

Automated Test Systems

Fives offers a full range of capabilities to develop a custom solution for your specific test application:

- Battery Test
- Cold Test
- Hot Test
- In-Process Test
- Transmission Test
- Leak Test
- Functional tests
- Gauging

Cinetic Battery Test

Introducing the newest Cinetic testing line that Fives has to offer – EV Battery Test. Fives’ patented design is a industry leader in battery manufacturing. Fives experience is both domestic (North America) and international

- Uniquely Scalable
- Adaptable
- Flexible
- Low Cost
- Less real estate
- Decreased time to market

Optimization:

- Battery sensor test
- Identification of defects
- Short test time
- 100% of batteries tested

Applications:

- Environmental testing
- Life cycle testing
- Cell / Cell testing
- High rate charge testing
- Discharge testing
- State of charge
- Reserve capacity testing
- BMS Communication CAN, LIN
- Relay testing
- Case Leak Testing
- Coolant System Leak Testing

Cinetic Battery Test



Battery Leak Test



Functional End of Line Test



High Voltage Functional Test

Cinetic Cold Test

Cinetic Cold Test is the process of validating the assembly of an internal combustion engine without using internal combustion. Reduced test time and expense. Safety and environmental risks are minimized as opposed to hot test.

Engine Types:

- Gasoline
- Diesel
- Two cycle
- Four cycle
- On-Road and Off-Road engine types

Optimization:

- Testing with or without ECM
- Engine Sensor Validation
- Identification of defects
- Component specific
- Short test time
- 100% of engines tested

Operation:

- Customized data acquisition and control
- Proven driveline and precision balance
- Laser alignment and vibration analysis
- Breakaway and running torque
- Intake and exhaust pressure
- Calibration tools
- NVH expertise
- Defect mapping
- Statistical analysis

Cinetic Cold Test

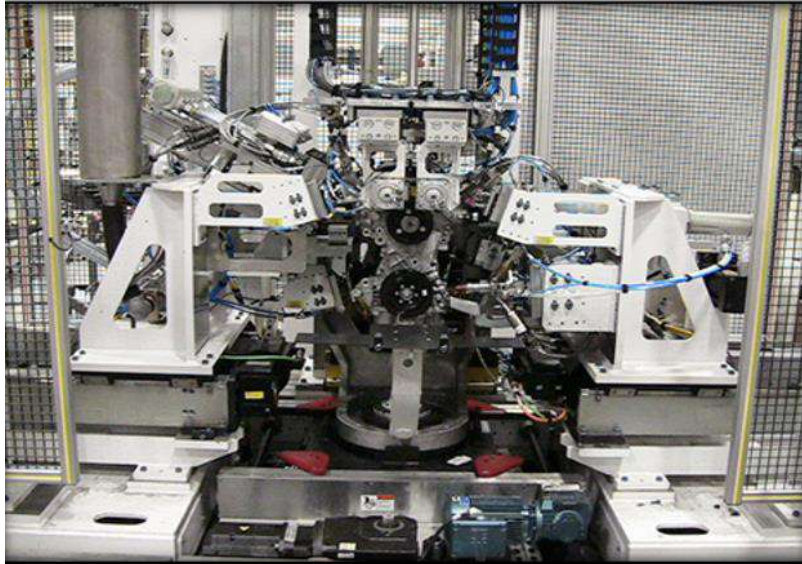
Benefits of Cinetic Cold Test:

- Short cycle times; average one to two minutes
- No coolant resources required
- Reduced fire hazards
- Low motoring speeds with no combustion, reduces risk to product
- Precision measurement of engine devices synchronized to Cyl #1 TDC
- High resolution of engine valvetrain component integrity and functionality
- High resolution of noise and vibration measurements with no combustion
- Identification of defective engine devices to specific components
- Reduced exhaust fume management

