

# End-of-Line Production Testing Solutions

EOL Production Validation Testing Systems for a Variety of Manufacturing Industries





Recreational, motorsports and UTV's



Material handling, fork lifts



Tractor, agricultural equipment and vehicles



Military MRAP Multi-function End-of-Line test stand



Self-contained end-of-line test cell including robotic actuators for self-driving

## ***From a Leader in Testing Solutions***

Mustang Advanced Engineering is an industry leader in the design, manufacture and installation of advanced End-Of-Line (EOL) test stands for automotive, heavy-duty and off-road vehicle production & quality assurance testing applications.

### **MAE produces end-of-line test stands for:**

- Automotive Electric Vehicles: EV, BEV, HEV, PHEV and FCEV
- Heavy-duty, commercial and transportation vehicles
- Motorsports, recreational and UTVs
- Agricultural and forestry equipment
- Construction vehicles and equipment
- Lawn and garden, grounds keeping and landscaping
- Material Handling
- Military & Government

MAE has extensive experience in the field of end-of-line (EOL) testing and offers a variety of products and services to support your production testing requirements. MAE has developed systems to handle multi-function vehicle testing, production electronic & wire harness testing, chassis sensor and electronic testing, production engine and transmission testing and many other applications. MAE can upgrade your existing production line hardware and software, interface with existing databases or supply a complete turnkey testing solution.

## ***"Custom Solutions" Approach***

MAE's "custom solutions" approach focuses all of our product, application and automation experience on your specific measurement and testing requirements. Our goal is to provide tailored solutions that optimize our customers' testing and development operations by providing intelligent system designs coupled with outstanding technical expertise and world-class customer support.

MAE provides a host of specialized EOL testing solutions, all designed to meet the customer's specific and/or unique application. MAE's modular design concept allows for a high degree of scalability and customizing, from simple chassis dyno test stands to highly-sophisticated and complex multi-function test cells with CAN interface.

## ***MRAP Multi-Function EOL Test Stand***

MAE's EOL test stand systems for military equipment and vehicles perform an entire series of EOL functionality tests including vehicle performance tests, driving course test, exhaust brake testing, retarder testing, functional and visual test, ECU test and DTC evaluations via the dynamometer portion of the multi-function tester. The brake portion of the multi-function tester performs a complete interactive function braking system test of the foundation brakes and the ABS braking system.

## ***Self-Contained End-Of-Line Test Cells***

MAE supplies all of the equipment, software and engineering required, including system design, installation, start-up and training. Self-contained end-of-line test cells incorporate a multi-function chassis dynamometer capable of variable wheelbase adjustment, dynamic vehicle load testing, brake testing, road simulation and function testing. Such test cells MAE has developed for motorcycles, electric vehicles, tow motors, and several other different market applications.



## Customizable Entire Testing System

Mustang Advanced Engineering offers a flexible solution for test control, data acquisition and operator interface, stepping test operators through each step of an automated EOL test sequence in a simple and user-friendly format, while collecting, analyzing and reporting on vehicle systems status and performance data. The dynamometer communicates with each test vehicle via CAN communication to determine pass/fail results and to establish certain vehicle system status as required during the test procedure. The flexibility of MAE's systems allows easy adaptation to meet unlimited test procedures and simulation requirements.

MAE's experience and expertise with sophisticated end-of-line systems stems from having supplied a host of fully-integrated, automated testing solutions for a wide range of EOL testing applications. MAE offers completely customized end-of-line testing solutions for your specific production validation applications.

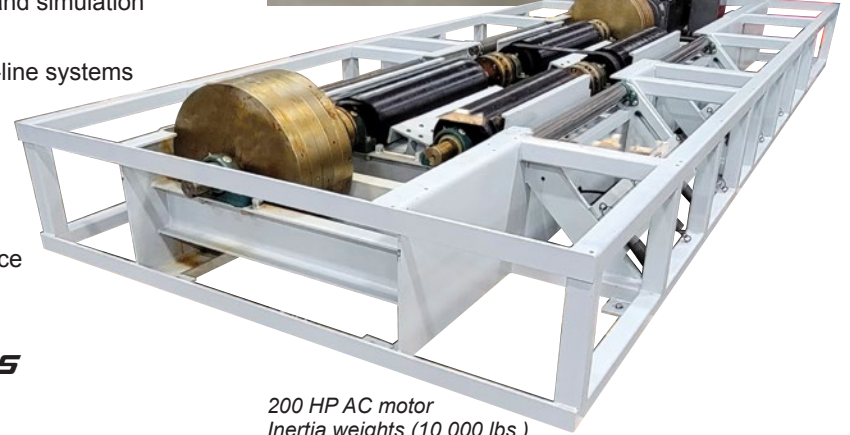
MAE can easily customize an automated EOL test sequence to meet your EOL testing requirements.

