Aircraft & Engines Structural Integrity Familiarization Course+

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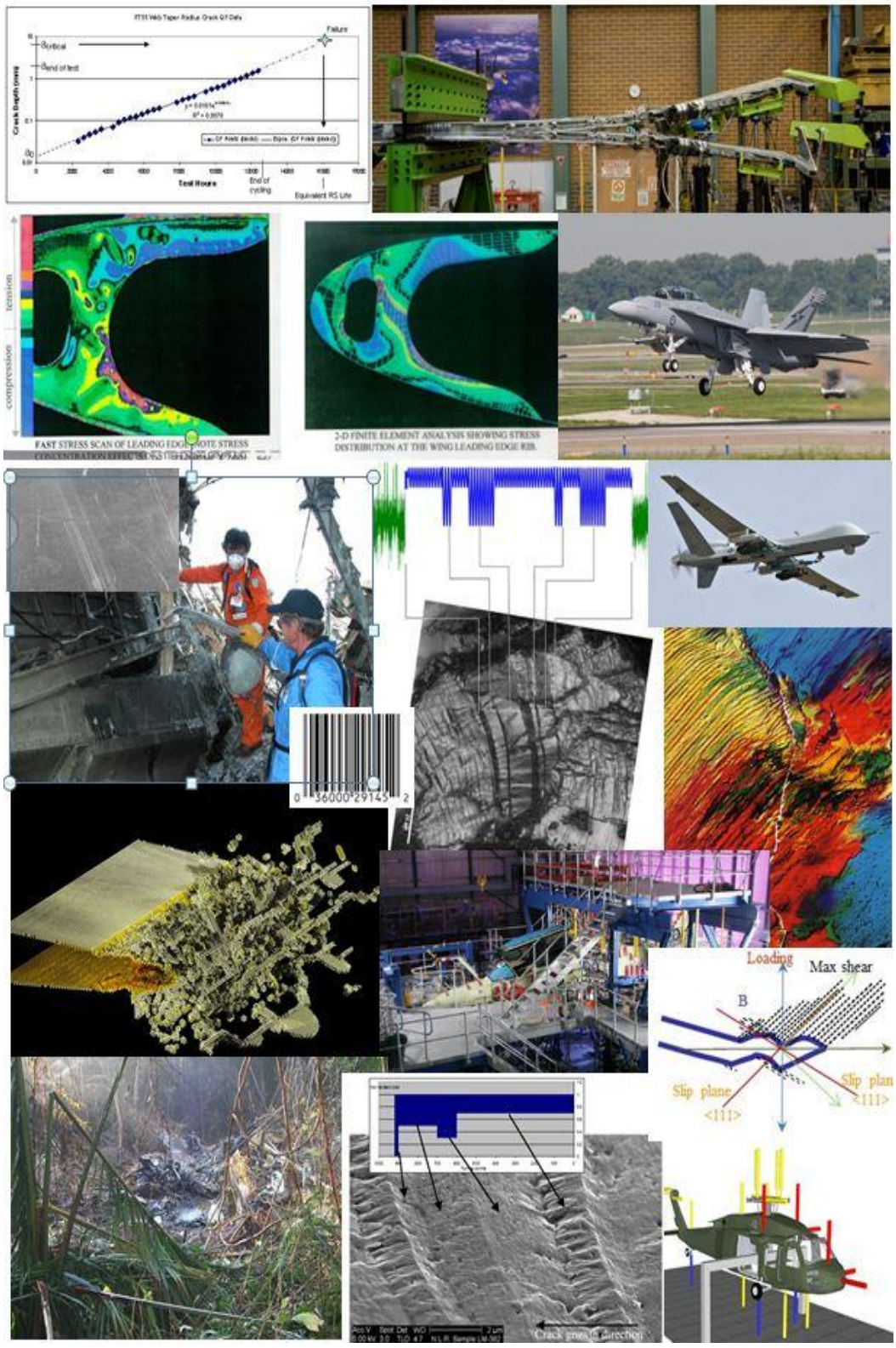
Molent Aerostructures

Bringing You Training, Coaching and Novel, Outcome Focused Innovative Aircraft Structural Integrity (ASI) Solutions and Advice



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Title: *Aircraft & Engines Structural Integrity Familiarization Course*
Course Topics (approx: 36 hours)