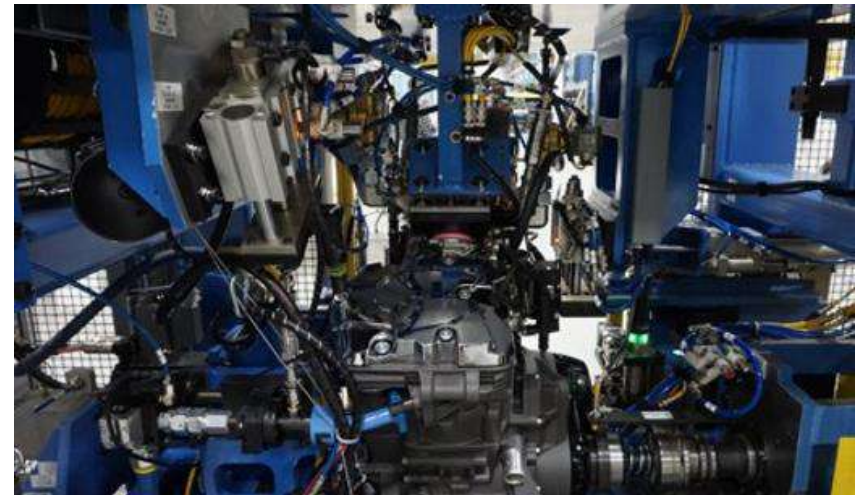
Trusted Partners:

- Bauer data acquisition software
- National Instruments – Hardware and Software
- Siemens PLC and Drive Systems Control
- SignalX
- Rockwell PLC and Drive System Control

Cinetic Cold Test



Automotive Gas Cold Test



Motorcycle Engine Gas Cold Test

Cinetic Hot Test

Cinetic Hot Test is the process of validating the assembly of a gasoline or diesel engine while using internal combustion. The engine's ECM (Engine Control Module) is typically utilized during Hot Test.

Controls:

- Emissions verification
- Valvetrain actuation
- ECM Validation
- Fuel system integrity
- Thermal cycling
- PC – PLC Controls and data collection

Cinetic Hot Test

Unloaded Dynamometer

Measurements:

- Cylinder combustion balance
- Vibration monitoring
- Engine sensor monitoring

Controls:

- Emission verification
- Valvetrain actuation
- ECM – PCM Validation
- Fuel System integrity
- PC – PLC controls and data collection

Fuel Types:

- Gasoline
- Diesel
- CNG



Cinetic Hot Test

Loaded Dynamometer

Measurements:

- Rated power
- Partial power
- Cylinder combustion balance
- Vibration monitoring
- Engine sensor monitoring

Fuel Types:

- Gasoline
- Diesel
- CNG

Controls:

- Emission verification
- Valvetrain actuation
- ECM – PCM Validation
- Fuel system integrity
- Thermal cycling
- PC – PLC controls and data collection

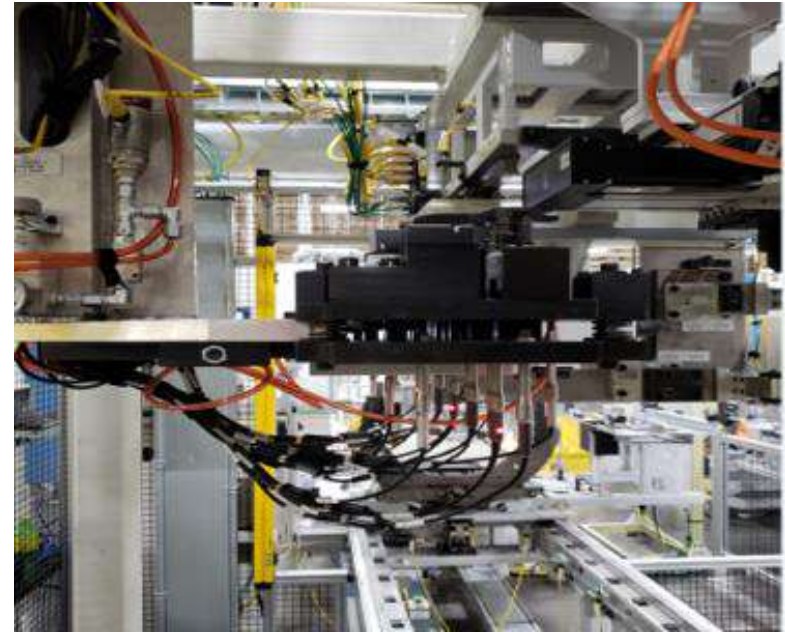


Cinetic In-Process Test

Cinetic In-Process Testing allows for early detection of defects or assembly errors. Early detections save time and cost, and allows greater resolution into root cause of failures

