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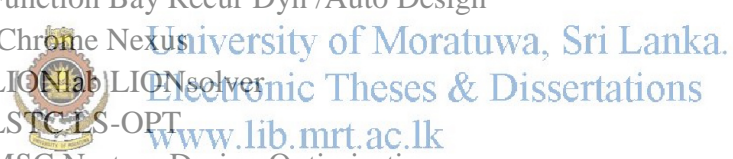
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## Appendix A: FEA Packages available for Analysis purposes

- Altair HyperStudy, OptiStruct, solidThinking Inspire
- ANSYS Adjoint Solver, Optimetrics
- Autodesk Optimisation for Inventor
- CD-adapco STAR-CCM+ /Enabling Optimate+
- Cenaero Minamo
- Collier Research HyperSizer
- COMSOL Multiphysics Optimisation
- Concepts NREC TurboOPT II
- DATADVANCE MACROS, pSeven
- DecisionVis ExplorerDV
- Dynamic Design Solutions FEMtools Optimisation
- Dynardo optiSLang
- ESI Group Virtual Performance Solution Optimisation
- ESTECO modeFRONTIER
- Exa PowerFLOW Optimisation Solution
- FEA-Opt SmartDO
- FRIENDSHIP SYSTEMS CAESES/FRIENDSHIP-Framework
- Function Bay Recur Dyn /Auto Design
- iChrome Nexus
- LIONlab LIONsolver
- LSTC LS-OPT
- MSC Nastran Design Optimisation
- NISA Software CSIL NISOPT
- Noesis Solutions Optimus
- Optimal Solutions Sculptor
- Phoenix Integration ModelCenter
- PIDOTECH PIA<sub>n</sub>O
- PTC Creo BMX (Behavioral Modeling Extension)
- Quint OPTISHAPE-TS
- RBF Morph
- Red Cedar Technology (a CD-adapco company) HEEDS MDO, HEEDS NP
- Siemens PLM NX Nastran Optimisation, Femap with NX Nastran Optimisation, LMS Virtual.Lab Optimisation
- Sigma Tech IOSO
- SIMULIA Isight, SEE, Tosca
- SolidWorks Simulation Structural Optimisation
- Vanderplaats R&D GENESIS, DOT, BIGDOT, VisualDOC
- Virtualpyxis Virtual.PYXIS
- Within Technologies (an Autodesk company) Enhance

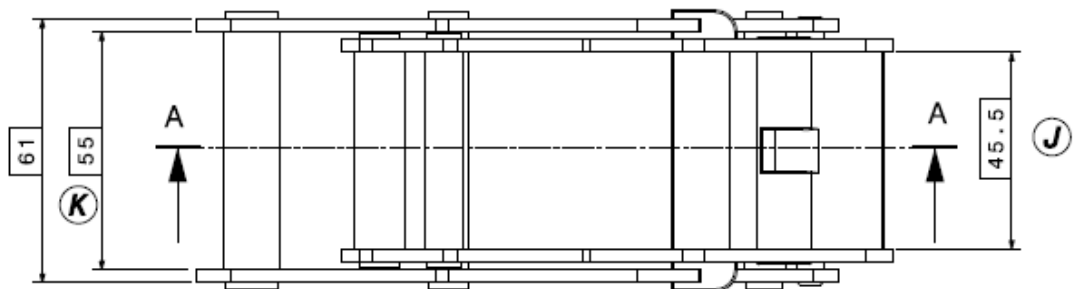
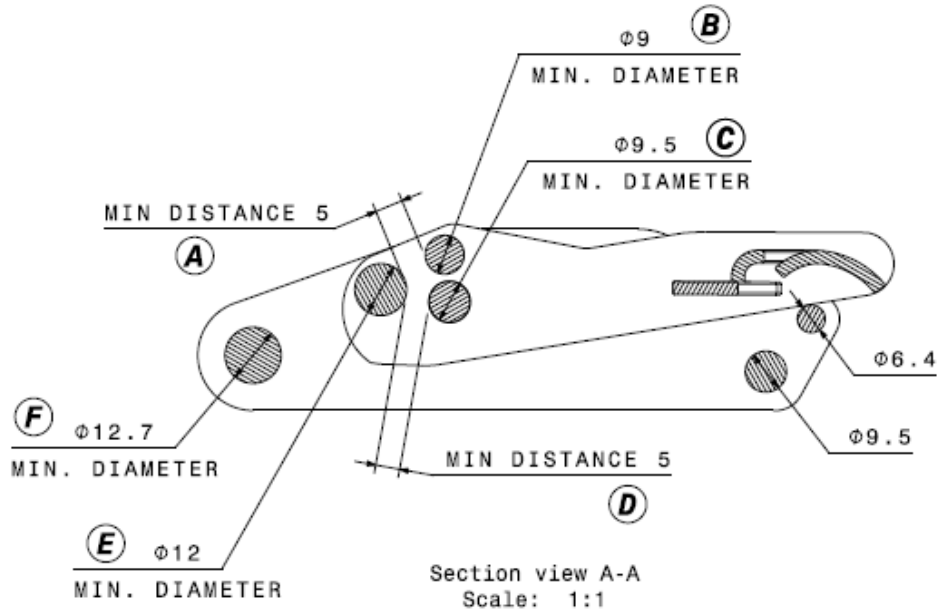


