2026

İPK MÜHENDİSLİK
VE TEST CİHAZLARI

PRODUCT CATALOG

Automotive Type Approval (Homologation) Test Solutions

UNECE R13 and EU2015/68 Compliant Braking Test Unit

CAN-Bus Protocol :
Full compliance with ISO 11992 communication protocols

High Sampling Rate: High-speed Data Acquisition (DAQ) at 1 kHz and above for millisecond-accurate response time measurements.

User-Friendly Interface: PC-based test management featuring real-time graphical analysis and automated reporting.

R13-TU

Pneumatic
Electric

Ek 6 Madde 2 Motorlu Taşıt
Tepki Süresi Testi Pnomatik

Ek 6 Madde 2 Motorlu Taşıt
Tepki Süresi Testi Pnomatik + Elektrik

Ek 6 Madde 2 Motorlu Taşıt
Tepki Süresi Testi Treylersiz Araç

Ek 6 Madde 3 Treyler
Tepki Süresi Testi Pnomatik

Ek 6 Madde 3 Treyler
Tepki Süresi Testi Pnomatik + Elektrik

Ek 7 Madde A.1.3 Treyler
Basınınç Tankı Kapasite
Testi Pnomatik + Elektrik

Ek 6 Madde 2.7 Motorlu Taşıt
Kopma Testi

Ayarlar Ve Kalibrasyon

Not Connected

Bağlan   Yenile

Trailers

Annex 6: Response Time Testing The system simulates the towing vehicle by delivering instantaneous pneumatic pressure or digital signals (braking via CAN-Bus) to the control line. It captures and records data from trailer-mounted pressure sensors with millisecond precision.

Automatic Reservoir Capacity Validation (8-Stroke Test) according to ECE R13 Annex 7 This test verifies the capacity of the trailer's air reservoirs to ensure safe braking performance even after the energy source (towing vehicle) is disconnected.

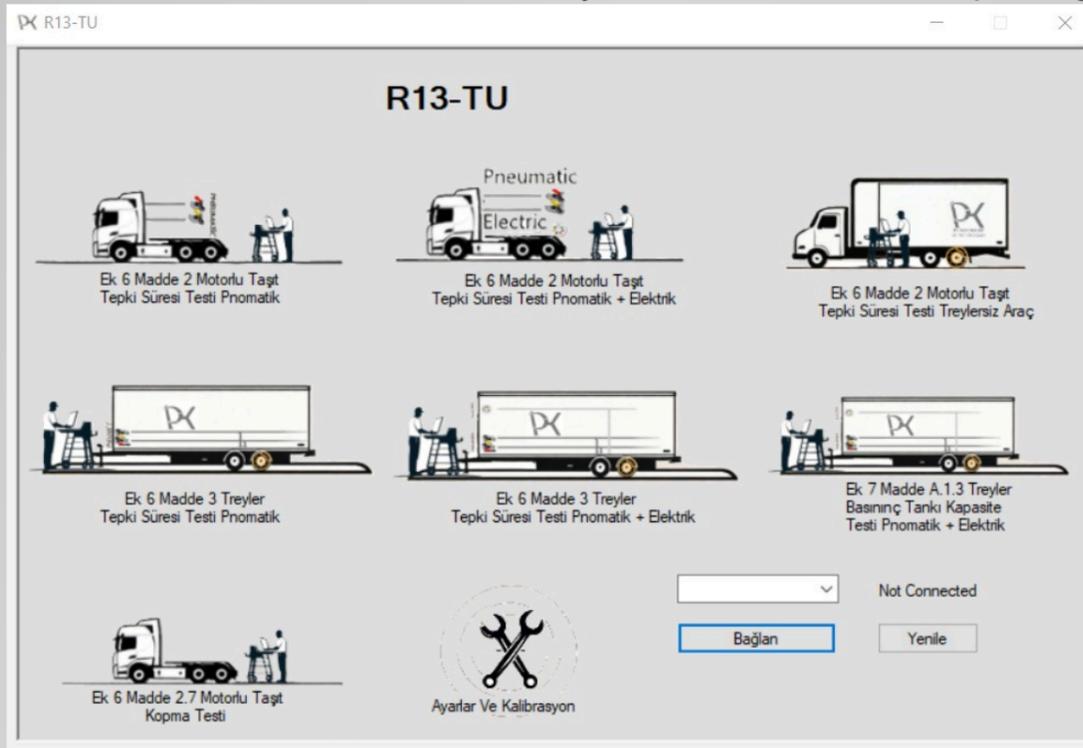## M, N and T Category Vehicles (Motor Vehicles)
Annex 6 - Response Time
"Precision Timing via Dual-Switch Triggering"

The R13-TU features an advanced brake pedal trigger mechanism equipped with dual high-speed switches to eliminate operator-induced latency.

Initial Contact Switch (T0): Captures the exact millisecond the pedal begins its travel, fulfilling the ECE R13 requirement for starting the response time clock.

Full-Stroke Switch (Tmax): Identifies the moment of maximum displacement, allowing for a comprehensive analysis of the system's pressure build-up curve.

ECE R79 Compliant Steering Test System

Annex 3 Steering Effort Measurement:

Measuring the maximum force (in Newtons) and torque applied by the driver to rotate the steering wheel.

Universal Quick-Mount: Adjustable clamp system for all steering wheel diameters (Trucks, Buses, Cars).

Integrated High-Resolution Torque Sensor: Features a high-precision Kistler Torque Sensor (Accuracy: ±0.1 Nm).

PC-Independent Operation & Seamless Data Management

Standalone Testing: High-performance integrated controller, the STU can manage the entire testing process without requiring an external PC connection.

Integrated Control Interface: Start tests and monitor real-time data directly through the on-device graphical display.

USB Data Export: Upon test completion, export all high-resolution graph data and measurement results in CSV format directly to a USB flash drive.
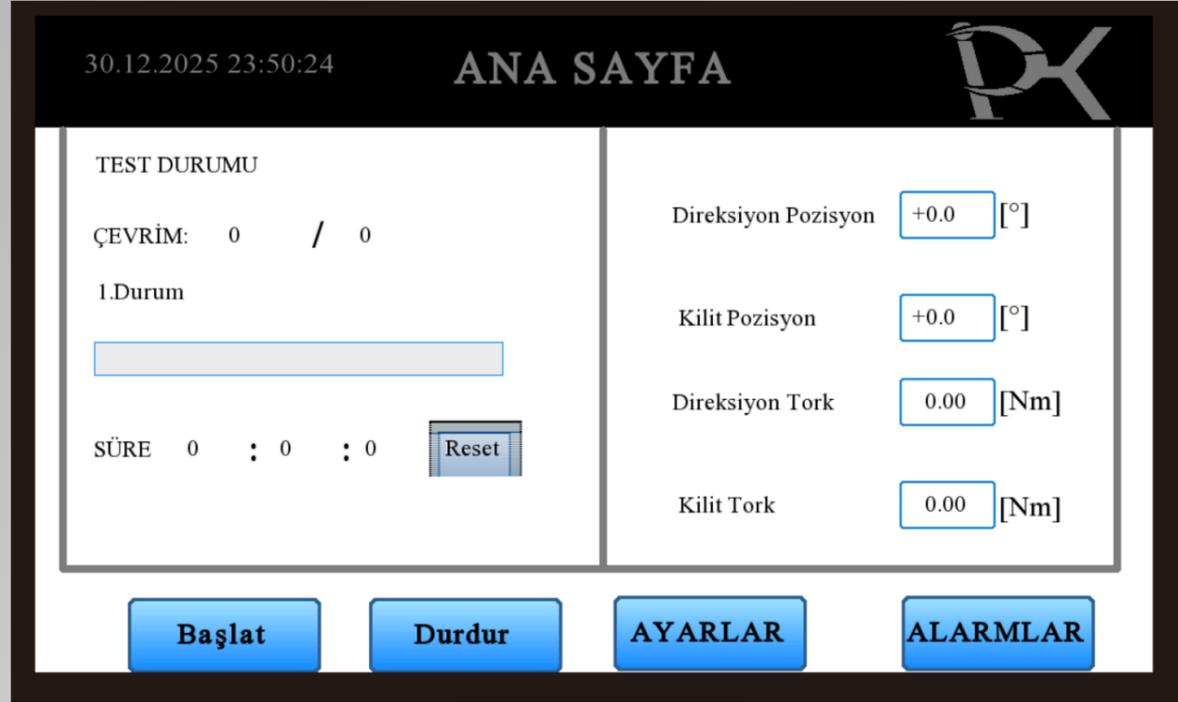
Plug-and-Play Analytics: Simply plug the USB drive into your workstation to perform advanced data analysis using standard spreadsheet software (Excel, etc.).
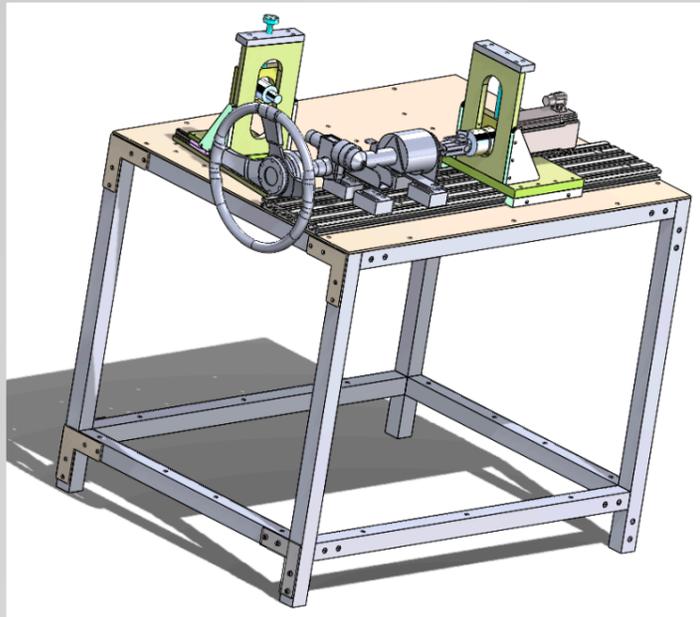
BM ECE R18 Compliant Steering Lock and Unauthorized Use Test System

Durability Test

Independent Operation and Intelligent Control:
HMI-Based Testing: Perform complex durability and strength tests directly via the high-resolution touchscreen. No external computer is required.