	Subject	Comments	Duration (hr)
	Welcome	**Malaysian Hosts**	0.15
1.	Molent Introduction	A little info about the author, aim and overview of course contents	1.0
2.	Threats to Structural Integrity - Ways an aircraft can fail	Outline of principle ways an aircraft can fail or not be airworthy	2.0
3.	Introduction to the needs and aims of an ASI management program	The need for ASI management plans and the tools/skills required	1.0
4.	Lessons from classic aircraft accidents and incidents	The root causes leading to fatigue failures are emphasized i.e. manufacturing and maintenance flaws	1.5
5.	Helocopter 101*	Present (some of) the unique aspects of helicopter flying and provide a very basic, introduction to the helicopter hazardous flight and ground conditions that can lead to accidents	1.5
6.	Design Standards, Requirements and Reporting	Overview of aircraft design standards with emphasis on MIL-STD-1530D and briefly EMARS, DEF-STAN-970, Usage Monitoring Reports etc	1.5
7.	What is metal fatigue?	As the fatigue crack growth (CG) concepts and tools to be presented may be novel, some contextual background is required. Fatigue issues specific to airframes are discussed.	2.0
8.	Helocopter Structural Integrity	Look at helicopter unique aspects of ASIP	1.5
9.	Aircraft Failure case study	AS350 Squirrel Tailboom Failure	1.0
10.	Aircraft Fatigue Failure case study	The AeroMacchi wing in-flight seperation	1.0
11.	Propulsion System Structural Integrity	Risks for propulsion systems and managment systems, MIL-STD-3024	1.0

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12.	Intro to Envirnomental Degradation and Prevention	Highlight major envirnomemental degradation issues, their managment and prevention.	1.5
13.	Fatigue Design tools	Summary of conventional fatigue design tools. Limitations.	2.0
14.	The Lead Crack Fatigue Life Assessment	The foundational Lead Crack method used by the RAAF (Hornet, Pc9, F111 etc)	2.0
15.	Fatigue Variability or Scatter. Scatter factors	What factors contribute to scatter in fatigue lives emphasizing initial defects which is an essential concept in the CG models.	1.0
16.	Quantitative Fractography (QF) and the measurement of fatigue CG	QF is a key tool in the analyses of fatigue and the method is briefly described. Data generated through QF was used to develop the CG tools	1.0
17.	Typical material and in-service maintenance flaws	Material, Manufacturing discontinuitoes and In-service induced maintenance flaws are the primary contributors to in-service aircraft fatigue failures. The presentation describes typical in-service flaws through a number of case studies. The Hornet compendium of crack data.	1.5
18.	Multiple-Site and Multi-element damage (MSD & MED)	Introduction to MSD and MED fatigue and failure	1.0
19.	MSD Case Study	Aloha B737 fuselage failure	1.0
20.	Intro into novel fatigue tools for assessing fatigue failures.	• The cubic stress rule • Effective Block Approach • The Hartman-Schijve CG Equation Variant e.g. A simple means of predicting the CG rate for a spectrum at an untested stress level from the results at a different stress level. Used in RAAF Hornet and P3C structural repair manuals.	1.5
21.	Fatigue loads, usage, and Health monitoring systems	Describes fatigue loads development and the philosophy and practice of	1.5

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		fatigue monitoring including use of strain gauges. Regime recognition.	
22.	Full-scale fatigue test (FSFT) objectives. Summary of Aust Hornet fatigue testing programs	The need for fatigue testing and enhanced teardown. Emphasising the application of buffet loads to empennage, centre barrel testing & teardown etc. Structural life extension program/aging structural issues and some strategies for aircraft life extension	2.0
23.	FSFT Interpretation	Novel ways of lifing an aircraft from FSFT results	1.0
24.	Probabilistic Failure Analyses	Probabilistic failure analyses provides a means of quantifying the probability of failure (POF) as an aircraft ages. MIL-STD-1530D requirement. Summary of one approach to estimating POF is presented	1.0
25.	Short Cracks	Stressing the importance of the physically short crack regime in failure analyses.	1.0
26.	Good fatigue design practice	Tips for fatigue resistant and fail-safe design. As machined, polished versus anodised, etched etc	1.0
27.	Case Studies (time permitting)	Pc9 ASIP and testing F111 wing failures P3C leading edge failure etc	1 each
28.	General discussions		1
29.	Wrap-up		0.5
30.	Total Time for above		≅36
Note	Bibliography provided for each topic		

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