

MANITOBA



AEROSPACE

Thrust Area Working Group # 5 – Testing and Certification

Steering Group Report

- Emerging Aero Engine Tests
- Custom Design of Specialized Instrumentation
- Improvement of Efficiency of test sites
- Engine Test Simulator

Critical Enabling Technology – Emerging Aero Tests

Description

- Newer emerging test capabilities will be required by the OEM's (GE, RR, PW, to support testing at Manitoba's two engine test certification centres
- New tests to be defined will include
 - Hail and water ingestion
 - Volcanic Ash
 - Ice Crystal

Timeline for Technologies

- Water and Hail Ingestion 1-2 years
- Ice Crystal 3-4 years
- Volcanic Ash 4-7 years

Critical Enabling Technology – Emerging Aero Tests (cont)

Cost to Implement

- Water and Hail Ingestion \$6M
- Ice Crystal \$10M
- Volcanic Ash \$10M

Manitoba's Role

- Collaboration/partners with OEM's to include University of Manitoba, Red River College, NRC, Standard Aero, MDS Aero

Risks if not implemented in Manitoba

The OEM's may seek other markets to develop testing techniques, develop the testing infrastructure, and perform the new tests. The potential knowledge base and associated economic activity would go elsewhere.

Critical Enabling Technology – Custom Design of Specialized Instrumentation

Description

- A broad thrust area that covers the need for new and specialized instrumentation to support existing and proposed engine certification and production tests
- New instrumentation technologies are required in the areas of:
 - High temp dynamic strain and pressure measurement
 - Blade tip deflection, clearance, and timing measurement
 - Gas, particulate, and acoustic emissions measurement
 - Others

Timeline for Technologies

- Varies based on specific technology – likely 2-5 years

Critical Enabling Technology – Customer Design of Specialized Instrumentation (cont'd)

Cost to Implement

- Varies, but likely \$1-2 Million per technology

Manitoba's Role

- Collaboration/partners with OEM's to include PIWG, EVI-GTI, University of Manitoba, Red River College, NRC, StandardAero, MDS Aero

Risks if not implemented in Manitoba

- Manitoba's engine test facilities may not be able to operate in accordance with Regulatory Requirements
- Costs and time required to perform testing with sub-standard instrumentation will be higher

Critical Enabling Technology – Capabilities/Efficiency of Test Sites

Description

- Important to be at or near leading-edge of reliable, efficient testing technologies, such as: robust wireless sensors and instrumentation; and the capture, analysis and transmission of high volumes of data including high speed imaging data
- Related technologies would directly benefit engine development & certification testing as well as production engine & other testing - and indirectly benefit IT companies in Manitoba.
- Potential to: attract more OEM testing, commercialize some technologies, and create spin-off economic benefits.

Timeline for Technologies

- Varies based on specific technology – likely 2-3 years

Critical Enabling Technology – Capabilities/Efficiency of Test Sites (cont'd)

Cost to Implement

- Varies, but likely \$1+ Million per technology

Manitoba's Role

Candidate for multi-partner, multi-disciplinary collaboration, including:

- Industry: engine OEMs, RR, PW, GE, StandardAero, MDS Aero, MB IT Companies
- Research organizations: NRC, ITC, NASA,
- Educational institutions: U of M, Red River College, other universities, CRIAQ,
- NPOs: WestCaRD, EnviroTREC, ICTAM, MAA
- Government funders: Industry Canada, (tech demo?) Prov of MB

Risks if not implemented in Manitoba

- Manitoba's engine test facilities may not be able to attract as much OEM testing activity or capitalize on investments to date, as costs and time required to perform testing with lower standard capability would no longer be competitive

Critical Enabling Technology – Engine Test Simulator

Description

- The gas turbine engine test simulator would create a virtual test that would enable operators to practice engine test procedures under normal and emergency situations.
- . It would also prove to be a training ground for the timing of critical certification tests including icing, ingestion, and blade out procedures.

Timeline for Technologies

- Certification Test Simulator 2 years
- Aftermarket Test (MRO, airlines) Simulator 3 years

Critical Enabling Technology – Engine Test Simulator (cont)

Cost to Implement

- Test Simulator \$2-3M
- Technology Demonstrator \$1M

Manitoba's Role

- Collaboration/partners with OEM's to include University of Manitoba, Red River College, NRC, Standard Aero, MDS Aero, IT industry, Industry Canada

Risks if not implemented in Manitoba

There are other companies that are currently working on similar products. The OEM's may eventually partner with these other (non- Canadian) companies. Potential for expertise would be lost to companies outside of Manitoba and Canada.