

# Thrust Area Working Group # 4 – Simulation Modelling and Analysis

- Enhanced Technical Instructions and VR Training
- Simulation Platform for Complex Interconnected Systems.
- Modelling of New and Emerging Composite Materials.

# Critical Enabling Technology – Enhanced Technical Instructions and VR Training

## *Description*

- As Advances in computer hardware and software are applied to the design and analysis of aeronautical products, new solutions are emerging in developing training, manufacturing and maintenance instructions from the design data.
- Areas of consideration
  - Electronic Interactive Technical Manuals (IETMs).
  - Virtual Reality (VR) and enhanced training.
  - Guided Troubleshooting

## *Timeline for Technologies*

- Already being utilized to some extent. These are emergent technologies that will become prevalent in the next 5-10 years.

# Critical Enabling Technology – Enhanced Technical Instructions and VR Training

(cont)

## ***Cost to Implement***

- Develop a tech demonstrator - VR Training. \$20k-200k
- IETM development \$100k-200k per project (eg. Engine type).
- Engine Test Cell Simulator Training – See engine test TAWG.

## ***Manitoba's Role***

- Collaboration/partner with OEM's to develop VR and enhanced training programs, IETMs. Need to get up to speed with S1000D requirements.

## ***Risks if not implemented in Manitoba***

The OEM's may seek other markets to develop manufacturing and maintenance training and documentation solutions. The unique offering of an engine test simulator could drive work to manitoba much like the cold weather testing capability has.

# Critical Enabling Technology – Simulation Platform for Complex Interconnected Systems.

## *Description*

- A broad thrust area that identifies the need for in-province capability to effectively analyze and understand product designs and the required simulation methods.
- The proposed technology as a simulation platform and the local know-how to enable representation of numerous systems simultaneously.

## *Timeline for Technologies*

- Software solutions already exist. Need to develop in-province expertise and a tech demonstrator to illustrate the successful application of the technology to a local need (Eg. Satellites, engine MRO).

# Critical Enabling Technology – Simulation Platform for Complex Interconnected Systems. (cont'd)

## ***Cost to Implement***

- Varies, up to \$5M to develop new software.
- Can take advantage of existing software to put together a tech demonstrator for substantially less.

## ***Manitoba's Role***

- Collaboration/partners with Maplesoft, Maya HTT, OEMs.

## ***Risks if not implemented in Manitoba***

- No Reduction in non-recurrent engineering costs.
- Loss of competitiveness.
- Improvements in local products and services that would otherwise not be realized.

# Critical Enabling Technology – Modelling of New and Emerging Composite Materials.

## *Description*

- Next generation aircraft and engine designs are utilizing more composite materials. New composite material forms and material systems are being looked at. The top areas of development and future interest are centered around ceramic matrix composites (CMCs) and 3D preforms.
- Simulation of these materials are necessary to support engineering analysis and process modelling.

## *Timeline for Technologies*

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

# Critical Enabling Technology – Modelling of New and Emerging Composite Materials. (cont'd)

## ***Cost to Implement***

- CMC modelling : \$2M-\$3M 2-3 year timeframe (collaborative).
- 3D preforms : < \$1M 2 year timeframe (collaborative).

## ***Manitoba's Role***

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

- Industry: ESI Group, E-Xstream Engineering.
- Research organizations: NRC, ITC,
- Educational institutions: U of M, Red River College, other universities, CRIAQ,
- Government funders: Industry Canada, (tech demo?) Prov of MB

## ***Risks if not implemented in Manitoba***

- Risk to competitiveness in being able to analyze and more importantly process model (especially 3D preforms). Not having modelling tools and expertise to support this activity with reduce the ability for manitoba to participate with OEMs in development and manufacturing.