Dual Servo Precision: Equipped with two high-performance servo motors for independent torque control of the ignition switch and steering column.

Innovative "Manual Teaching" Mode

Steering Wheel Position Learning:
Easily identify the left and right locked positions by manually rotating the steering wheel; the system records these coordinates with a single click.

Mechanical Flexibility and Ergonomics

Symmetric Modular Design: The entire system is built on a mirrored architecture. The ignition servo and mounting hardware can be easily switched from left to right, allowing testing for both left-hand drive (LHD) and right-hand drive (RHD) vehicle configurations.

Multi-Axis Adjustability:

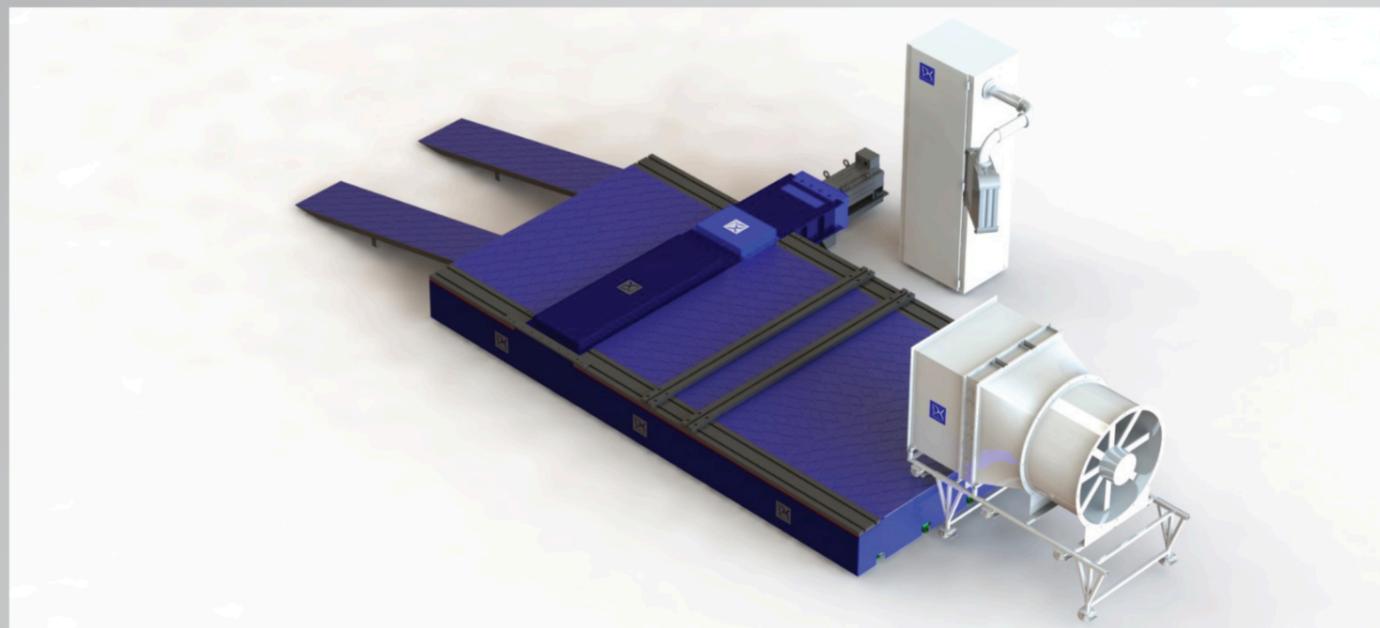**Key Angle and Height:** Precise adjustment for various ignition switch geometries.
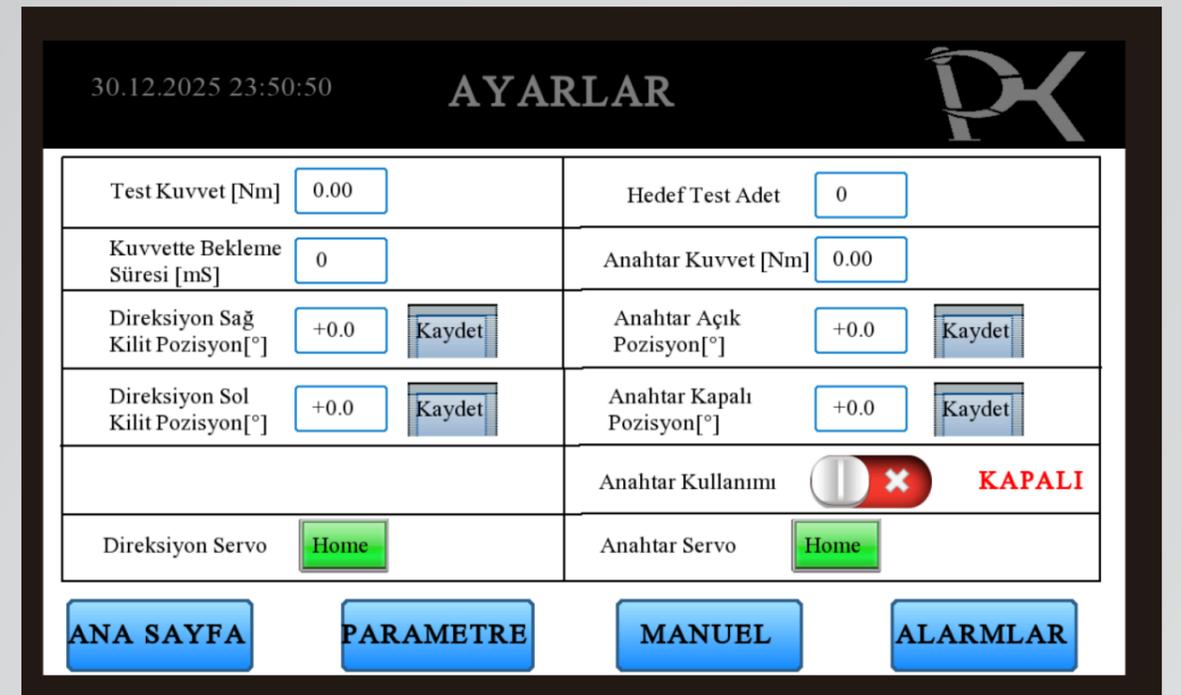
Chassis Dynamometer for L-Category Vehicles

EU 134/2014
UNECE R85

Compliant Energy & Performance Validation

Regulation-Ready Road Simulations
WMTC Integration: Fully supports World Motorcycle Test Cycle (WMTC) road simulations as per EU 134/2014.

- Embedded Class Profiles

- Customizable Test Paths

Energy & Range Validation

High-precision measurement systems for energy consumption and electric vehicle range testing.

- Superior Engineering & Hardware

- Industrial Control Power
  Driven by the Beckhoff Industrial PC, ensuring real-time control and high-speed data processing.

- Precision Torque and Speed Measurement
  Integrated Kistler Torque Sensors

- Specially Balanced Rollers

- Flexible Configuration
  Modular design supporting both Single and Dual Roller usage for various vehicle wheelbases.

- Speed-Matched Wind Simulation
  Integrated cooling fan system that generates headwind proportional to the actual vehicle speed, ensuring realistic thermal conditions.

Real-Time DataStreaming:

A dynamic, high-resolution speed-time graph flows across the operator dashboard for instantaneous performance monitoring.

Autonomous & Driverless Test Capability

High-Performance Electric Motor Test Bench

ECE R85

- **Net Power Measurement**

- **Maximum 30 Minutes Power Test**

Fully compliant with mandatory test procedures, including the 5-minute peak power scan and the 30 minute maximum continuous power test.

Dynamic Performance Mapping: Real-time generation of torque-speed and power-speed curves as required for electric motor characterization.

Integrated Thermal Management: System includes an integrated chiller unit for the water-cooled Eddy Current Brake to ensure stabilized results during long-duration (30 min) tests.
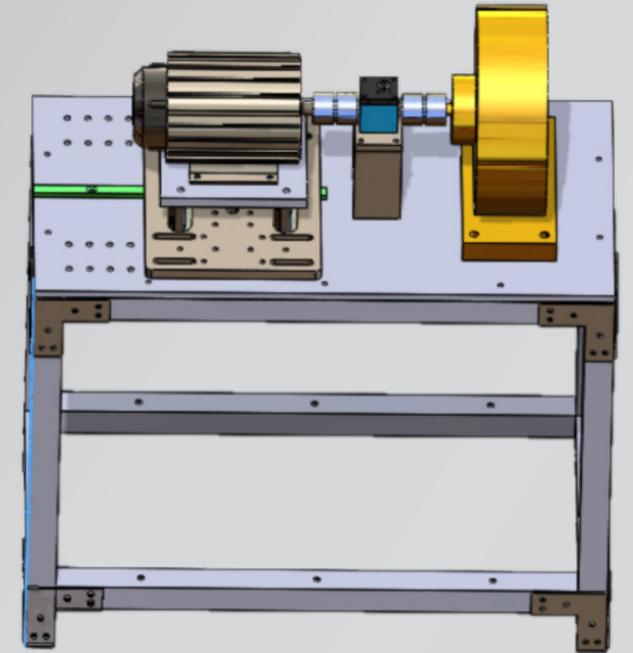
High-Speed Eddy Current Brake: Precision water-cooled loading system capable of handling motors up to 16 kW and speeds up to 8,000 RPM

Industrial-grade torque sensing technology ensures laboratory-level accuracy in all power calculations.

