

# Active Combustion Pattern Factor Control for Marine Gas Turbines



*The APFC system is applicable for aviation, naval, and land-based commercial gas turbines*

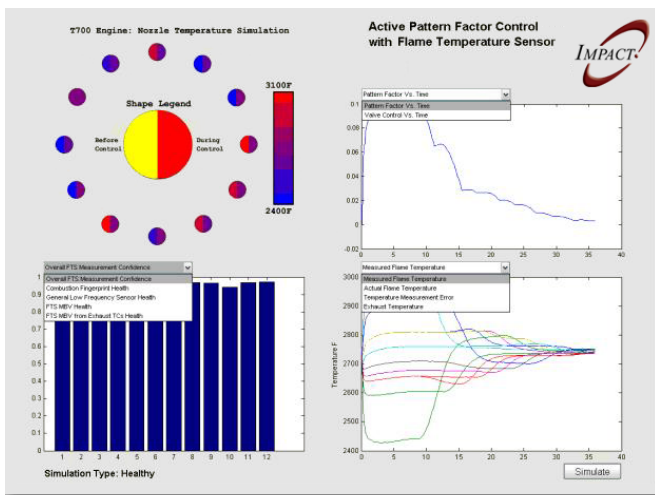
Impact Technologies developed and performed application studies for an innovative active combustion pattern factor controller (APFC) for gas turbines. The APFC system determines combustion flame temperatures, validates the values, and integrates an assessment of signal and combustion hardware health to determine how to trim the fuel flow to individual fuel nozzles.

## Key aspects of the system include:

- Determination of each flame's bulk temperature.
- Assessment of the reliability of both the flame temperature data and physical combustion hardware health through analysis of features calculated from the high frequency output of the sensor.
- Validation of the flame temperature signal using a data-driven approach.
- Fusion of sensor 'health indices' into the APFC to alter the trim control signal based on the health of each sensor and fuel nozzle/combustor.
- Fault-tolerant peak/valley detection and control switching module that selects individual fuel valves to target to reduce the pattern factor, while simultaneously balancing the overall fuel flow so as not to affect the engine output.



The APFC system is applicable for aviation, naval and land-based commercial gas turbines, and can be used in closed-loop control or adapted as an open-loop advisory/diagnostic system.



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**Headquarters  
New York Office**  
200 Canal View Boulevard  
Rochester, NY 14623  
Phone: 585.424.1990  
Fax: 585.424.1177

**Pennsylvania Office**  
270 Walker Drive, Suite 200W  
State College, PA 16801  
Phone: 814.867.5122  
Fax: 814.867.7550

**Georgia Office**  
75 Fifth Street NW, Suite 312  
Atlanta, GA 30308  
Phone: 404.526.6188  
Fax: 404.526.6189