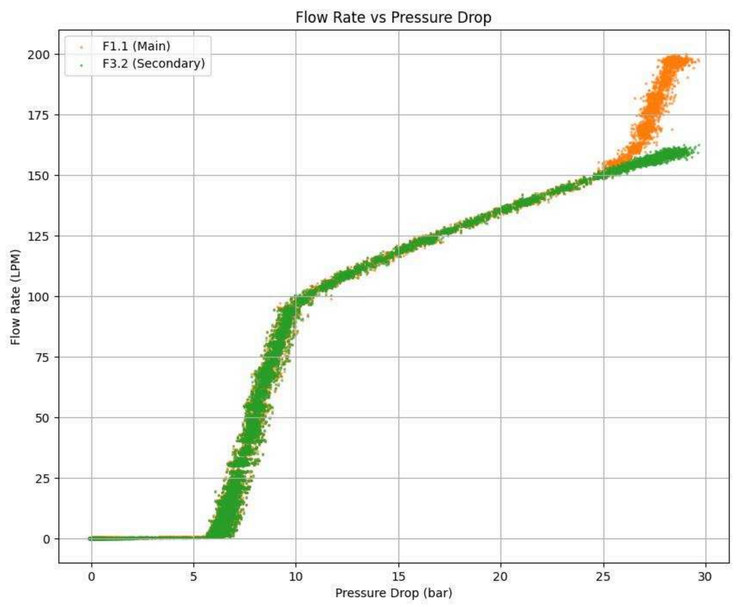
A) Pressure Drop & Flow Characterization (ΔP Vs Flow)

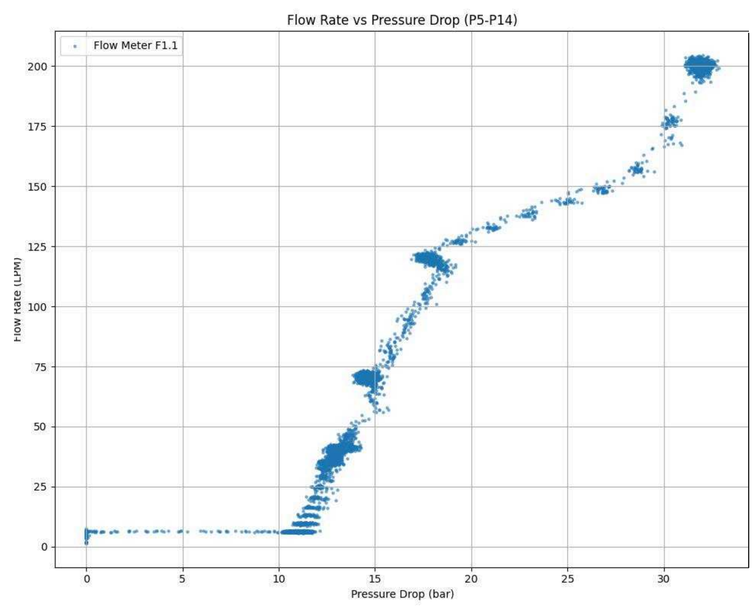
Purpose: Quantify Energy Losses Through The Valve Metering Path And Validate Whether A Valve Meets The Expected Hydraulic Efficiency Across Flow Ranges.

What The Stand Does:

- Sweeps Flow Through Defined Operating Points
- Measures Inlet/Outlet/Work-Port Pressures
- Builds ΔP Trends And ΔP Vs Flow Curves (For Cartridge Valves And Directional Valves)
- Enables Comparison Of Pressure-Drop Behavior Between Valve Variants, Spool/Sleeve Options, And Manufacturing Batches
- Supports Repeat Runs At Stabilized Temperature To Separate “True Valve Behavior” From Viscosity Effects