Autonomous Cycle Execution: Pre-programmed R85 test sequences allow for fully autonomous execution, minimizing human error and ensuring 100% repeatability.

Real-Time Data Analytics: Proprietary C# application provides instantaneous visualization of critical parameters: RPM, Torque, Power, and Cooling Temperature.

Net Power Test interface showing:

Net Power Test	Maximum 30min	temizl

Declared Net Power [KW] : 0.00

MAKSİMUM HIZ ..... [RPM]
MAKSİMUM TORK ..... [Nm]
MAKSİMUM GÜÇ ..... [KW]
MİNİMUM GÜÇ ..... [KW]
ORTALAMA GÜÇ ..... [KW]

ANLIK HIZ ..... [RPM]
ANLIK TORK ..... [Nm]
ANLIK GÜÇ ..... [KW]
ANLIK FREN AKIM ..... [A]
SOĞUTMA ISISI ..... [°C]

Test Bilgilerini Set Et | Rapor Oluştur
haberleşme başlat | Test Başlat
Haberleşme Başlatılmadı
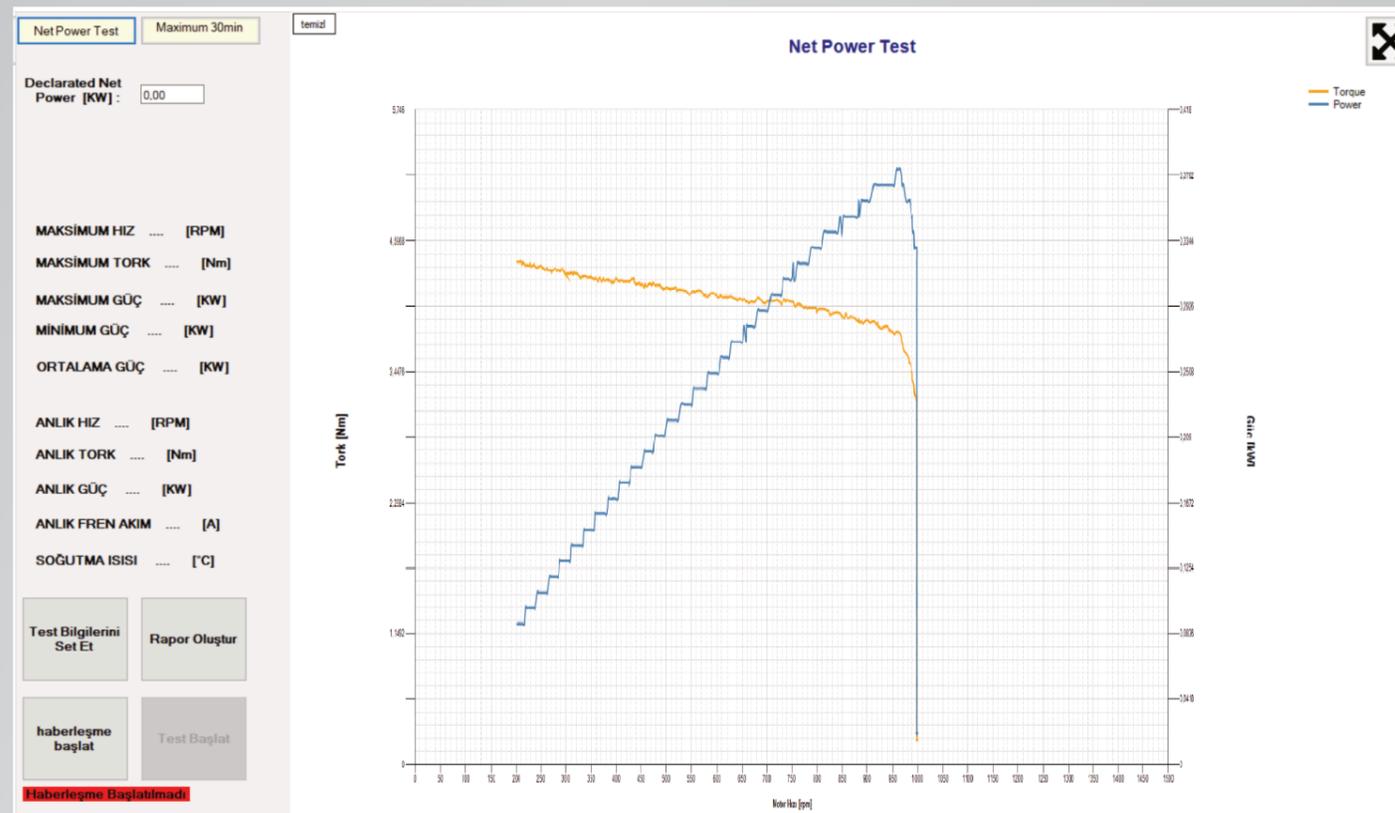
Conditioned Rooms & Cabinets

Precision Environmental Control for Regulatory Compliance

- **UN ECE R100 - Battery Thermal Conditioning**

- **UN ECE R118 - Flammability Pre-Conditioning**

- **WLTP / EU 2017/1151 - Dyno Room Stability**

- **UN ECE R43 - Safety Glass Testing**

- **UN ECE R134 - Hydrogen-Powered Vehicles (H2)**

- **ISO 16750-4 - Climatic Loads for Electronics**

High-Precision Stability:
Temperature control accuracy of ±0.1 °C and humidity control of ±2% RH to meet the strictest homologation standards.

Long-Term Logging & Traceability:
Integrated data acquisition systems that provide 24/7 logging of environmental conditions, essential for technical service audits.

Safety Features for Battery Testing:
Optional fire suppression, gas detection, and pressure relief systems for battery "soak" rooms to ensure lab safety during EV testing.

Programmable Cycles:
User-friendly HMI allows for complex temperature/ humidity profiles and automated 24-hour soaking timers.

Dynamic Coupling Component Test System

UN ECE R55 Compliant Dynamic Fatigue & Strength Testing
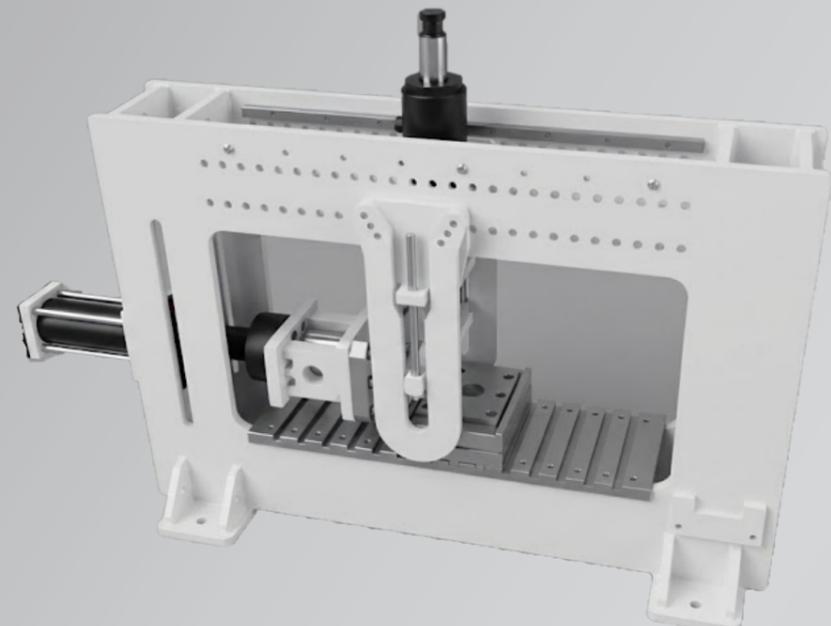
UN ECE R55 Mechanical Coupling Validation:
Specifically designed to perform the mandatory dynamic fatigue tests for coupling balls, towing brackets, and drawbeams.

- **Multi-Axis Force Application:**
  Capability to apply high-capacity forces

- **High-Frequency Performance:**
  Achieves 3-5 Hz for standard dynamic tests, with the ability to reach 5-10 Hz at lower force levels for accelerated fatigue analysis.

- For specialized applications requiring higher frequencies, we offer custom design capabilities up to 35 Hz.
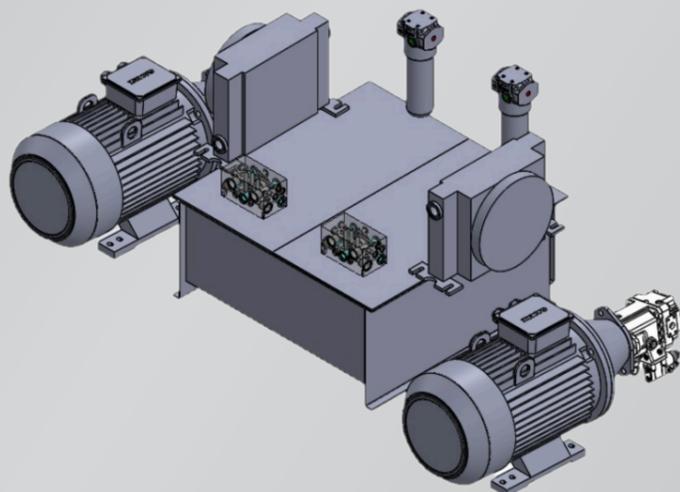
Integrated Test Environment

Soundproof & Conditioned Environment:
The system can be integrated into a specialized sound-insulated and thermally conditioned room to maintain lab safety and result stability.

Outer White Panel
Steel Construction Frame
Sound Insulation Barrier Bondex Sponge
Inner OSB Board

Sound Insulated & Conditioned Room

- **Servo-Proportional Hydraulic Precision:**
  High-response servo-proportional valves ensure millisecond-level reaction times and precise force control.