## Features, Options & Accessories

- Power analyzer measurement systems
- Exhaust removal systems and vehicle cooling systems
- Battery simulators & capability of testing EV recharging systems
- ECM read/write control interfaces
- Factory automation system interfaces
- Fire & sound suppression systems
- Temperature chamber packages
- Thermal imaging system integration
- Vibration analysis
- Automated pop-up restraint systems, increasing vehicle throughput
- Variety of inertia loads for superior driveability simulations
- High quality structures designed for safety, ease of use, including low profile frames, allowing systems to be placed upon the factory floor with ramps



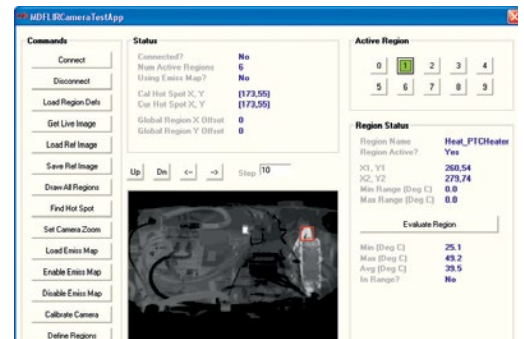
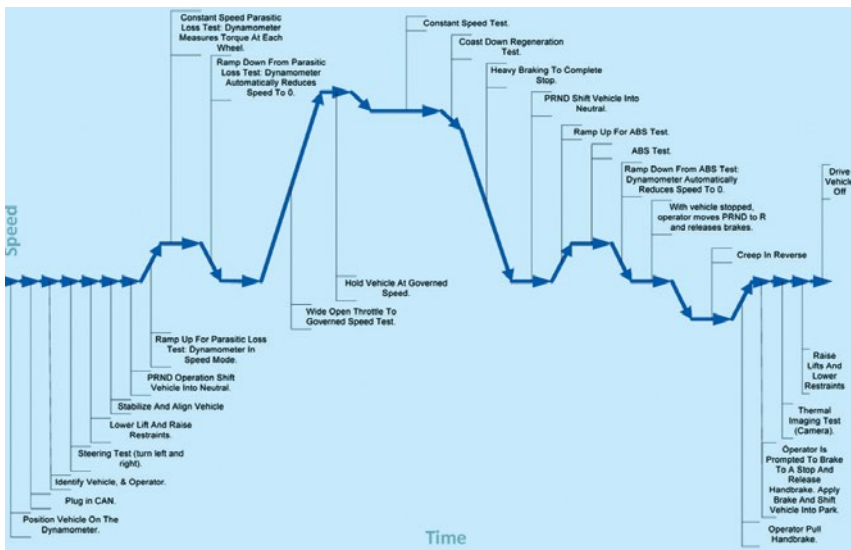
Automated pop-up restraints



200 HP AC motor  
Inertia weights (10,000 lbs.)  
Structural steel frame assembly

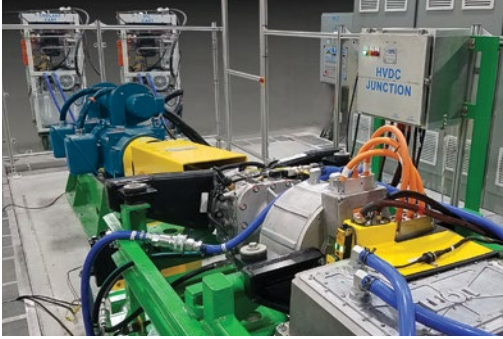


Robotic pedal-throttle actuators for automatic driving



Thermal Imaging and vibration analysis are commonly integrated into EOL test stands. Thermal images on key under hood points before and after cycle testing allows QA engineers to establish pass/fail criteria based on areas-of-interest and temperature limits.

# World Leader in Testing Solutions



End-of-Line EV Power-train Test Cell



End-of-Line EV Chassis Dynamometer



End-of-Line EV e-Axle Test Cell



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## End-of-Line Testing for EVs

MAE is a test cell system integrator capable of supplying turnkey, fully functional, integrated test cell solutions. MAE draws on more than 35 years of equipment production and test cell integration experience to provide customers the perfect test cell for their requirements. MAE leverages our vast test cell experience and our safety minded engineers to develop test cells that are safe and meet local and national safety requirements. Safety is achieved through physical barriers, electrically lockable access barriers monitored until conditions are safe to unlock, guards, dual hand touch pads, light curtains, electrical lockable doors/covers, pressure pads, lights, lamps and sound. Safety is also designed into the high-power electrical systems with lock-out/tag-out requirements, arch flash analysis and facility interface design.

## Additional EV Test Articles

MAE is poised to serve the Electric Vehicle markets (EV, BEV, HEV, PHEV, FCEV) and its current and future testing needs. Additional test stands MAE has designed and created include:

- Electric Power-train
- Electric Motors
- Electric Motor Control Units
- Electric DC/DC Converters
- Battery Simulators
- Components and accessories
- Climate controller interfaces
- Inverters
- Fuel Cells
- Gearboxes
- Batteries
- Coolant conditioning systems
- Hydrogen fuel supply systems
- Test article interfaces

## About MAE

Mustang Advanced Engineering is a leading supplier of advanced, custom engineered testing and measurement systems. Located in Twinsburg, Ohio since 1986, MAE delivers world-class testing solutions, custom design support, technical assistance, backed by a dedicated factory service team, making them a trusted source of expertise for the global industrial market. Visit [MustangAE.com](http://MustangAE.com) for more information. Follow them on Facebook, Twitter, LinkedIn, and Instagram