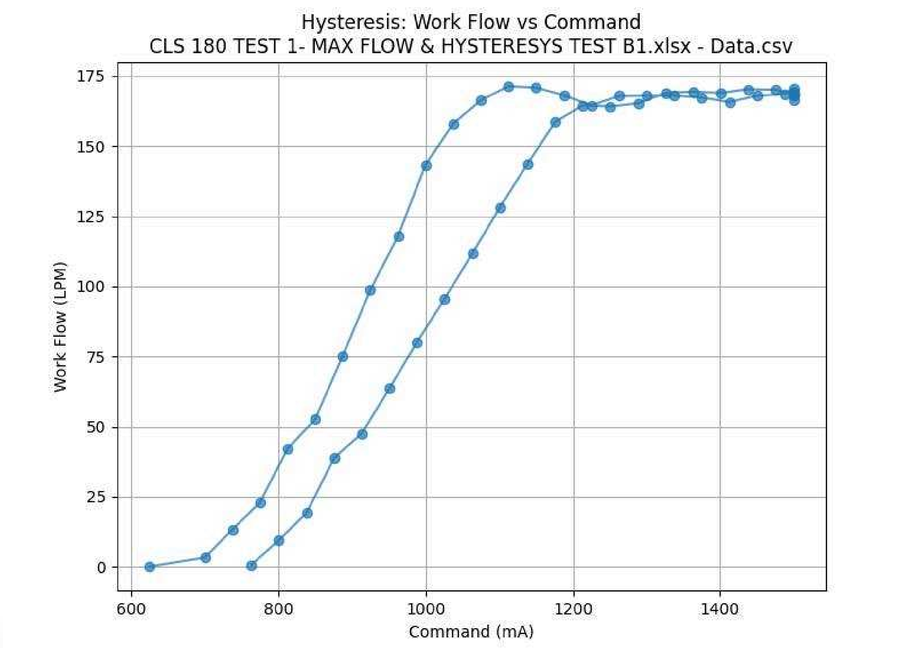
B) Hysteresis Testing (Command ↑ And Command ↓ Behaviour)

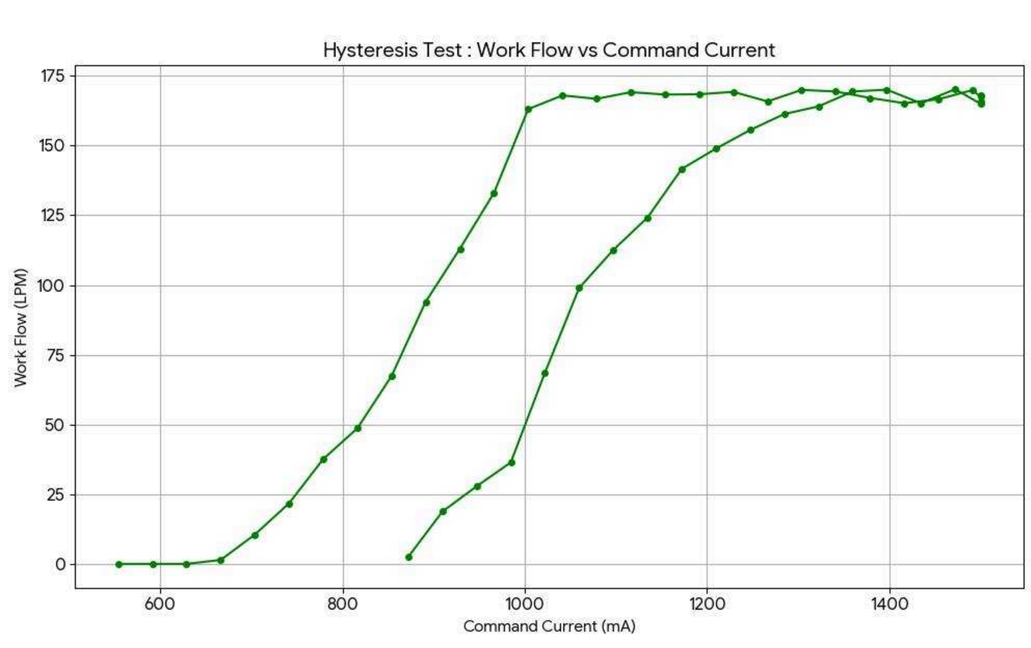
Purpose: Validate Whether The Valve Responds Consistently When Approaching A Target From Increasing Vs Decreasing Command (A Major Driver Of Controllability And “Feel” In Mobile Machines).