- **Industrial PC-Based Architecture:**
  Driven by a powerful industrial PC for high-speed data acquisition and real-time closed-loop control.

- **Fully Customizable Design:**
  Force, speed, and mechanical stroke parameters can be tailored; the modular structural design allows for project-specific modifications.
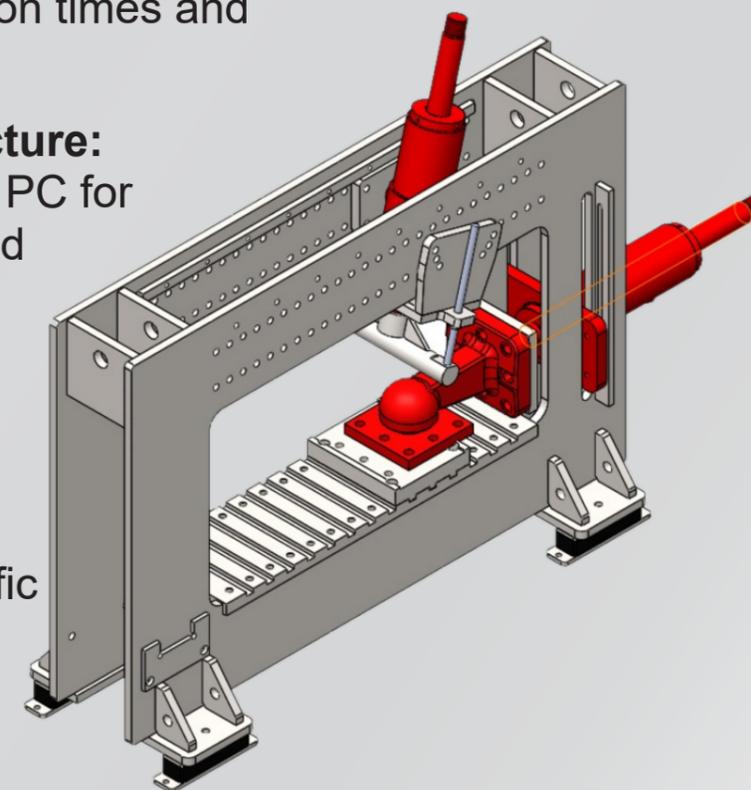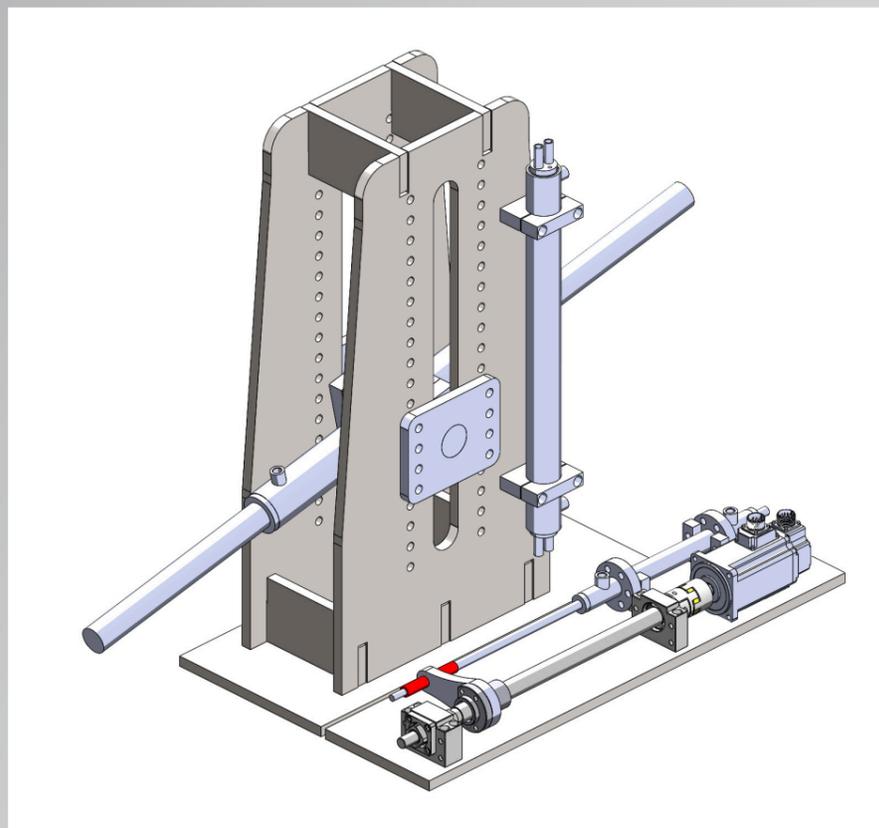
Dynamic Strength Validation for Towing Devices

Regulation Compliance

• EU 1005/2010 Fully Compliant

• UN ECE R55 Equivalent Technical Standards

• Verified Integrity for Vehicle Towing Devices

Precision Load Management: Using a closed-loop control system method, it applies forces to the target forces while remaining within the 5% tolerance specified in the regulation.

Integrated Data Analysis:

• **Real-Time Displacement Tracking:** Instantaneous tracking and graphical representation of deformations occurring during testing.

• **Automated Test Cycles:** Automatic control of the staged loading and holding processes required by the regulation.

• **Rigid Testing Frame:** High-strength steel frame structure compatible with different vehicle classes (M1, N1, etc.).

• **Multi-Vector Force Application:** Advanced actuator system allowing simultaneous or independent application of tensile and vertical loads.

Heavy-Duty Protective Structure Test System

EU 1322/2014 Compliant Force and Energy Absorption Validation

Specifically engineered to perform mandatory static loading tests for agricultural and forestry vehicle cabins, ensuring the "Clearance Zone" remains protected during a rollover.

Full Control and Traceability via C# Based Visual Studio Suite

Real-Time Synchronized Graphing

Automated Parameter Management

Multi-Axis Manual & Auto Control

One-Click Professional Reporting

Data Export : Excel (.xlsx) and Image (.jpg/png)

Intelligent Software Interface & Data Analytics
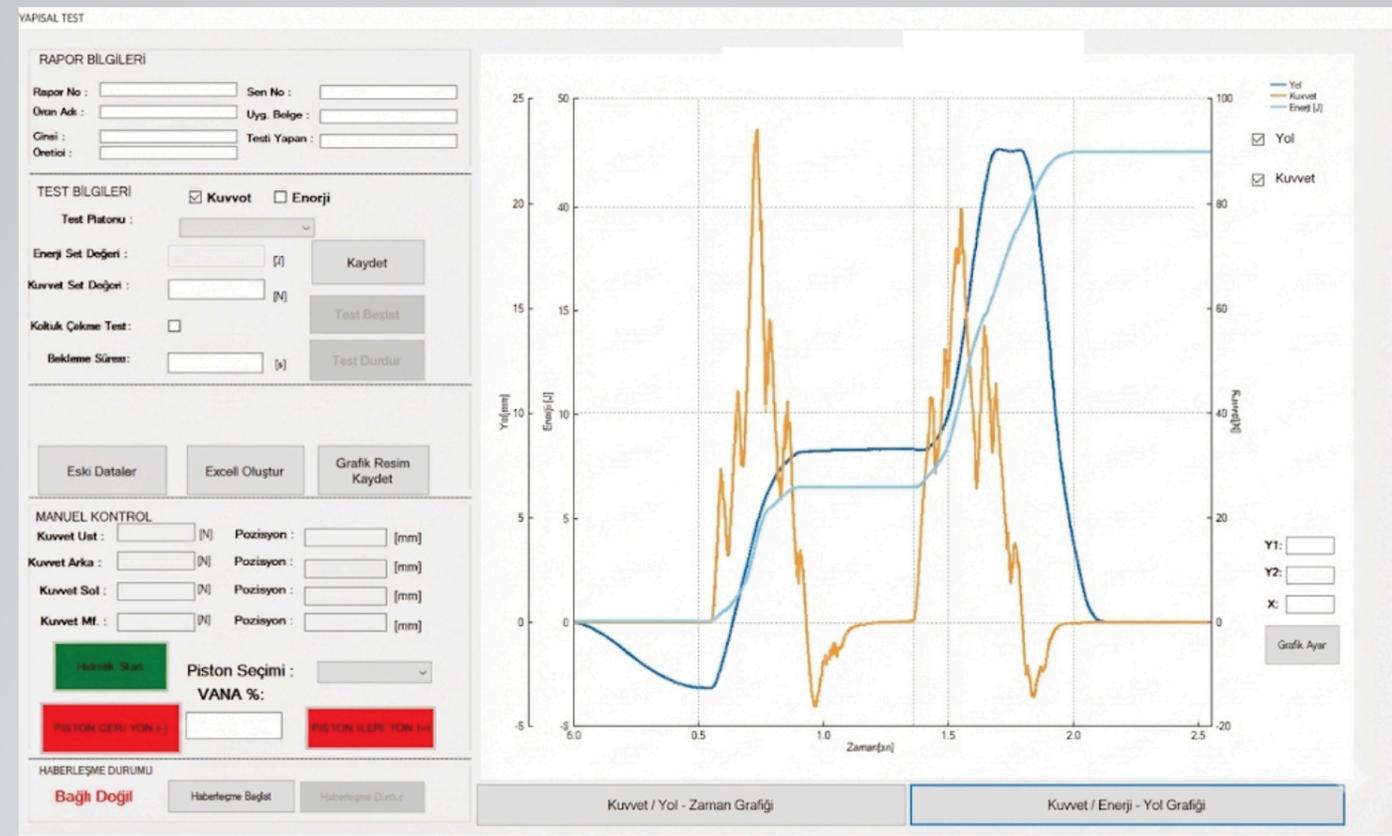
Regulatory Force & Energy Testing

- **Lateral Loading (Energy Absorption):**
  Application of lateral force to simulate side rollovers, calculating the exact energy (kJ) absorbed by the structure to meet regulatory safety thresholds.

