



UNIVERSITY OF
SOUTH CAROLINA

College of Engineering
and Computing

Engineering & The Military

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engineering & computing





2002 – to date...



1999 – to date...



Technical Advances In High Power Systems

- ESRDC has *defined the field* of reconfigurable power systems and architectures, protection, and controls at the 100MW microgrid level.
 - Not historically part of power system research.
 - ESRDC performed the core research in this area
 - Now is becoming important far beyond ship systems (DoD bases, DoE, microgrid, renewable energy (wind, solar), ultra-high-reliability industrial power)



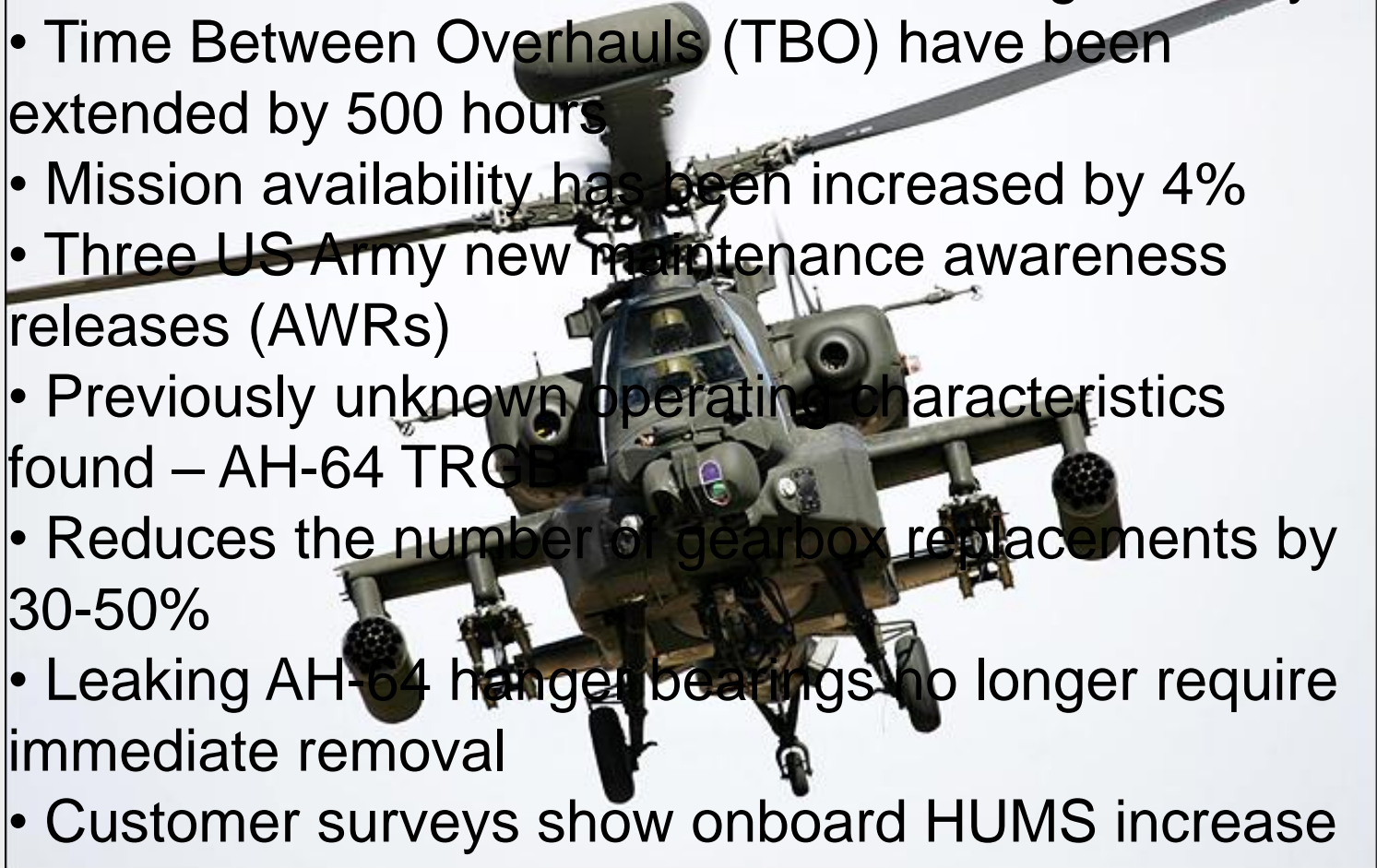
Where the Graduates Work

- ABB - US
- ABB - Global research
- Advanced Flex Sensor Research
- Advanced Test Concepts
- Arkansas Power Electronics International, Inc
- Boeing
- Carrier
- Caterpillar
- Columbia Research Corporation
- Converteam Naval Systems
- CREE
- Cummings
- Danfoss
- Delphi
- Duke Energy
- Eaton Corporation
- ETH Switzerland
- Exxon Mobil
- Florida Power and Light
- FSU Nat High Mag
- GE Aviation
- GE Corporate Research
- GE Global Research
- Georgia Tech
- Guadong Power, China
- Hamilton Sundstrand
- Huawei San Diego R&D Center
- Hubbell Power Systems
- IBM
- Innovative Power Systems
- John Deere
- L-3
- Lawrence Berkley National Lab
- Lineage Power
- Los Alamos National Lab
- Magnatek
- Northrop Grumman
- NSWCCD Philadelphia
- Nuclear Regulatory Commission
- ON Semiconductor
- Pacific Northwest Nat Lab
- PC Krause and Assoc
- Progress Energy
- Raytheon
- Rolls Royce
- S&C Electric
- SC Electric and Gas
- Schlumberger
- Siemens
- Stanley Consultants
- Tai-Yang Research
- Tallahassee Electric Utility
- Texas Instrument
- The Shaw Group
- Tulane University
- United Technologies Res Cntr
- University of California Berkley
- Univ of Iowa
- US Navy SPAWAR
- Vicor Corporation



Highlights and Success Stories

- Tens of millions of dollars of cost saving annually
- Time Between Overhauls (TBO) have been extended by 500 hours
- Mission availability has been increased by 4%
- Three US Army new maintenance awareness releases (AWRs)
- Previously unknown operating characteristics found – AH-64 TRGS
- Reduces the number of gearbox replacements by 30-50%
- Leaking AH-64 hanger bearings no longer require immediate removal
- Customer surveys show onboard HUMS increase user confidence in the reliability and safety of their aircraft





Observations

1. None of this work is exclusive to US citizens
– so far
2. Little or no restrictions on publications
3. Is directly supporting the needs of US industry
4. The work is aimed at reducing costs in the military, as well as improving availability and capability



Future?

1. Some of our students are being offered security clearances.
2. State-sponsored cyber attacks...
3. The need for more US citizens to do graduate studies...Increasing issue over export controls and defense-related work
4. Driving the need for more interdisciplinary studies, e.g. systems design/engineering
5. Great opportunities for academic and defense (contractors) collaboration – e.g. counterfeit chips
6. Need for a 'secure briefing room'!