**Appendix B: 5000 lb Over-center Buckle Engineering Drawings**



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**Appendix C: Balloon Marked Dimensions for Deformation Check**



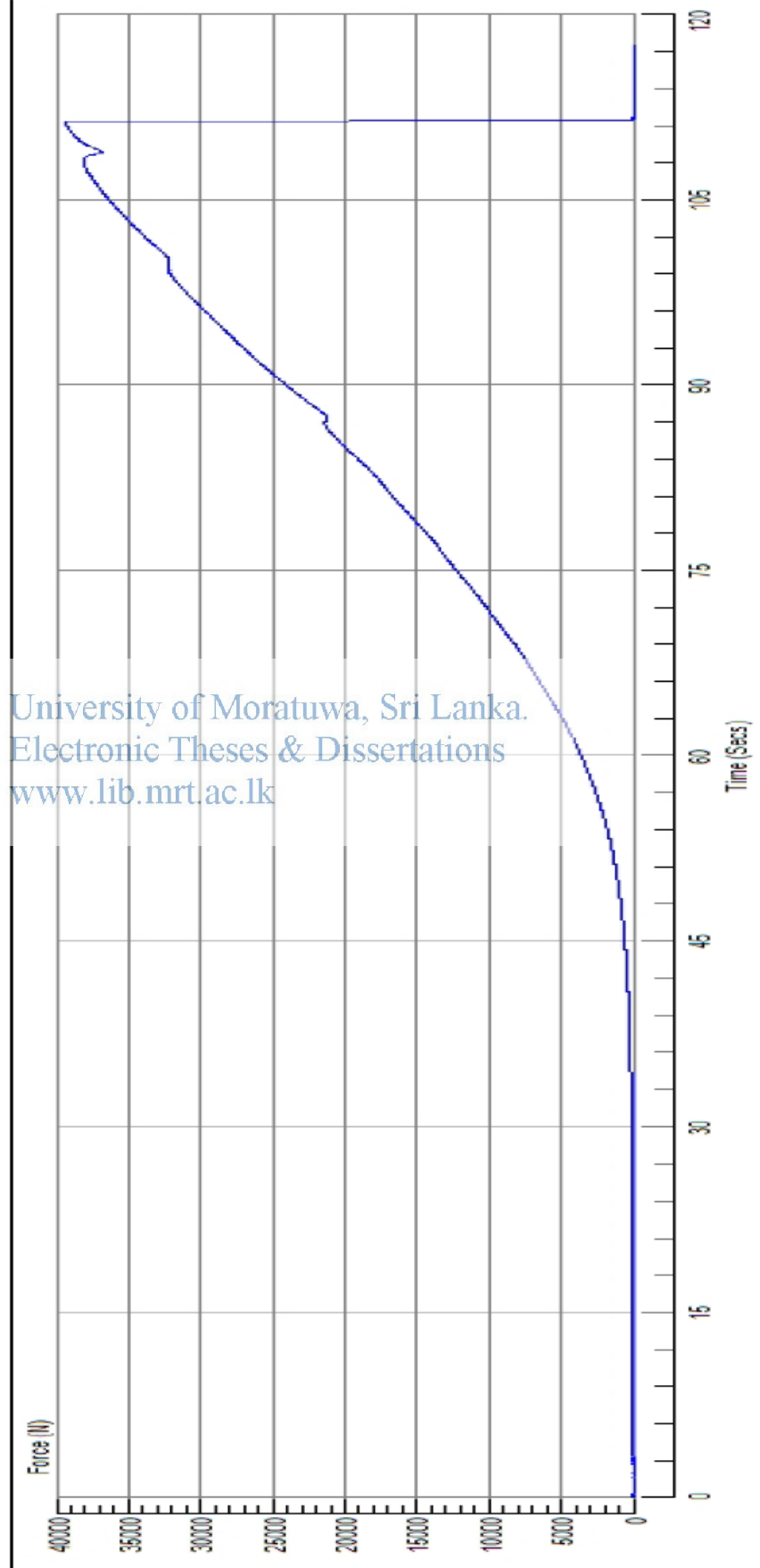
**Appendix D: Time vs Force Graph – Test for OCB Failure**

Test No      Force @  
                  Peak  
                  (N)