- **Longitudinal Loading (Front & Rear):**
  Testing the structural integrity against longitudinal impacts to verify that the protective frame can withstand forces from front or rear-end collisions.

- **Vertical Crushing Test:**
  High-capacity vertical load application to simulate the weight of the overturned vehicle, ensuring the structure does not collapse into the operator's space.

Advanced Seat & Seat Belt Tension Test System

Multi-Regulation Compliance for ECE R14, R16, R21, R80, FMVSS 210 Standards

- **FMVSS 210 - Seat Belt Assembly Anchorages (USA):**
  Establishes stringent requirements for seat belt anchorages to ensure their proper location for effective occupant restraint and structural integrity during high-load crash simulations.

- **ECE R14 - Seat Belt Anchorages (EU):**
  Specifically designed to perform static strength tests on belt anchorages, ensuring the vehicle structure can withstand extreme loads.

- **ECE R16 - Seat Belt Assembly:**
  Validation of the complete seat belt system, including webbing, buckles, and retractors under high-tension requirements.

- **ECE R80 - Strength of Seats (M2 & M3):**
  Testing the strength of seats and their anchorages for large passenger vehicles to ensure passenger protection during impacts.

- **ECE R21 - Interior Fittings:**
  Verification of interior components to ensure they do not detach or cause injury during high-force scenarios.
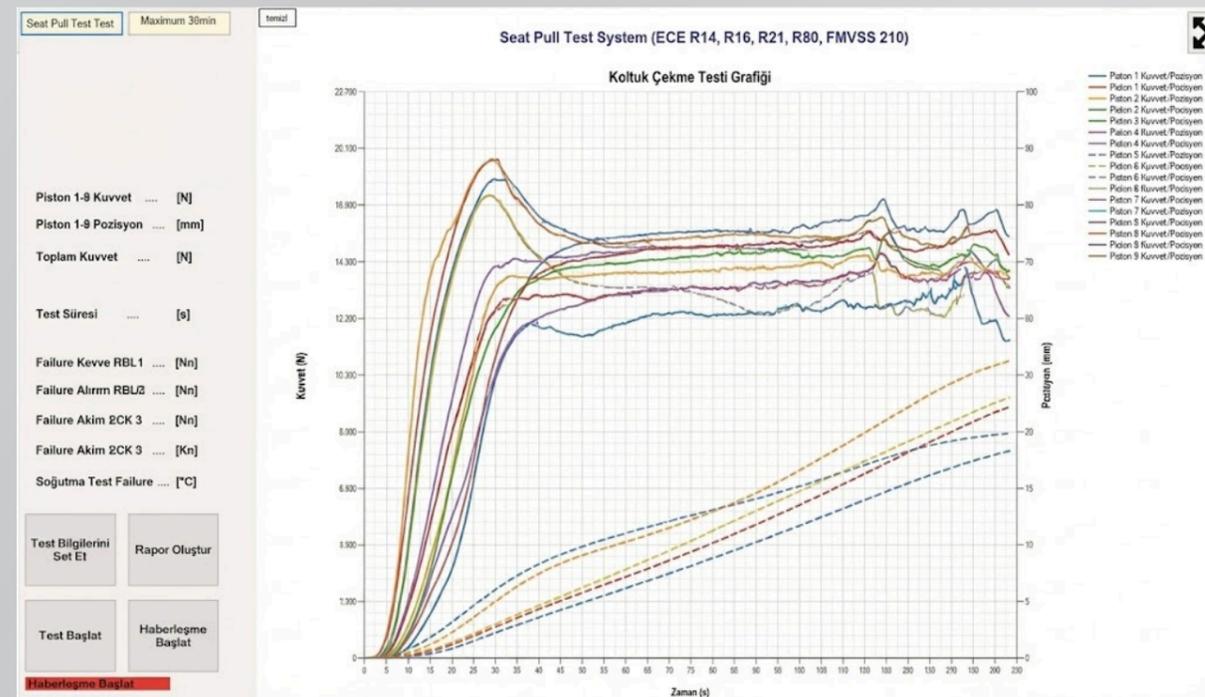
- **9-Channel 3x3 Matrix Actuator System:** Features 9 independently controllable servo-actuators in a matrix layout for complex, multi-point synchronized pulling scenarios.

- **Synchronized Load Profiles:** Capability to define individual pull rates and force targets for each actuator, ensuring a perfectly distributed load according to regulation geometry.

- **Industrial PC-Based Architecture:** Driven by a powerful industrial PC for high-speed data acquisition and real-time closed-loop control.

- **C# Visual Studio Based GUI:** Custom-developed software (seen on dashboard) providing real-time monitoring of force-displacement curves for all 9 channels.

- **Professional One-Click Reporting:** Instant generation of detailed Excel and PDF reports including peak force data and graphical analysis for homologation audits.
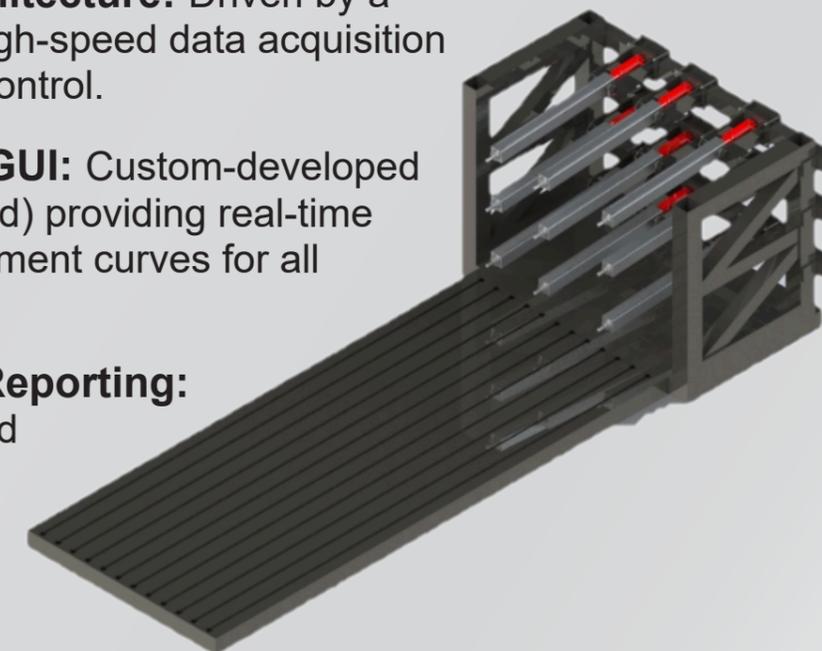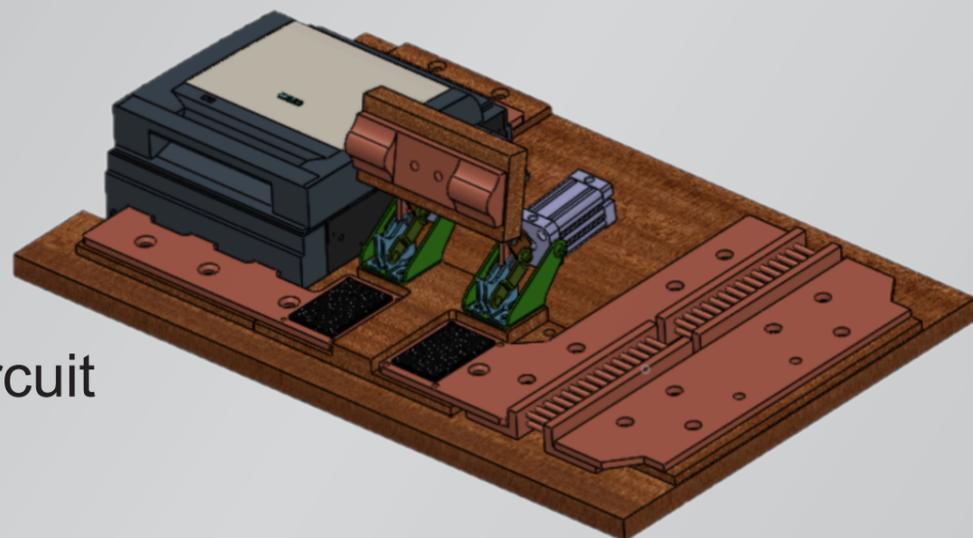
High-Speed Short Circuit Test Device

UN ECE R100 Compliant Battery Safety & Short Circuit Validation

- **UN ECE R100 Battery Behavior Monitoring:** Specifically engineered to observe and analyze the thermal and electrical behavior of electric vehicle batteries during a controlled short-circuit event.

