



# ADVANCED

## TEST & AUTOMATION

Systems and Software for a Complex World in Motion



# Project Overview



## Wet Clutch Assembly

Performance & Durability Test Stand



# Who We Worked With

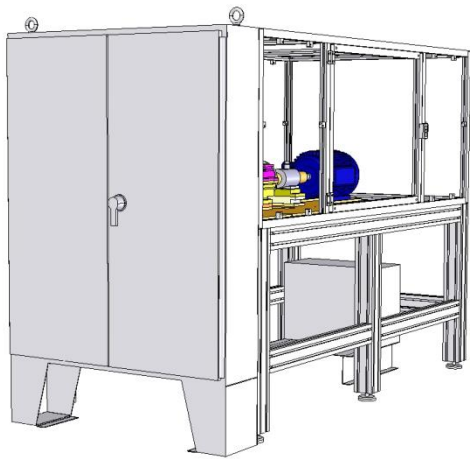
- ATA Inc. was approached by a client with a need to test a newly designed wet clutch assembly in terms of performance and durability
- The client was a large international company looking for the most cost efficient solution to test their newly developed clutch
- The client had little previous experience with test procedures or the design of specialized test systems in this field
- In addition to being able to benchmark the existing design in terms of performance data, such as continuous slip wet friction characterization, the solution also need to be capable of running durability and endurance tests





# Tailored To Specific Needs

- ATA began by understanding the test component functionality by looking at the operating parameter envelope in terms of speed, torque, pressure, and temperature



- Through this process ATA was able to develop a full understanding of the component behavior and its different modes of operation
- Client was aware that many other higher end systems existed or could have been designed, however they were expensive
- ATA was able to distill the client's requirements to be specific to the clutch assembly to be tested, and propose an architecture that was adapted specifically to this model



# Key Design Elements

- The first step of the design process was sizing all major test bench components specifically to client's product requirements, such as:
  - selection of drive motor in terms of torque vs. speed profiles
  - sizing of hydraulic power unit based on the pressure requirement
  - torque sensor selection based on technology, range, and frequency response
- To maximize the cost efficiency of the design, ATA was able to reuse an existing AC motor that the client had sitting around in their facility
- Design of the load circuit consisting of a water brake and a closed, water storage reservoir also provided an inexpensive, yet consistent method of torque control
- For technical info regarding the test bench, see datasheet



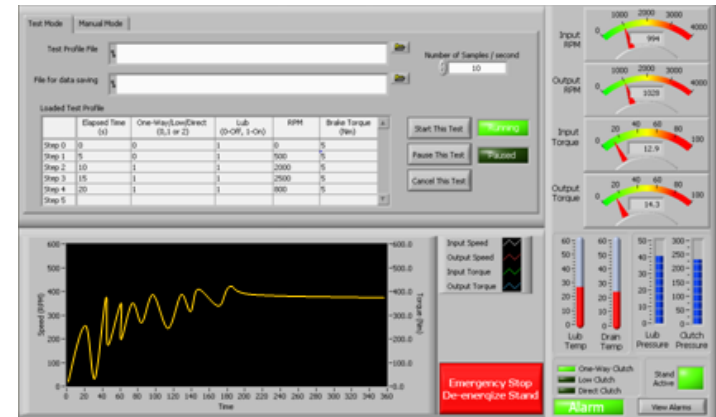
# Productivity & Expandability

- The test stand was designed as a cost effective solution by using proven and reliable technologies, as well as maximizing the use of off-the-shelf components that were easy to replace
- Built in software features such as PID control, combined with a high level of test script automation, managed to simplify the design engineer's tasks
- Multiple test sequences were preloaded on the test stand, which when combined with the automatic safety features of the machine, allowed the operator for more unsupervised control
- A standardized design approach resulted in lower cost and uncertainty, better measurement accuracy, and improved software capability, with only the mechanical fixture design being unique



