

DETAILS OF ENGINEERING/GEOSCIENCE WORK				
Applicant Legal Surname	Doetzel	Date	December 18, 2016	
Applicant First Name	Ed	Applicant APEGA ID	118094	
Designing aircraft structure parts and alterations to aircraft structure parts for interior components, integration of avionics systems, security of occupants and cargo.				
Company:	Avmax			Total Months
Start (mmm-YYYY)	May-13	Finish (mmm-YYYY)	Jan-17	44
Company:	Field Aviation			Total Months
Start (mmm-YYYY)	Jan-06	Finish (mmm-YYYY)	May-13	88
Company:				Total Months
Start (mmm-YYYY)		Finish (mmm-YYYY)		0
Company:				Total Months
Start (mmm-YYYY)		Finish (mmm-YYYY)		0
Company:				Total Months
Start (mmm-YYYY)		Finish (mmm-YYYY)		0
Details of the Engineering Work Performed For Licensing Activity 1				
I design metallic and composite interior monuments such as stowage units, wall and ceiling panels, partitions, shelves, racks and alterations to the same. I alter and integrate aircraft seats and seat belts. I design the attachment of monuments, seats, seat belts, avionics equipment and other items of mass to the aircraft fuselage structure including seat rails, floor supports, instrument and other panel support structure, and frame, stringer skin semi-monocoque construction. I determine loads and structural strength of supporting structure and design structural reinforcement where required. I design penetrations through fuselage skin and pressure bulkheads and reinforcement thereof. I design repairs to aircraft metallic and composite structures. I select materials, finishes, layout and means of construction for the items I design. I estimate and later verify the design loads. I use the following engineering theory in these designs to size these structures: - I calculate distribution of internal loads and reactions of statically determinate and indeterminate structures using statics, principle of superposition, Hardy Cross, castigliano, least work methods by hand calculations from references such as Bruhn, Peery, Roarks, Flabel. I do finite element analysis using references such as Cook, NAFEMS library, Ian Taig & Boeing reports, etc. - I determine tension, compression, bending and shear loads and stresses. I determine the buckling (Euler long and short) and crippling (Girard, Needham) failure of compression members. -I calculate combined loads -I calculate joint shear, bearing, tension and combined loads including the effects of prying on discrete & integral joints -I analyze pin&socket joints -I use statistically determined allowables from references such as MMPDS-01, OEM design manuals. I apply techniques such as Neubers, Cozzone's to estimate stress. Analysis of composite materials. Tsai-Wu failure mode, Sandwich panel analysis. I analyze plates and shells and shear distribution in thin-walled structures. -generalizing my analytical process, I use a series of idealized models of increasing complexity to improve estimated stress field in components. The first calculations are always hand calculations and finite element analysis is used only if complexity demands. Models are verified and validated using NAFEMS guidelines, Morris "A Practical Guide to Reliable Finite Element Modeling" and GAMA Publication 13. I design structures to be robust by smart application of geometry and sizing. I use component or assembly level structural tests to validate designs where existing published data is unavailable.				

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LICENSING ACTIVITY 2				
Evaluating static and fatigue loads, margins of safety, fatigue life and damage tolerance for aircraft structure parts and alterations to aircraft structure parts				
Company:	Avmax			Total Months
Start (mmm-YYYY)	May-13	Finish (mmm-YYYY)	Jan-17	44
Company:	Field Aviation			Total Months
Start (mmm-YYYY)	Jan-06	Finish (mmm-YYYY)	May-13	88
Company:				Total Months
Start (mmm-YYYY)		Finish (mmm-YYYY)		0
Company:				Total Months
Start (mmm-YYYY)		Finish (mmm-YYYY)		0
Company:				Total Months
Start (mmm-YYYY)		Finish (mmm-YYYY)		0
Details of the Engineering Work Performed For Licensing Activity 2				
I -determine the Canadian and/or foreign airworthiness requirements -calculate distribution of weights & moments in aircraft and aircraft parts w/ statics principles and ensure cargo/baggage restrained adequately to prevent shifts in load -apply limit and ultimate loads in equilibrium with inertia forces using first principles including redistributing for non-linear deflection -apply prescribed factor of safety of 1.5 to limit loads -evaluate critical loading and failure modes and evaluate fatigue -calculate structural strength margin of safety and effect of deflections -apply aerodynamic loads to simple externals like antennas using classical aerodynamic lift and drag calculations (ref: Hoerner, Anderson) -apply OEM design pressurization loads and prescribed load factors to aircraft skin-frame-stringer structure (FAA Chicago ACO paper) - apply prescribed emergency landing condition loads to occupants items of mass -determine the probable locations of fatigue in integrated and altered metallic structural parts. I determine fatigue life and damage tolerance of structure using Swift, Huth, Petersons' SCF, FAA Seattle ACO guidelines, TC SI 513-001, RAPIDC, AFGROW, etc. I calculate combined stress concentrations using superposition of published factors or converged FE models. I calculate end fastener loads using 1d matrix analysis (Swift, Boeing) with consideration of secondary joint bending. I calculate crack growth using the NASGRO equation (modified Paris) and apply factors for environment and other factors to establish a safe inspection threshold and interval appropriate to the non-destruction inspection process and the detectable crack length with consideration of other inspection intervals in the OEM tested design. I ensure residual strength of structure against fatigue, rogue flaw damage, WSD/MSD to the requirements. I apply special factors by application (i.e. quick change, fittings, lugs), material & material variability, and load (bearing) from FAR requirements, GAMA Pub 13, aircraft OEM manuals, etc. I conservatively address dynamic loads on antennas including induced vortices (Von Karman/Strouhal). I apply abuse loads to account for ground handling, maintenance and other human factors based on industry best practices, ergonomics data. I evaluate the worth of projects using engineering economics. I evaluate fabrication problems of parts and alterations and provide rectification instruction.				