- **Low-Impedance DC Shunt Resistance:** Features a high-precision DC shunt with a resistance of < 5mΩ, ensuring full compliance with strict regulatory requirements for high-current discharge testing.
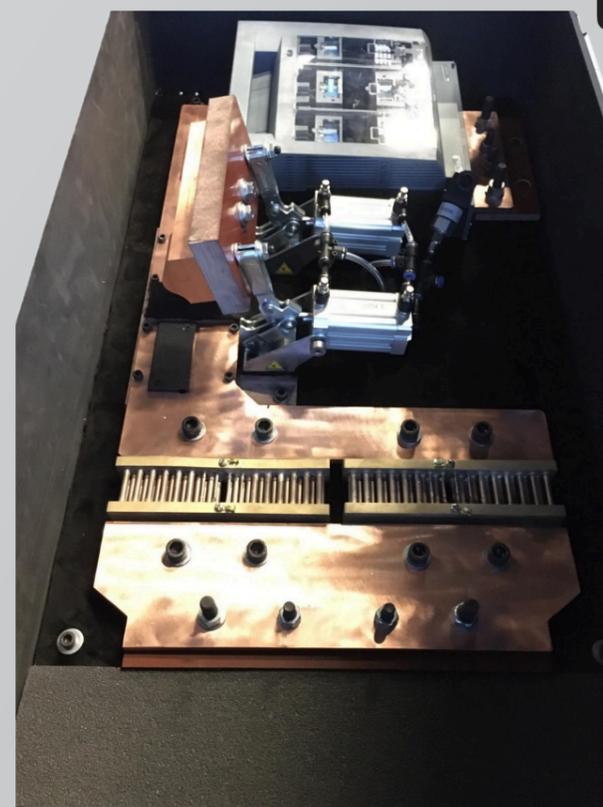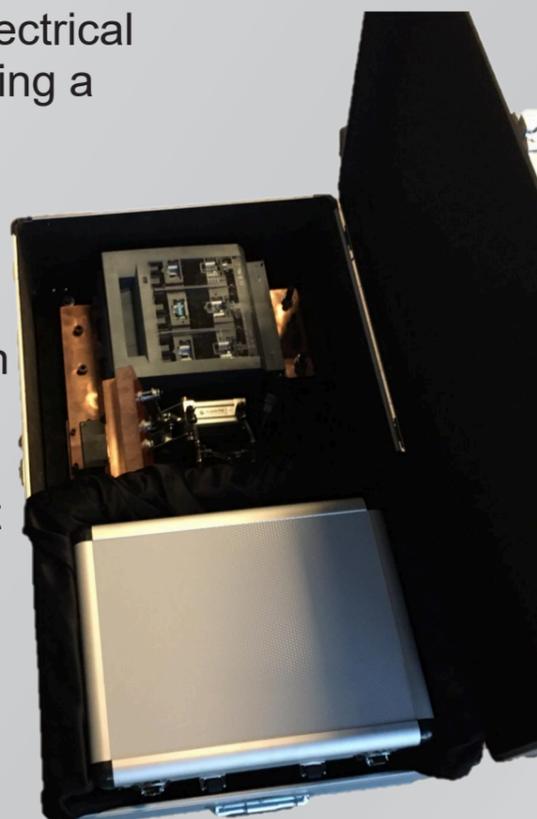
Ultra-High Speed Data Acquisition

Equipped with specialized high-speed analog input cards, allowing for laboratory-grade precision in extreme conditions.

- **10 Microsecond Sampling Rate:** Captures critical voltage and current data points every **10µs**(100kHz), providing a high-resolution map of the battery's reaction in the first microseconds of the short circuit.

- **Real-Time Synchronized Control:** Powered by the industrial PC architecture to ensure ultra-low latency and perfect synchronization between current measurement and safety interlocks.

- **USB Data Export:** Upon test completion, export all high-resolution graph data and measurement results in CSV format directly to a USB flash drive.

- **Plug-and-Play Analytics:** Simply plug the USB drive into your workstation to perform advanced data analysis using standard spreadsheet software (Excel, etc.).

UN ECE R141 Compliant TPMS Simulator

Advanced CAN-Bus Simulation for Tyre Pressure Monitoring Systems

ECE R141 Protocol Accuracy: Fully compliant with ECE R141 CAN-Bus protocols and message intervals, ensuring seamless communication with all EU-standard vehicles.

Industrial Reliability: Built into a high-durability transit case for field testing and lab environments, featuring robust industrial PCB design.
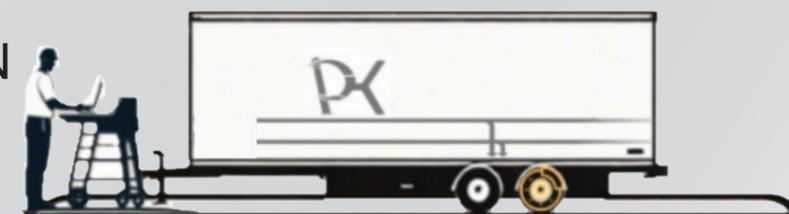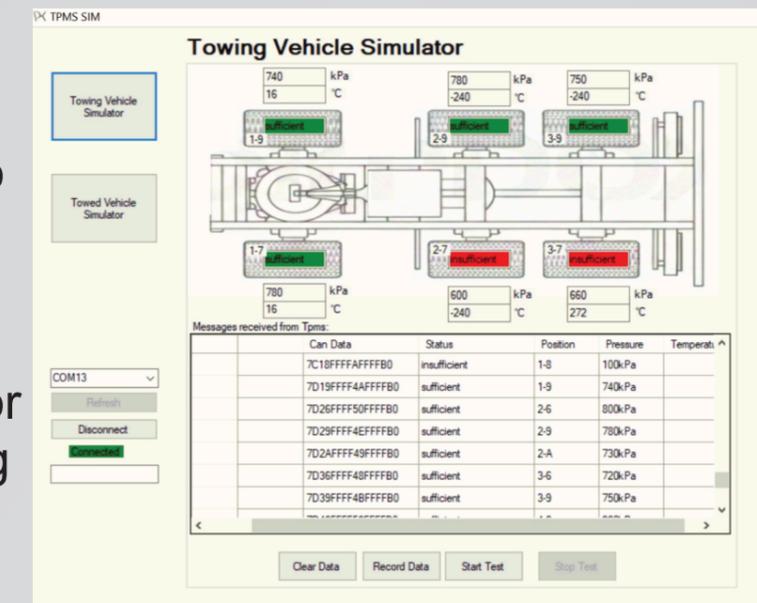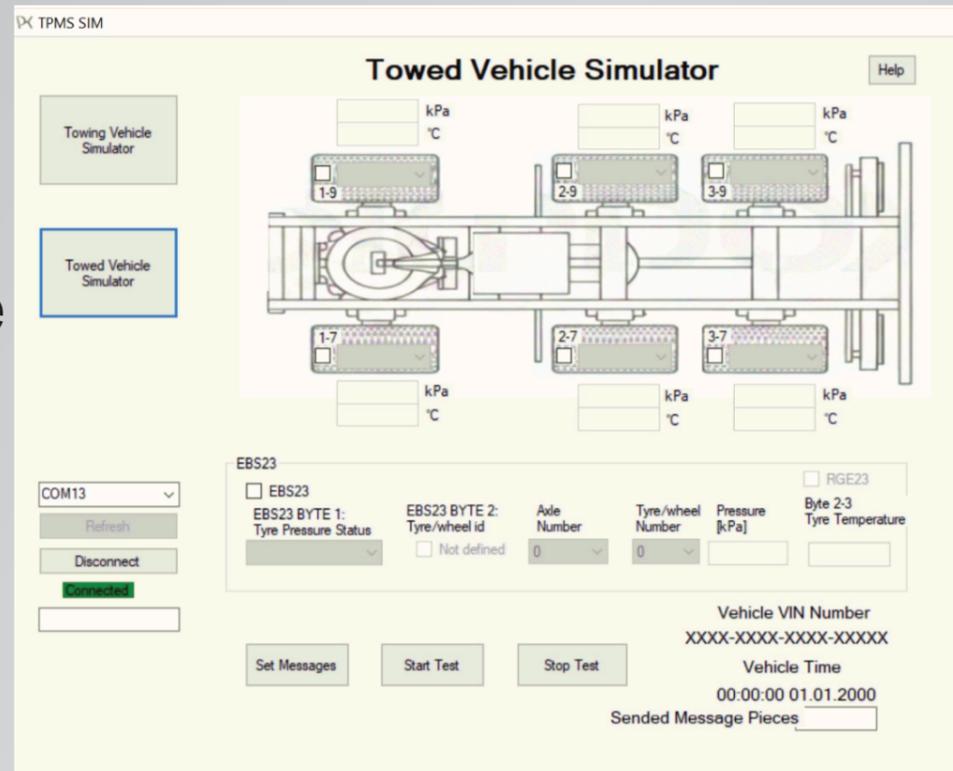

Trailer Simulation Mode :

Acts as a smart trailer to simulate TPMS CAN messages sent to the towing vehicle. It allows the user to configure axle/wheel layouts and transmit real-time pressure and temperature data.

Supports mandatory status messaging: Sufficient, Insufficient, Error Indicator, and Not Available. Used to verify dashboard warning lights and the accuracy of the vehicle's onboard computer.

Towing Vehicle Simulation Mode:

Acts as the towing vehicle to capture and decode TPMS messages originating from the trailer. It visualizes pressure and temperature for up to 6 tires while monitoring all TPMS-related network traffic.

Detailed Data Logging:

Capable of capturing and recording all incoming CAN messages in Excel (.xlsx) format for comprehensive auditing and reporting.

EU 2015/68 Compliant Tractor Braking Test System
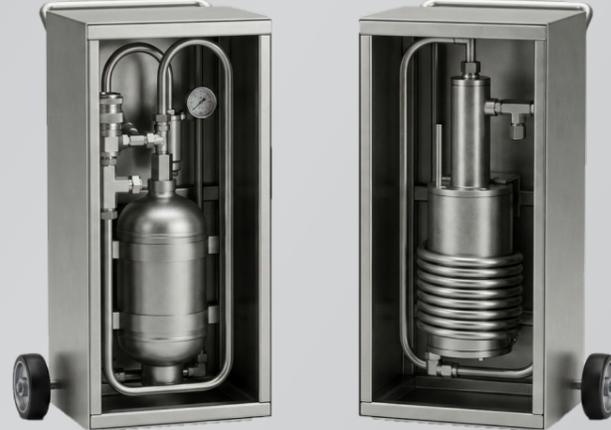
- **EU 2015/68 Dual-Line Hydraulic Compliance:** Specifically engineered for tractors equipped with dual hydraulic line braking systems to ensure full compliance with European safety standards.

- **Precision Response Time Analysis:** Accurately measures the time interval from the moment the brake pedal is actuated until the target pressure is reached, fulfilling strict regulatory timing requirements.

- **Handbrake & Breakaway Verification:** Automated testing of the parking brake effectiveness and the emergency breakaway function to ensure the trailer remains safe even in decoupling scenarios.

