Australian Government
Department of Defence
Defence Aviation Safety Authority

Propulsion Structural Integrity Section

Contribution to safety, capability and cost of ownership

WGCDR David Hood
DD P/HSI, NDT&CT, DAVENG-DASA

Scope of brief

- **Propulsion Structural Integrity section mandate**
- **Track record & examples of value (with DSTG and QinetiQ)**
- **Is there a future need?**
- **The importance of DSTG and QinetiQ**

PSI Section mandate

- **DASA Vision:**
  - 'Capability First, Safety Always'

- **DAVENG Business Model describes a stewardship role for SI management ---> safety, capability & cost of ownership:**
  1. Ensure safety is maintained to acceptable levels
  2. Ensure platforms reach their PWD
  3. Avoid unforcasted refurbishments
  4. Optimise maintenance / minimise maintenance downtime
  5. Contribute to the achievement of planned aircraft availability

- **Notes:**
  - **Policy:** DEFLOGMAN Part 2, Vol 10, Chap 18
  - Identical roles to our airframe SI section peers
  - These roles should be common to all in this room

Track record & examples of value

- **Complex / difficult business:**
  - Access to data
  - Access to SME resources (QQ, DSTG, OEM)
  - Relatively fragile QTE construct compared to FW SI:
    - Fewer Masters qualifications
    - Smaller pool for OIC ESI position
  - **Acknowledge: at times our support has been limited / imperfect**
- **Many recent examples of value add:**
  - MRH-90 turbine blade RA (avoid blade replacement program – capability)
  - S-70B-2 EOT life limits (simplified logistics system – cost of ownership)
  - F/A-18F/G engine RA for continued operations (capability)
  - P-3C critical part inspection limits (safety)
  - PC-9 mission analysis (safety)
  - F/A-18A/B HPT ACP / RS risk assessment & MPTF (capability)
  - WDA laboratory (safety / capability)
  - Evolution to PSIP (clarity and more holistic management)

Is there a future need? Strategic view:

- **Sovereign Structural Integrity Capability**
  - Some capabilities are so important for national security that they must be retained and controlled by Australian Defence and industry
  - A sovereign SI management capability:
    - Supports capability and cost of ownership
    - Provides independence from foreign governments and companies
  - How much / what level is enough? DAVENG currently working to define

- **Challenges (or opportunities?) for PSI:**
  - How much / what level is possible?
  - Greater collaboration with OEMs
    - Eg Rolls Royce industry placement
    - How do we access more OEM information?
  - DSTG support to Force-in-Being – already too weak in some areas
  - Greater utilisation of QQ
  - Greater partnering with foreign militaries

Is there a future need? Tactical view:

- **Do more of the same, eg:**
  - **Cross-platform issues:**
    - Support component lifing issues / RA
    - Optimise HUMS and how we use, certification requirements
    - Advance CM programs (eg Chipcheck) / discrete issue management
    - Support for Mission Analyses
    - DSTG task sponsorship
  - **Romeo Seahawk:** validate ADF usage
  - **Chinook:** quantify effect of IRSS (potential for increased engine life limits)
  - **Taipan & Tiger:** higher fidelity HUMS (data quality, uses for data)
  - **HAFT-TD:** refined/new RW certification requirements, MOC and approaches
    - Spinoffs for engine critical part lifing?
  - **F-35 JSF:** engine certification
  - **C-27J:** propeller balancing certification requirements

Is there a future need? Tactical view:

- **Do more of the same, eg:**
  - **PSI sees across the entire community, objectively**
    - Ability to steward / lead problem resolution effectively
  - **Important conduit between DSTG and the community. Generally:**
    - PSI understands DSTG better than the operating community
    - PSI understands the operating community better than DSTG

    => Link problems with solutions

    => Steward tasks to completion

The importance of DSTG

- **Essential S&T support to PSI and for the F-I-B:**
  - Component/structure life management, independent of OEM
  - Validation / exploration of OEM life limits and related analyses
  - Validation of OEM risk assessments for technical issues
  - Conduct of independent risk analyses for in-service events
  - Independent research/investigation into in-service events & issues
    - HUMS
    - Condition Monitoring
    - Lifing policy
    - Component durability, reliability
  - Forensic investigation services
  - Emerging NDT technology, processes, equipment, methods, etc

  - LRR supporting capacity to undertake activities such as those above
  - Access to OEMs, other S&T organisations and academia

What PSI wants from DSTG in future

- **Continued support to PSI and the F-I-B:**
  - AD Plan ‘Roadmaps’ (AD strategy):
    - Certified Additive Manufacturing
    - Advanced Sensors
    - Data Analytics
    - Composite lifing
  - But also, more of the same from the last slide
    - Propulsion system support already ‘too thin’ in some areas

What PSI wants from DSTG in future

- **My view: need for DSTG support to the F-I-B will <u>grow</u>:**
  - Ever increasing complexity in aero engine design / performance
    => new, difficult problems
  - Reducing fleet sizes and increased cost
    => Each individual asset is more important
  - Challenges of:
    - Data access
    - Influence / innovation / inflexibility in global fleet management models

What PSI wants from DSTG in future

- **Growing need:**
  - Innovative ways to ‘work around’ typical limitations (eg access to data)
    - Eg indiginous relifing of critical parts
    - Eg indigenous HUMS improvements
    - Eg greater support to CM in all forms
  - Continued and greater engagement with peers (eg US military S&T organisations) and academia
  - Greater liaison with OEMs for specific projects (eg new lifing methods)

- **So if you agree – make a noise**
  - DSTG task planning
    - Engage PSI for coordination
  - Engage DSTG direct

Opportunity for DAVENG industry partner (QinetiQ)

- PSI has not historically utilised QQ to any significant degree
- Opportunity to increase PSI capacity / output
  - See relevance increasing in similar way to DSTG

- Increasing challenges relating to IP (access to data that the ADF holds)?

QUESTIONS?

PSI section contribution to safety, capability & cost of ownership:

1. Ensure safety is maintained to acceptable levels
2. Ensure platforms reach their PWD
3. Avoid unforcasted refurbishments
4. Optimise maintenance / minimise maintenance downtime
5. Contribute to the achievement of planned aircraft availability