

Michael Flory

EXPERIENCE

HILTNER COMBUSTION SYSTEMS, LLC. (2004-Present)

Ferndale, WA

Partner, 2004-Present

Partner in engineering consulting firm specializing in engine system modeling, engine control system algorithm development, after-treatment system integration and engine performance development.

A sample of recent projects includes the following:

- Supervised and conducted engine calibration and performance validation testing on several OEM engine platforms ranging in output from 100kW to 400kW. Engines included new air/fuel ratio control and after-treatment systems for oil field, natural gas pipeline compression applications. Designed, assembled and refined novel instrumentation system for accurately and robustly measuring exhaust valve temperatures.
- Designed, procured and assembled major subsystems of several stationary natural gas engine test cells ranging in capacity from 1 MW to 100 kW for multi-cylinder and single cylinder test engines. Subsystems designed and implemented include engine and test cell controls, cooling tower and heat rejection equipment, low speed data acquisition, safety, exhaust gas extraction emissions sampling equipment including 5 gas analyzers, FID and FTIR systems and single cylinder air supply.
- Created business plan and conducted financial analysis to determine feasibility of strategic expansion into engine test services in 2006. Secured financing for initial multi-million dollar engine test facility construction in 2007 as well as an expansion during the national economic downturn in 2008. Responsible for managing most business related activities for HCS including setting project scope, project bidding, financial reporting, bookkeeping, human resources, etc. Oversaw a sevenfold increase in annual revenue in the span of 4 years.
- Assisted OEM dealership in the specification, calibration and deployment of after-market engine control system (Woodward EGS-02) for two Caterpillar G3508 genset engines at a wastewater treatment plant in Beaver Dam, WI. Project included using an HCS proprietary combustion cycle simulation tool to develop a 'desktop' calibration based on varying fuel composition data from the site. This calibration was directly used during engine commissioning. After initial plant start-up, the control system was calibrated on-site to meet required emissions levels while tolerating methane composition swings of +/-10% over a span of 1 minute or less.
- Developed transient system model of stationary natural gas power generation engine to use while writing and validating new engine control algorithms using Matlab/Simulink/RealTimeWorkshop (RTW) for island mode natural gas fired genset. Migrated new control system to real-machine to prove out and further refine control system on actual engine platform running in a test cell. Work was concluded by interfacing with final code development and calibration team for field deployment. A paper describing the methodology was published at the 2007 CIMAC Conference in Austria, Germany (see website for copy).
- Designed and built single cylinder test engine controller using Matlab/Simulink/RTW. Developed and tested engine control algorithms in Simulink environment and then deployed them on a real time computing platform as a robust, flexible engine control system. The system was configured to read in multiple sensor inputs, process the inputs, generate command outputs and control actuators using analog output signals and over CAN. A fivefold reduction in testing time was achieved while vastly improving test data quality and test cell flexibility.
- Designed, procured and assembled major subsystems for several engine test cells ranging in capacity from 1MW multi-cylinder engine capable test cells to highly specialized large bore single cylinder test cells in the 100 kW range. Major subsystems include: rapid prototyping engine controller, test cell operation and safety integration, control of all pumps, electric motors, heat rejection equipment, plumbing, fuel and air delivery systems, data acquisition and instrumentation.
- Conducted several different market studies for new technology implementation including application of Stirling engine technology for recreational vehicle portable power generation, use of Stirling engine for residential combined heating and power markets in Europe and investigated waste heat desalination systems. Summarized results into final reports and provided actionable recommendations to client.

HONDA R&D AMERICAS, INC. (2003-2004)**Raymond, OH****Senior Engine Research Engineer, Engine Calibration**

- Section project leader and calibration data manager for 2005 MY Pilot. Responsibilities included maintaining, coordinating and releasing over 5,000 calibration parameter settings, implementing engine control software changes, holding weekly data correlation meetings and issuing new software releases. Reported test results to chief engineers at major program.

FORD MOTOR COMPANY (1996-2003)**Dearborn, MI****Senior Product Development Engineer, Advanced Powertrain 2001-2003**

- Lead calibration engineer for prototype variable displacement engine project. Demonstrated vehicle level fuel economy and specified control/after-treatment system. Assisted in development and validation of torque-based control algorithms. US patents issued 6,817,336, 6,772,724 and 6,694,948.
- Managed capital expenditure budget and coordinated engineering efforts to deliver a tenfold reduction in vehicle exhaust emissions on new V8 engine architecture.
- Applied and developed powertrain calibration and control strategies to engine and after-treatment systems in order to meet SULEV tailpipe emissions standards.
- Coordinated calibration efforts with external catalyst suppliers and internal technical specialists to develop optimized catalyst precious metal loadings, cell densities and after-treatment system volumes.

EDUCATION

2004-2007	THE OHIO STATE UNIVERSITY College of Mechanical Engineering	Columbus, OH Doctoral Candidate
2002	UNIVERSITY OF MICHIGAN University of Michigan Business School	Ann Arbor, MI Master of Business Administration
1996	THE OHIO STATE UNIVERSITY College of Mechanical Engineering	Columbus, OH Master of Science
1995	THE OHIO STATE UNIVERSITY College of Mechanical Engineering	Columbus, OH Bachelor of Science