Real-Time Graphical Interface: Feature-rich software dashboard providing live pressure-time curves, allowing operators to monitor the buildup and release phases of the test cycle.
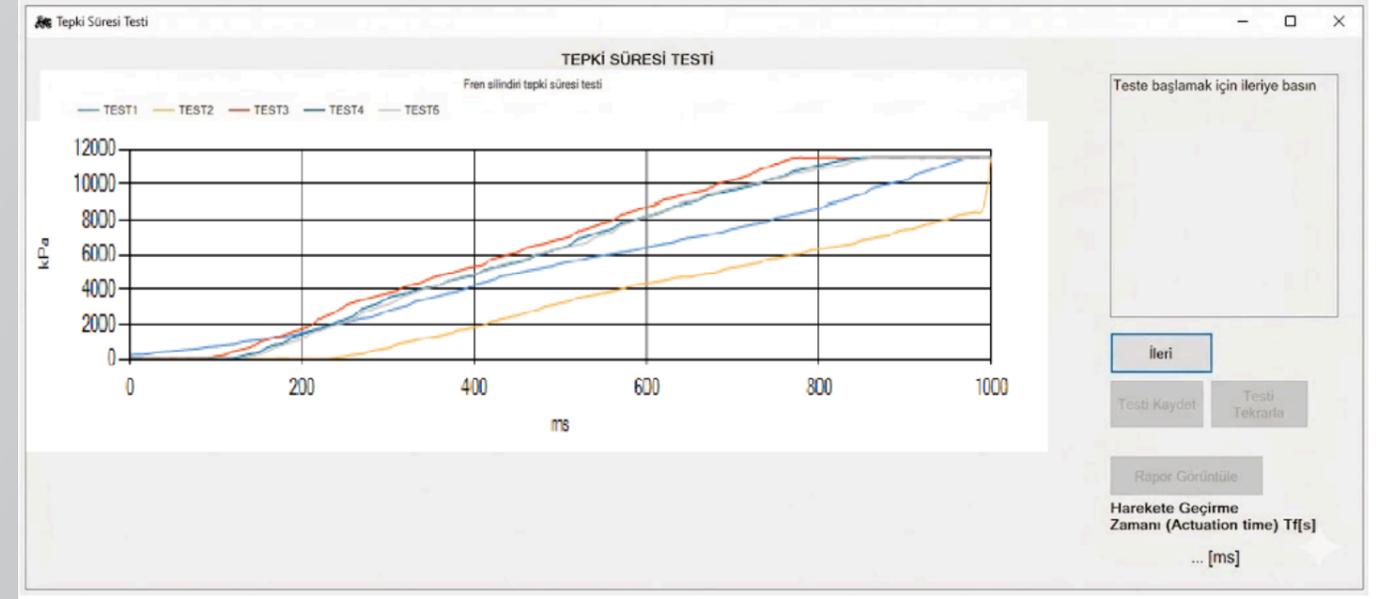
- **Integrated Pressure Simulators:** Equipped with specialized hydraulic reservoirs and simulators to replicate real-world trailer braking loads with high fidelity, supporting operations up to the regulatory maximum of 160 bar.

- **Industrial High-Speed Data Acquisition:** Powered by a robust control unit for millisecond-accurate pressure monitoring and synchronized real-time control.

- Professional Multi-Format Reporting: Instant generation of detailed test reports in both PDF and Excel (.xlsx) formats for official certification and internal R&D traceability.
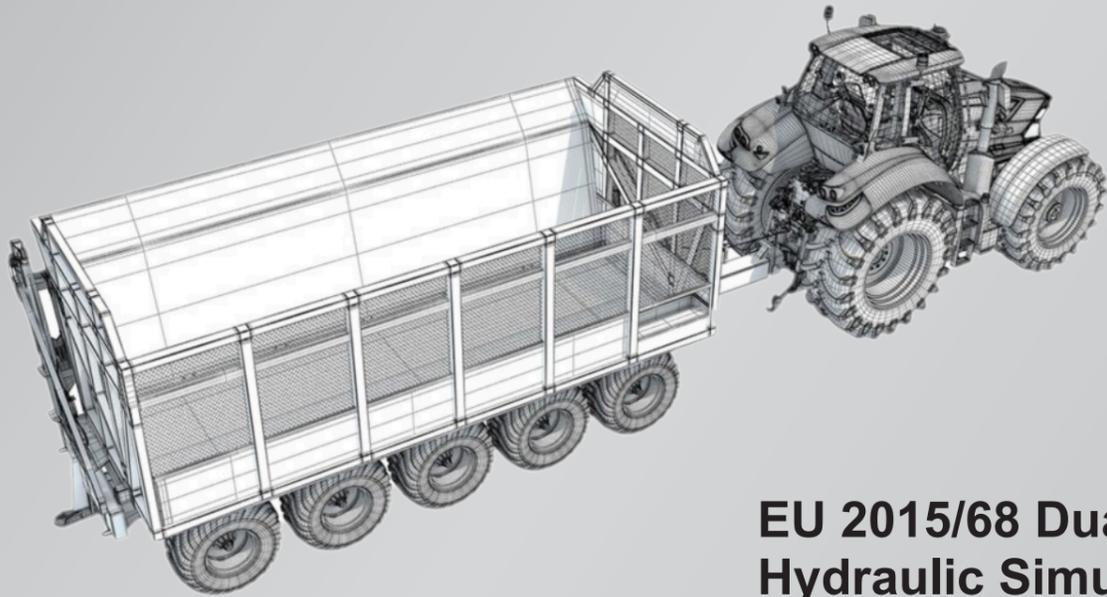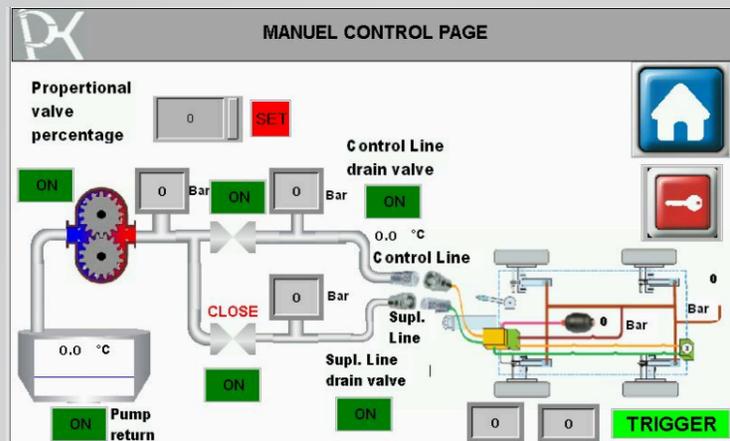
Advanced Agricultural Trailer Test Unit

EU 2015/68 Compliant Testing for Agricultural Trailers (Category R & S)

EU 2015/68 Dual-Line Hydraulic Simulation: Designed to act as a tractor to test agricultural trailers (Category R) and interchangeable towed equipment (Category S) equipped with dual-line hydraulic braking systems.

High-Performance Hydraulic Power Unit: Mobile and robust hydraulic unit capable of providing the necessary pressure and flow rates required for heavy-duty trailer testing.

Integrated Control & Measurement Case: Portable industrial control case featuring high-precision pressure transducers and high-speed data acquisition hardware for on-site testing.

Annex III Response Time Testing: Precisely measures the response time of the trailer's braking system, ensuring the time elapsed between the tractor's command and the trailer's brake activation meets safety limits.
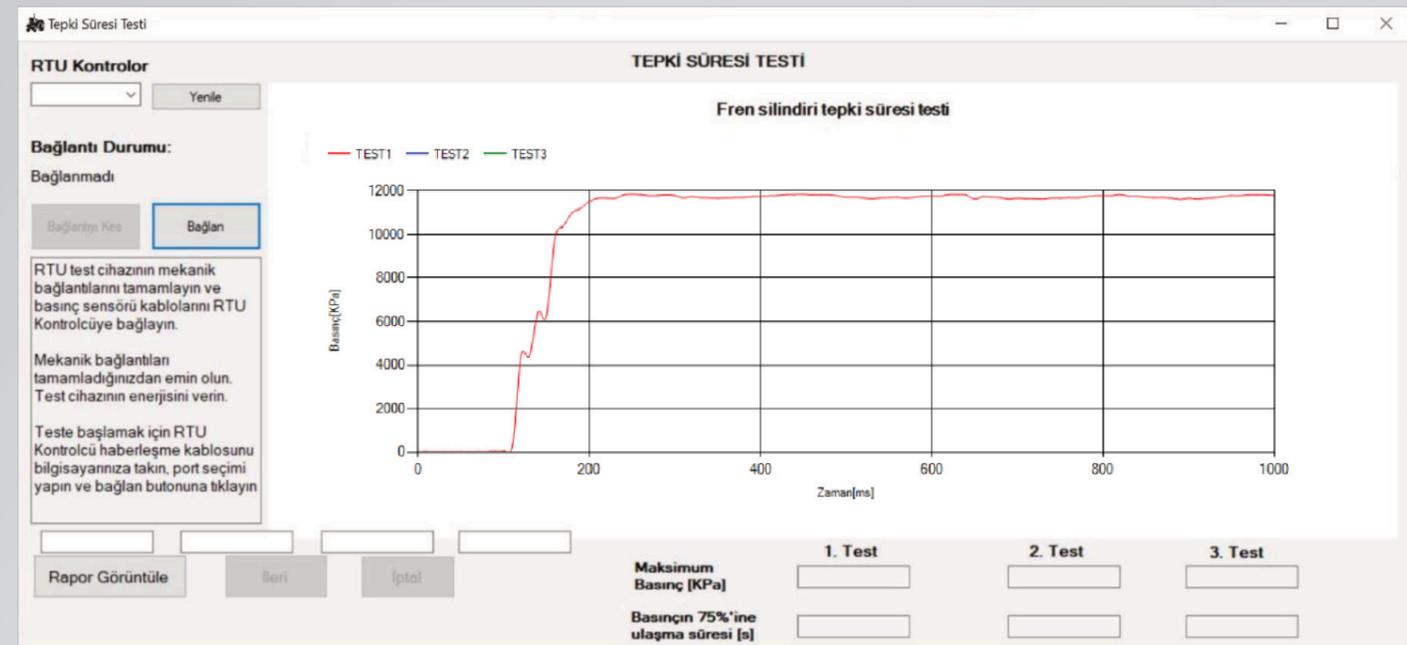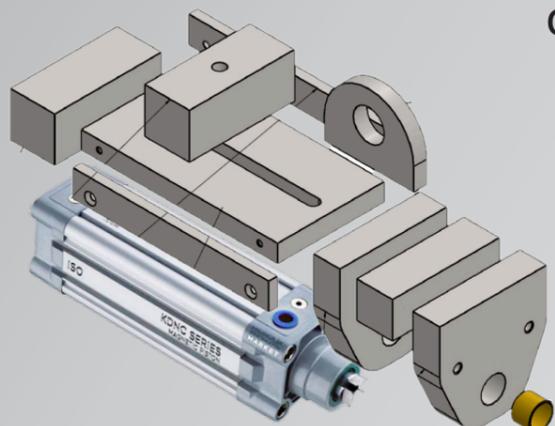
Precision FOPS Impact & Release System