What The Stand Does:

- Slowly Ramps Command From Zero To Max And Back To Zero
- Logs Flow Vs Command And Generates A Hysteresis Curve
- Helps Identify Sticky Spool Behavior, Biased Neutral, Or Friction-Driven Nonlinearity
- Supports “Before/After” Comparisons When Tuning Deadband, Flow Gain, Or Pressure Gain CLS180

Procedures Explicitly Describe This Style Of Hysteresis Curve Measurement During Section Flow Metering Performance Testing.

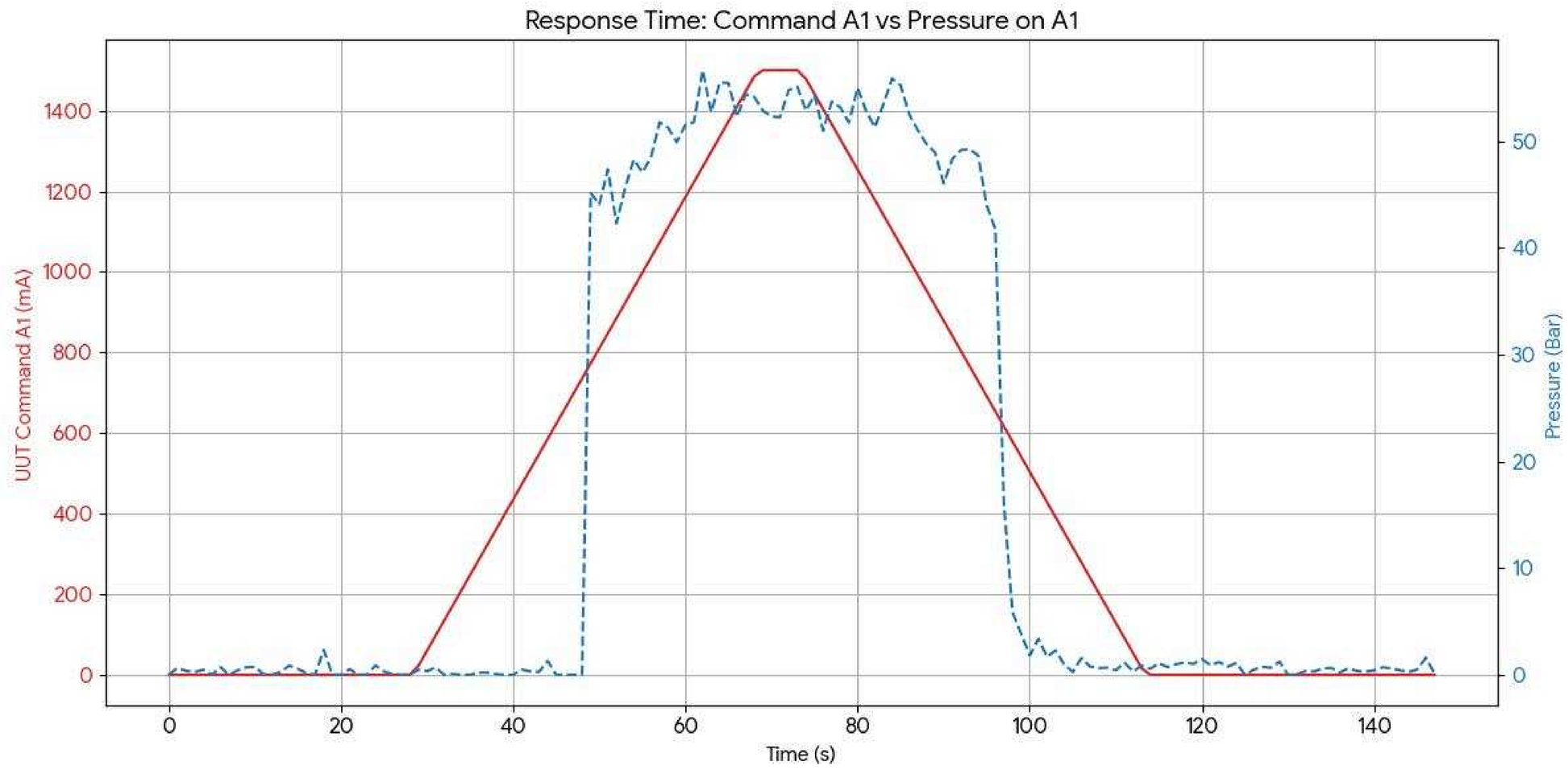




C) Max Flow Verification Purpose:
Confirm The Valve Reaches Expected Rated Flow Under Specified Command Conditions (And Identify Incorrect Spool/Sleeve Combinations Or Tuning Issues).
Where It Matters:
• Sectional Valves (CLS180/CMA) Where Each Section Must Meet Its Metering Expectation
• EH Valves Where Sleeve/Spool Combinations Define Rated Flow Windows
• Ensuring Production Consistency: A “Small Shift” In Max Flow Often Signals A Real Assembly Or Calibration Issue

D) Leakage Testing (Internal And External)
Purpose: Leakage Is Not Just A Quality Metric—It Directly Impacts:
• Load Holding Safety,
• Thermal Efficiency,
• Machine Drift, And
• Ability To Meet Neutral Stability Requirements.
What The Stand Validates:
• External Leakage (Assembly Integrity Under Pressure)
• Internal Leakage At Work Ports / Critical Seals (Especially On Valve Banks)
• Leakage Changes After Endurance Cycling (A Strong Indicator Of Wear Or Seal Degradation)
• Neutral/Position-Specific Leakage Behavior (Useful In Fine Control Valves)

E) Response Time / Dynamic Behaviour
Purpose: Determine How Fast The Valve Reaches The Commanded Position/Flow (Critical For Closed-Loop Performance And Stability).
What The Stand Does:
• Applies Step Commands / Shaped Commands
• Measures Flow/Pressure Response Over Time
• Flags Sluggishness, Overshoot, Oscillation, Or Instability