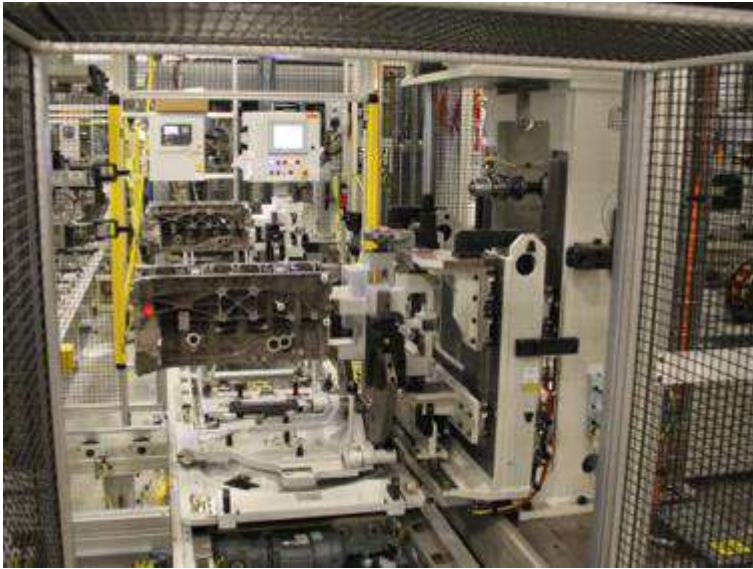
Services:

- Torque to turn with or without pistons
- Piston protrusion
- Valve body
- Patented spark gap measurement
- Leak test
- HIPOT

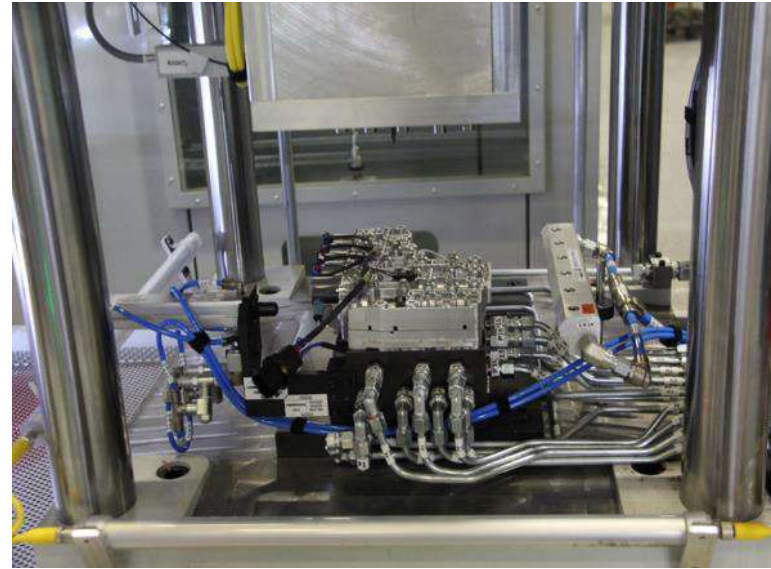


Combined Torque to Turn and Piston Protrusion

Cinetic In-Process Test



Torque to Turn (without pistons)