1      39320.000

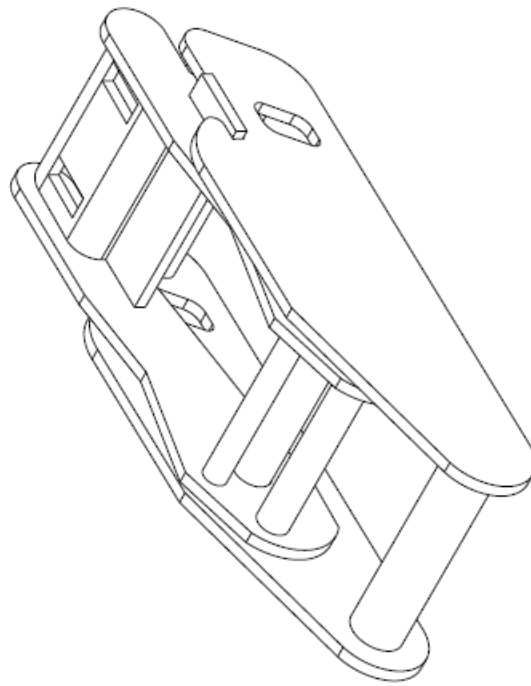
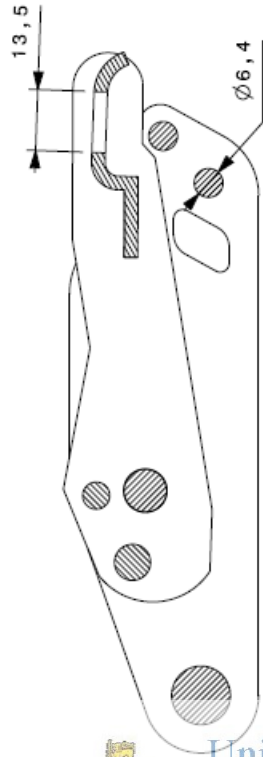


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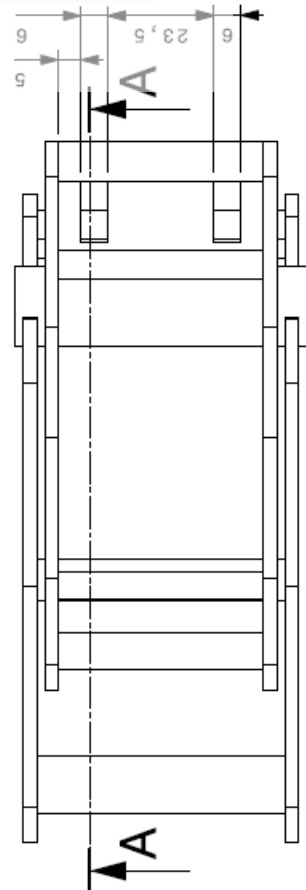
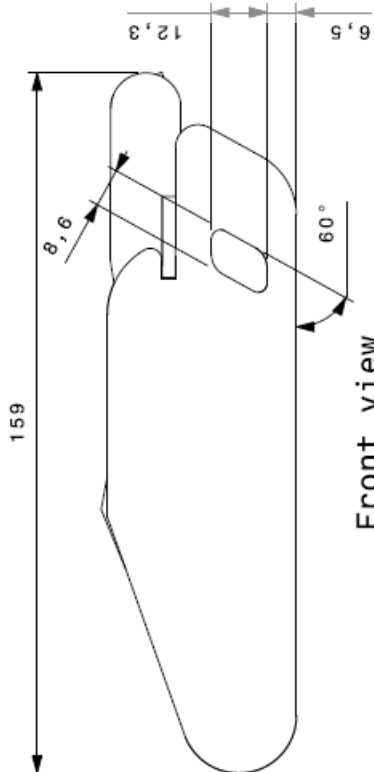




**Appendix E: Changes in the Optimised OCB Design**



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**Appendix F: Estimated Cost Savings for Airlines**

Source: [23]

<b>Estimated cost savings for ABC Airlines</b>						
	<b>Aircraft type</b>	<b>Quantity</b>	<b>Pallet positions</b>	<b>Total pallet positions</b>	<b>Weight savings (kg)</b>	<b>Fuel savings (\$k)</b>
Passenger	A330	22	6	132	1,320	242,352
	A340	15	6	90	900	165,240
	A380	18	10	180	1,800	330,480
	777-200	22	6	132	1,320	242,352
	777-300	55	8	440	4,400	807,840
Freighter	747F	8	36	288	2,880	528,768
	777F	4	37	148	1,480	271,728
<b>Total</b>		<b>144</b>	<b>109</b>	<b>1,410</b>	<b>14,100</b>	<b>2,588,760</b>

*Assuming a 10kg per net weight saving  
 Fuel cost \$1,025/tonne and a 1kg weight saving = \$183.60 per year  
 Estimated 4,500 flying hours per year (average 12.3 hours per day)*



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