EU 1322/2014 FOPS Requirements: Specifically designed to perform mandatory drop tests for agricultural and forestry vehicles to verify the cabin's resistance against falling objects.

High-Performance Pneumatic Triggering

Instantaneous Frictionless Release:
The specialized pneumatic trigger body ensures an instantaneous release of the test weight, eliminating mechanical friction and ensuring 100% gravitational accuracy.

Remote Safety Activation:
Pneumatic control allows operators to trigger the release from a safe distance, fulfilling laboratory occupational health and safety (OHS) protocols
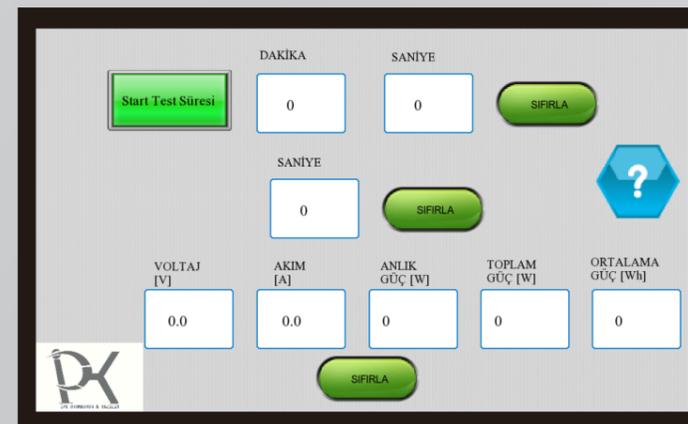
Heavy-Duty Modular Design:
The trigger mechanism is constructed from high-strength treated steel (as shown in the technical CAD) to handle repetitive high-mass drop cycles without deformation.

Electric Vehicle Energy Efficiency & Power Analysis System

e-SORT Standardised On-Road Test Cycles: Specifically designed to calculate the energy consumption of electric vehicles according to UITP e-SORT protocols under various operating conditions.

Total Energy & Average Power Calculation: Measures and records total energy consumption (Wh) and average power demand during standardized driving cycles to determine the vehicle's kWh/km efficiency.

High-Precision Power Mapping: Real-time monitoring of voltage and current to map the power delivery characteristics of the battery and drivetrain during acceleration, cruise, and regeneration phases.
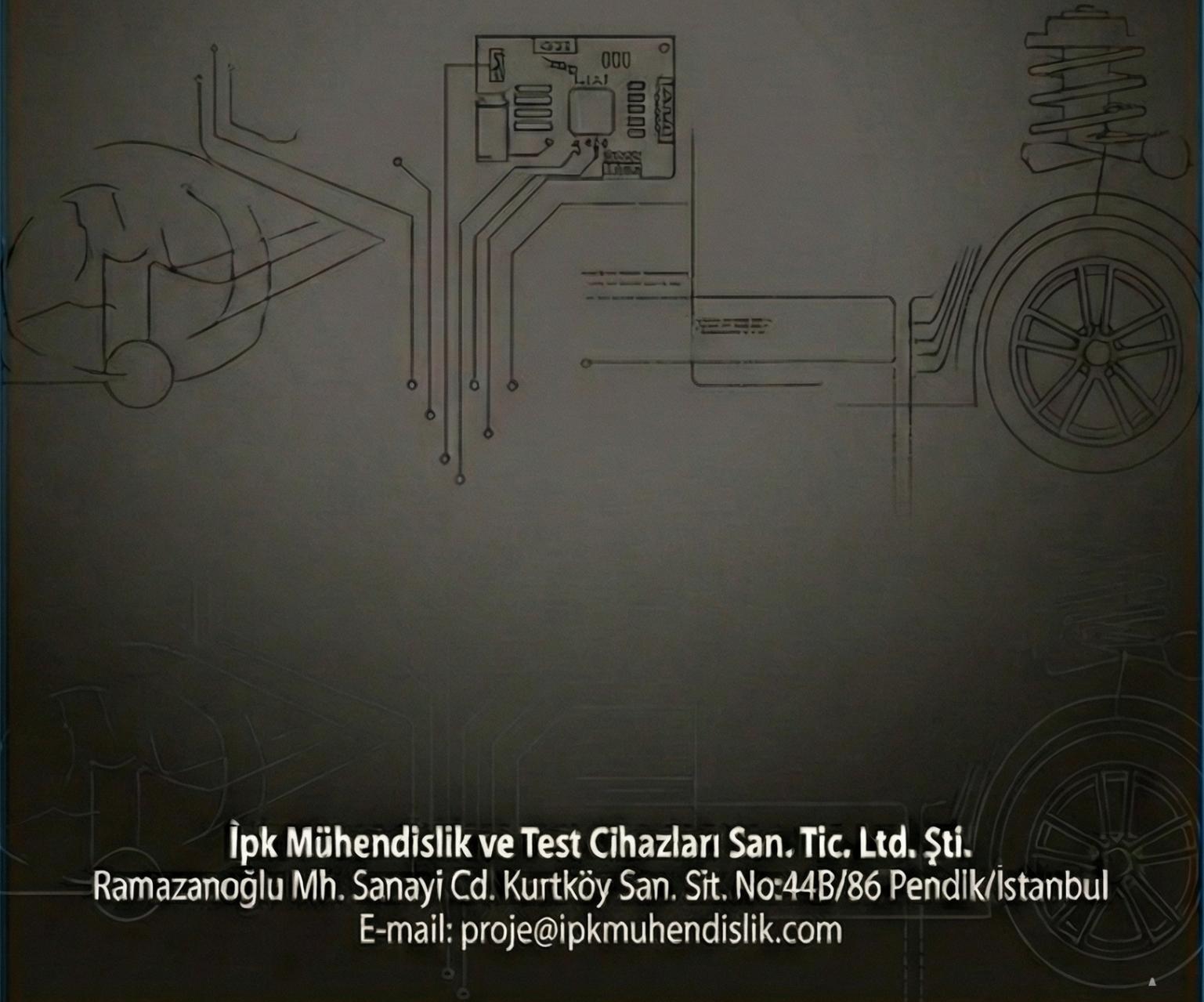
Real-Time Dashboard: Features an intuitive interface (as seen in image_37b8d6.png) for monitoring critical parameters: Voltage (V), Current (A), Instantaneous Power (W), and Cumulative Energy (Wh).
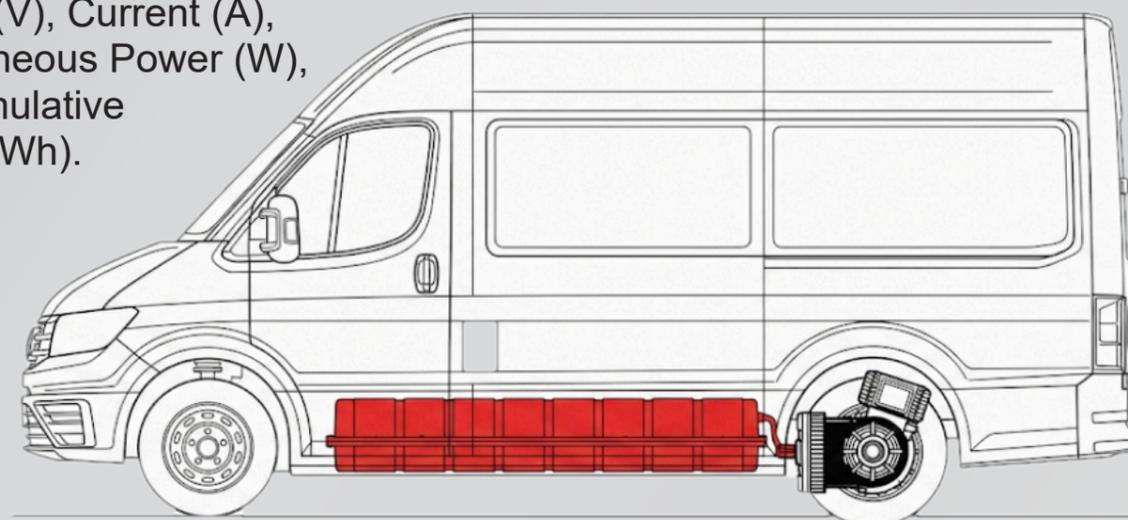
On-Board Energy Monitoring Infrastructure

İPK MÜHENDISLIK
VE TEST CİHAZLARI