Valve Body Functional Test

Cinetic Transmission Test

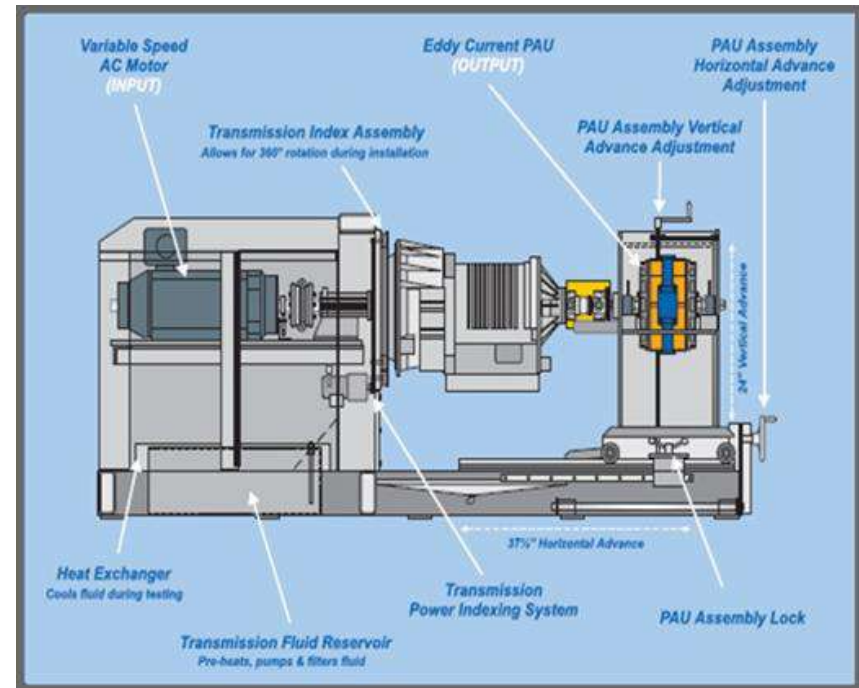
Cinetic Transmission Test cells include a drive motor to simulate engine power inputs to the transmission. Additional drive motors are typically utilized to mimic the vehicle loading conditions seen in real world applications.

Fives Advantages:

- Maximum flexibility and cost savings
- Cinetic standard, proven technology

Cinetic Transmission Test Station:

- Sub-Assemblies
- Mechanical Design
- Hydraulic Design
- Electronics Design



Cinetic Transmission Test

Applications:

- Automatic and Manual
- Continuously Variable – CVT
- Transaxel and Differentials
- Hybrid Powertrains
- Valve Body Validation
- PTO's
- Front, rear, all-wheel drive
- Torque converter or Dual Clutch Transmission

Optimization:

- Testing with or without TCM
- Real time closed loop control
- Transmission Sensor Validation
- Identification of defects
- Component specific fault detection
- Short test time
- 100% of transmissions tested



Fully Automated CVT Test Stand



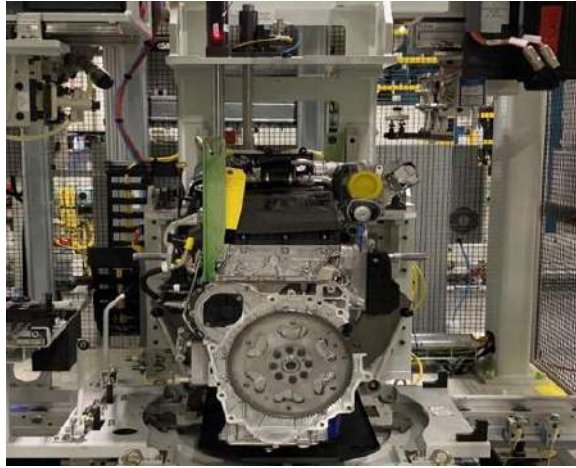
Transaxle Test Stand

Cinetic Leak Test

Fives is a leader in the design and manufacturing of leak test and assembly verification instrumentation and custom solutions. Offering unparalleled quality in the design and application of leak testing equipment and integration, fast cycle time with reliable and repeatable results, proven by high volume leak test detection systems.

Features:

- Fully automatic
- Mass flow analysis
- Pressure decay
- Specialty / Custom seals



Water Cavity Leak Test

Cinetic Leak Test

Fives Advantages:

- Extensive leak test experience
- Quick seal plate changeover
- Minimum changeover and start up time

Applications:

- Engine Cavity
- Oil Cavity
- Coolant Cavity
- Fuel Rail
- Cylinder Head
- Transmission
- Valve Body
- Battery
- EGR Coolers



Battery Leak Test



fives ultimate machines
ultimate factory

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