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LICENSING ACTIVITY 3				
Designing				
Aircraft interior parts and layout of aircraft interior parts for occupant safety				
Company:	Avmax			Total Months
Start (mmm-YYYY)	May-13	Finish (mmm-YYYY)	Jan-17	44
Company:	Field Aviation			Total Months
Start (mmm-YYYY)	Jan-06	Finish (mmm-YYYY)	May-13	88
Company:				Total Months
Start (mmm-YYYY)		Finish (mmm-YYYY)		0
Company:				Total Months
Start (mmm-YYYY)		Finish (mmm-YYYY)		0
Company:				Total Months
Start (mmm-YYYY)		Finish (mmm-YYYY)		0
Details of the Engineering Work Performed For Licensing Activity 3				
I design aircraft interior components to the occupant safety and crashworthiness requirements of Canada and foreign countries. Principle design guidance used is FAA AC 25-17A and GAMA Publication 13. I use government and non-government ergonomics data such as MIL-STD-1472, to size my designs. I evaluate passenger seating for head strike and ensure no injurious features will contact passengers while seated or moving about the cabin. I ensure seat installation limitations are met. I locate passenger service units for ergonomics of passengers to read signage & apply oxygen masks in emergency. I provide adequate adequate handholds for passengers moving throughout aircraft. I ensure the flammability performance of materials and material combinations used meet the application specific performance standards using guidance from the FAA Fire Test Handbook, FAA AC25.853-1, PS-ANM-25.853-01, etc. I assess existing flammability test data from past internal tests and FAA reports to reduce design-test cycles for our new products -I assess slip resistance of floor surfaces I specify -I secure safety equipment ensuring location allows ready accessibility. -I ensure placards and other markings contain the information required by design requirements and are easily read and durable, benchmarked to aircraft OEM design practices. I do data review and physical evaluations onboard the aircraft of the interior to validate items I design (LA3) plus the following performance aspects that may be affected by my design: -Pilot compartment door function and provisions for emergency egress -Latches on stowage compartments for life cycle reliability - passenger information sign visibility from passenger viewpoint with ergonomic data - access to and function of emergency exits in cabin -check function and visibility of emergency exit markings, floor proximity escape path lighting and emergency lighting -checks of aisle and emergency exit passage width.				

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LICENSING ACTIVITY 4				
Preparing plans and specifications for aircraft structure parts and alterations to structure parts for interior components, integration of avionics systems, security of occupants and cargo, and repair.				
Company:	Avmax			Total Months
Start (mmm-YYYY)	May-13	Finish (mmm-YYYY)	Jan-17	44
Company:	Field Aviation			Total Months
Start (mmm-YYYY)	Jan-06	Finish (mmm-YYYY)	May-13	88
Company:				Total Months
Start (mmm-YYYY)		Finish (mmm-YYYY)		0
Company:				Total Months
Start (mmm-YYYY)		Finish (mmm-YYYY)		0
Company:				Total Months
Start (mmm-YYYY)		Finish (mmm-YYYY)		0
Details of the Engineering Work Performed For Licensing Activity 4				
I prepare installation, assembly, and part drawings -include consideration of structural and system requirements (such as spacing from production joints and interference/performance when locating an antenna in pressurized skin) -collect information from manuals, drawings and rubbings/sketches from the aircraft including for damage to be repaired -use only parts and/or materials that conform to specifications with existing test data or I generate test data -provide appropriate electrical bonding for antennas and other electrical equipment installed as well as electrical bonding of parts to the airframe -specify means of fabrication by process specification known to produce consistently sound structure (such as MIL or industry standard or aircraft OEM process specifications) -specify protection of structure against corrosion, abrasion moisture ingress/egress, and drainage using finishes, sealants and coatings applying knowlege of aircraft type and its protection level by area, the aircraft inspection program, dissimilar or incompatible materials (i.e. CCF & AL), hydrogen embrittlement, etc. -specify installation of fasteners and other details consering fatigue, protection, edge distance, etc. -I include consideration of maintenance and access to maintenance of other components -I prepare plans for structural tests including design of the test apparatus using first principles such as tests on roll-up doors for distributed bearing loads or established test standards such as a splice bending test for sandwich material per ASTM C 393. I specify welds for fabrication and repair calculating strength and heat affected zone (Mandel "Alunminum Welding"). I write test plans for function of installed equipment. Roll-up door opening loads. I set tolerances for detail part and installation layout to meet strength and other requirements. I prepare instructions for continued airworthiness in the form of maintenance manual supplements. -I set airworthiness limitations for structure in cycles between inspections based on calculated fatigue and damage tolerance -I prepare maintenance and service instructions, inspection schedules and techniques, installation and removal instructions, function tests, and other procedures. Aircraft damage tolerant evaluation includes determination of mandatory "airworthiness limitation" (AWL) inspection intervals and procedures where structural integrity is reliant. All these procedures extensive use of existing OEM inspection procedures. I apply non-destructive evaluation of fatigue and damage tolerant aircraft semi-monocoque metallic structure and identify locations needing technique.				