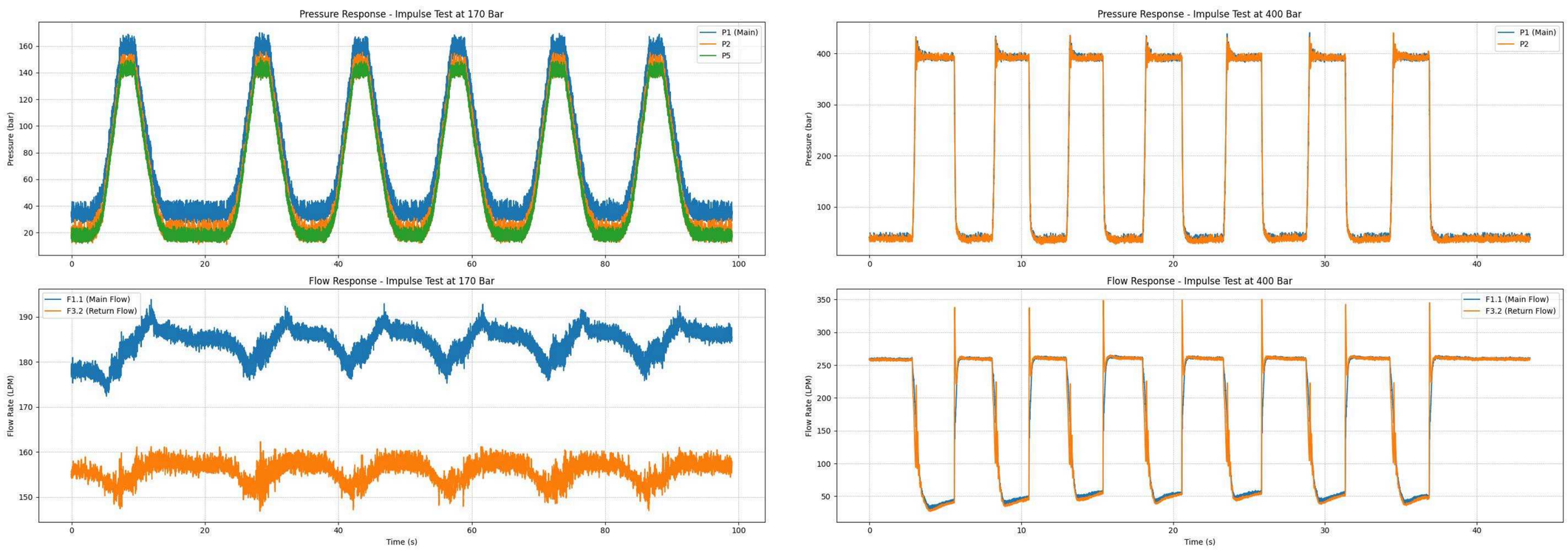


F) Pressure Impulse / Cycling Tests

Purpose: Validate Robustness Under Repeated