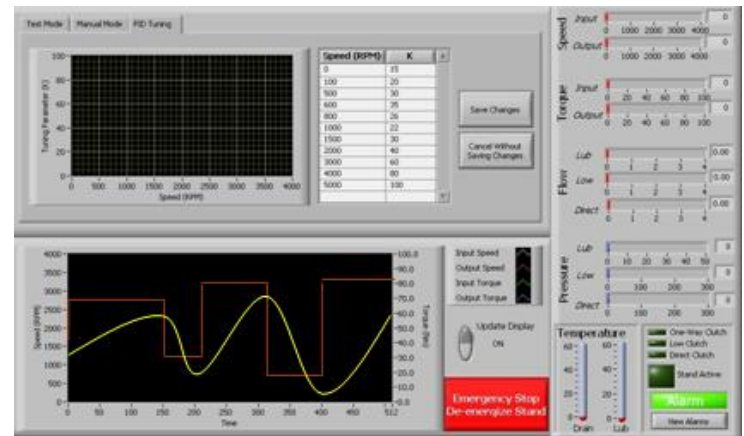
# Superior Efficiency

- Quick clutch assembly changeover times between tests, due to smart fixture and drive mechanism design that minimizes the total number of steps required to install a new part
- Refined software features provide automatic test selection and execution, based on detecting the appropriate conditions specified by the user, such as the test fluid temperature
- Onboard system diagnostics with automatic alarming parameters, which notify the operator of the current test execution status, or if any conditions have caused the test to be aborted



# Making Sense Of The Data

- Automatic execution of test scripts allowed the client to retrieve test data in the three available modes of operation of the clutch assembly:
  - one-way clutch
  - low clutch
  - direct clutch
- Flexibility on the data logging format and the sampling frequency through the programming interface, in order to facilitate integration into existing databases or analysis tools
- Real-time graphing features provided live feedback of any measured parameter, including a variable historical buffer for operator reference
- Integrated test data management software helped to maintain and organize data from multiple tests



# Project Milestones

- The project was delivered on-time and on-budget, and concluded with the notion that ATA will continue to support the client whenever any assistance is required
- Upon project completion, all documentation needed for service and maintenance of the test stand was released to the client:
  - electrical, hydraulic and pneumatic drawings
  - mechanical drawings of custom fixtures and spare parts
  - comprehensive test stand and software manuals
- Proposal to full design time: 1 month
- Design to approval time: 3 weeks
- Build and commissioning time: 1.5 months
- On-site setup to test results time: 1 week

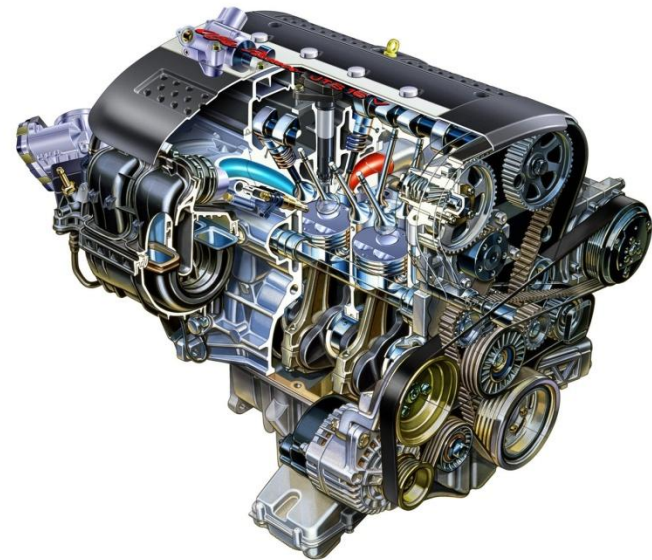
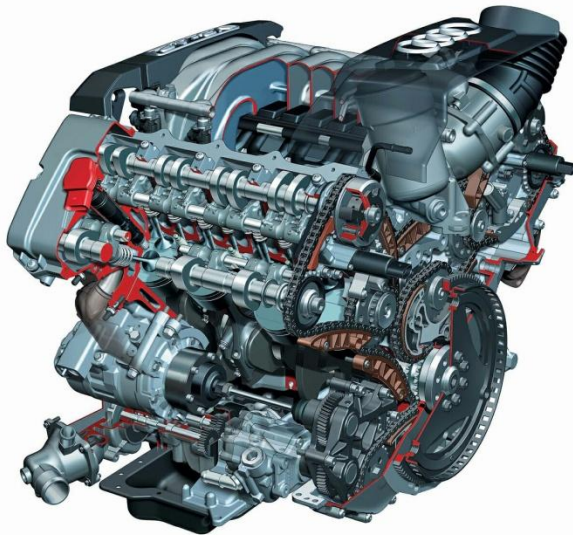




# Facts About ATA Inc.



- Certified Engineering Firm
- Specialized in Complex Rotating Components
- Formalized Project Management & Delivery Process
- Internal Design, Integration and Commissioning Team



# ATA Inc.

*Your Partner in Test*

For further information please contact:

Anthony Khoraych, P.Eng.  
**Advanced Test & Automation Inc.**

641 Main Street East  
MILTON ON L9T 3J2  
Canada

Tel: +1 (647) 477-6247, Ext. 32

Fax: +1 (647) 477-2180

[Anthony.Khoraych@advancedta.com](mailto:Anthony.Khoraych@advancedta.com)

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[www.advancedta.com](http://www.advancedta.com)