What Typhoon does …

- **Development**
  - Modeling and Simulation for Power Electronic system and controls
    -- Take your controller and put it “In the Loop” with models of your inverter (power electronics)
  - **Functionality TESTING and OPTIMIZATION**
  - Verification and Validation of control at component level
    - Flow into subsystem and system testing

- **Lifecycle Engineering**
  - Concept to Decommissioning
  - Integration with other systems
    - AMMPs
    - IPD
    - Etc
  - **Automated and Regression TESTING over time**

- **Streamline Engineering**
  - HILCOMPATIBLE
  - HILTESTED

Jeff Jaglowicz
Program Manager
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Academic Users

100+ institutes on 6 continents
Industrial Users

- Critical Power & Heavy industry
  - Distribution
  - Microgrids
  - Marine Power Systems
  - ABB
  - Marine
  - Raytheon
  - Remontowa Electrical Solutions
  - MIT Lincoln Laboratory
  - Arpa-e

- Motor drives
  - ABB
  - Medium Voltage Drives
  - Danfoss
  - TMEiC
  - GE
  - LSis
  - Toshiba

"Finally a HIL an engineer can use."

Plaek Joeng
ABB Switzerland
Typhoon HIL Consultant
Consulting
Industrial Users (Cont)

Renewable energy

Solar inverters

Battery UPS

Wind converters
Definitions

**Model**

- **Virtual HIL (VHIL)**
  - Inv
  - G
  - C
  - C
  - DMS
  - μC
  - Cost: $  
  - Fidelity: Low  
  - Project Sav: $  
  - Use: Power Electronics Modeling

- **Controller HIL (CHIL)***
  - Inv
  - G
  - C
  - C
  - DMS
  - μC
  - Cost: $$  
  - Fidelity: High  
  - Project Sav: $$$$  
  - Use: System and Controller Validation

- **Power HIL (PHIL)**
  - Amp
  - Inv
  - C
  - C
  - DMS
  - μC
  - Cost: $$$  
  - Fidelity: Med **  
  - Project Sav: $$$  
  - Focus: ** Component Validation

- **Operation**
  - Inv
  - G
  - C
  - C
  - DMS
  - μC
  - Cost: $$$$$$  
  - Fidelity: Highest  
  - Project Sav: $$$$  
  - Focus: Operation Repair Overhaul

* Actual controller or code only (SIL)
Typhoon HIL real-time simulation.

Controller Hardware In the Loop (CHIL). Model-based software design and testing.
# Typhoon HIL: Vertically Integrated Solution

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## hardware

- HIL 604
- HIL-Controller interfaces
- Large scale simulators
Why HIL?

HIL Use vs. No HIL Use

- **$540,000** Avg. Total Cost-Savings of development projects with HIL Use.
- **+17.8%** Save Time required to fix defects with HIL use.
- **-11.0%** Less Software Defects reported per year after deployment with HIL use.

**Ahead of Schedule** on current embedded software development projects with and without HIL use.

Benefits of HIL:

- **Save Money**
- **Save Time**
- **Increase Quality**
- **Scale Design**
- **Resilient Design**
Welcome to HIL Academy!

The online learning hub for professionals and students. Master Model and Simulation - Based Systems Engineering tools for future power electronic and power systems engineers.

Learn more
Closest Typhoon HIL Offices
- Boston, MA, USA
- Norfolk, VA USA
- Vancouver, BC, Canada

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