Pressure Events And Confirm Stable Behaviour Across Repeated Cycles.

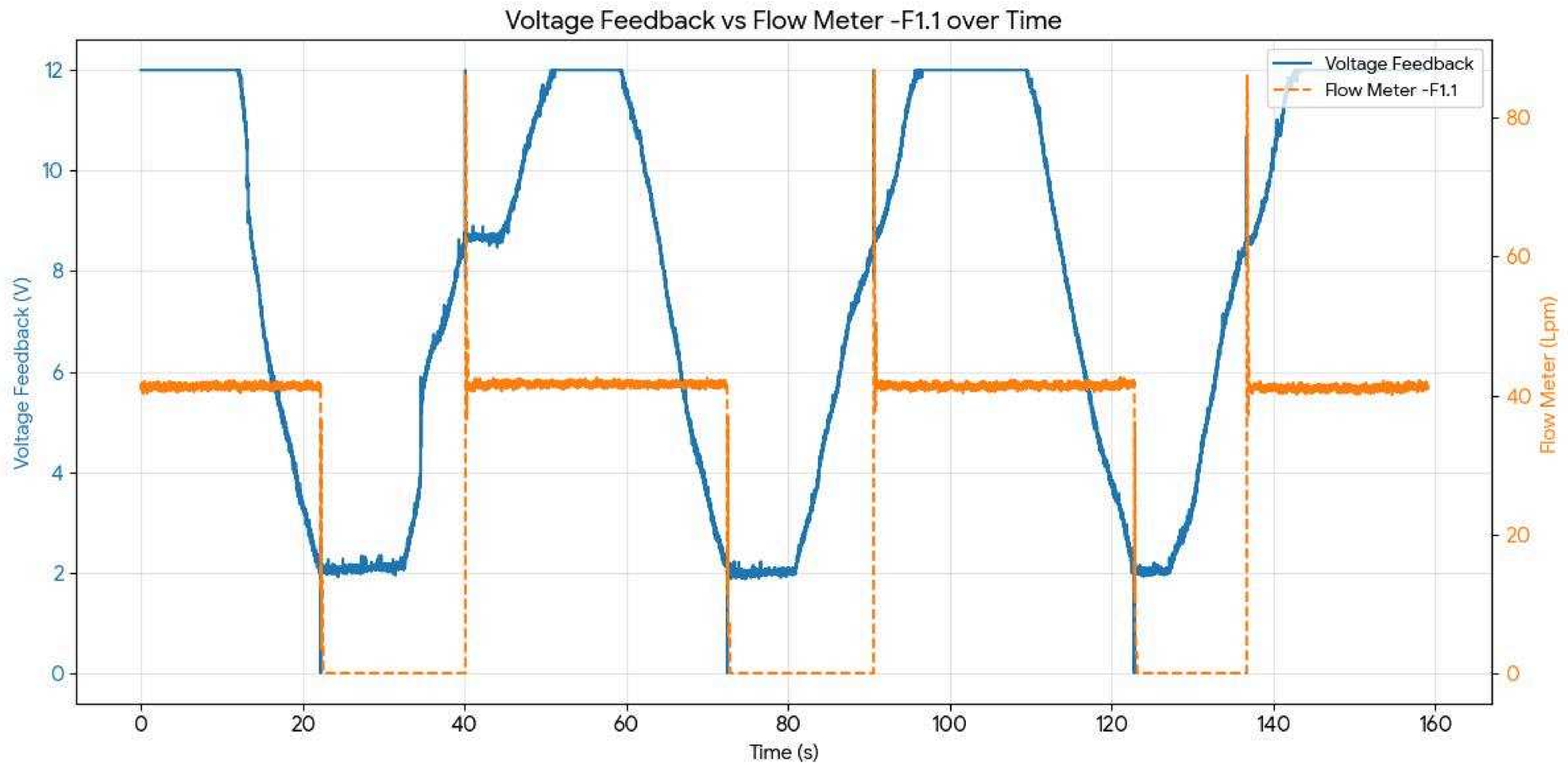
What The Stand Does:

- Runs Programmed Pressure Impulses And Cycling Sequences
- Logs Pressure/Flow Response And Any Drift Over Time
- Helps Reveal Weak Points That Steady-State Tests Can Miss (Seals, Dynamics, Recovery Stability)
- Supports Comparison Of Event-To-Event Repeatability (An Important QA Indicator)

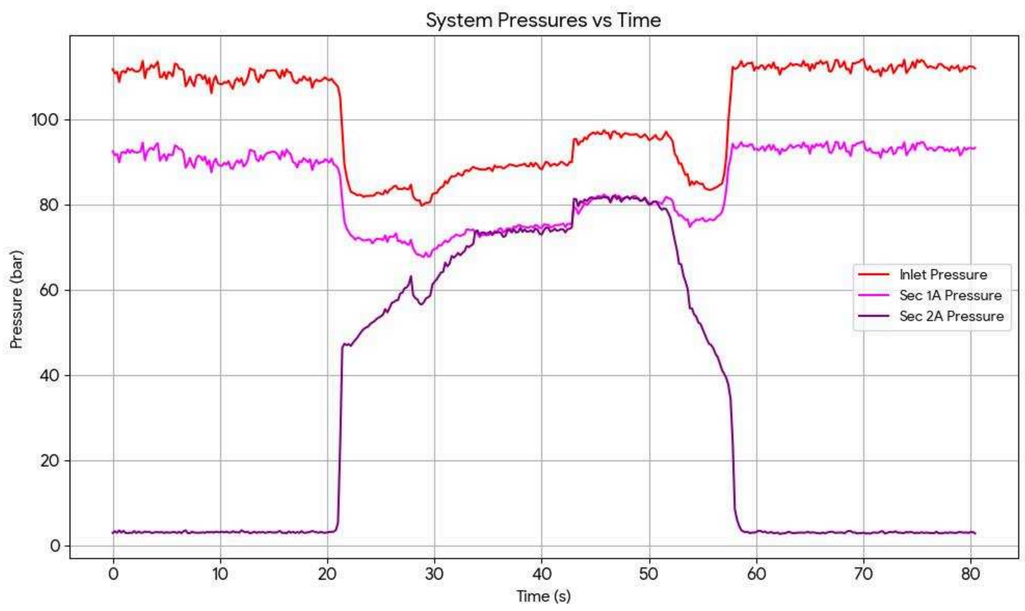


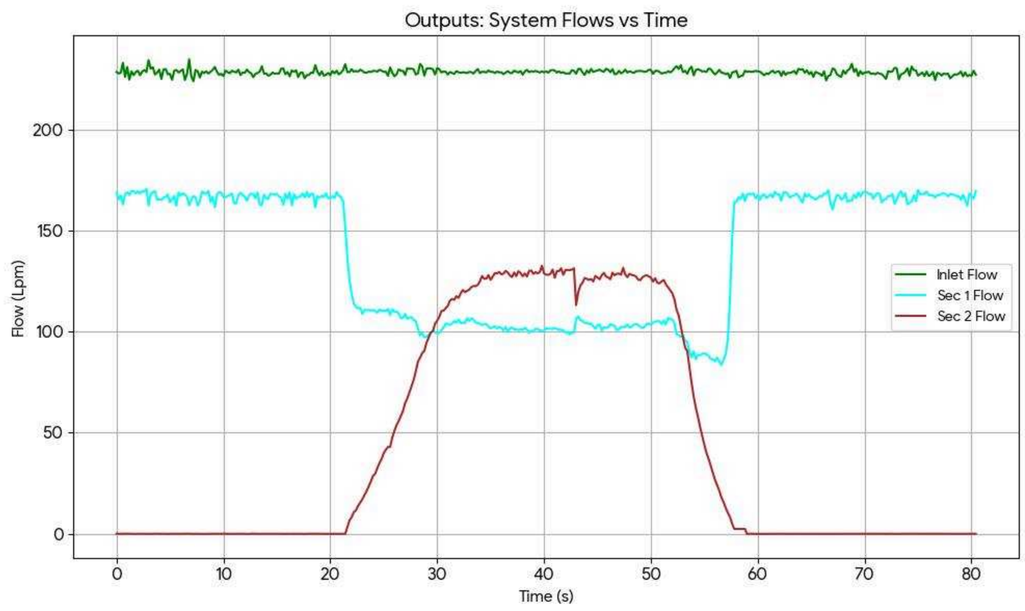
G) Pull-In Current & Drop-Out Voltage Tests (Electrical Behaviour Under Load)

Purpose: Confirm The Valve's Electrohydraulic Actuation Behaves Correctly—Especially Important For Coils, Drivers, And Integrated Electronics. This Is Explicitly Listed As A Test Capability In The Manual. In Production, These Tests Help Quickly Isolate Whether An Issue Is Hydraulic (Spool Friction, Contamination) Or Electrical (Coil Characteristics, Driver Behavior, Wiring/Shielding). For Field Troubleshooting, Pull-In/Drop-Out Evidence Often Pinpoints Intermittent Electrical Faults That Would Otherwise Be Blamed On Hydraulics.



H) Flow Sharing And Anti-Saturation Behaviour (Multi-Section Valve Banks)
Purpose: This Is Where A True Mobile Valve Test Stand Earns Its Keep.
When Multiple Sections Are Commanded Together, The System Must:
• Distribute Flow Correctly,
• Maintain Controllability, And
• Avoid Function “Stealing” Or Instability. The FAT Procedure Includes Dedicated Flow Sharing / Anti-Saturation Style Evaluations (Multiple Sections At Defined Pressure Drops And Commands).
These Tests Are Especially Valuable For:
• Validating Priority Functions Vs Non-Priority Functions,
• Confirming Consistent Behavior With Combined Demands,
• Ensuring Predictable Machine Motion Under Multi-Function Operation.





I) Flow Compensation (Pressure Compensation Stability)

Purpose: Validate That A Section’s Metered Flow Stays Stable Even As Inlet Or Load Pressure Changes—Critical For Predictable Machine Motion. CLS180 Procedures Include Compensation Validation By Ramping Pressures And Recording Flow Variation. This Is One Of The Most Practical “Real World” Tests For Mobile Hydraulics, Because It Replicates What Happens When An Actuator Load Changes Mid-Motion. A Good Compensation Curve Means The Operator Feels Consistency; A Bad Curve Means Jerks, Stalls, Or Unexpected Speed Changes.