3.1.2 Strength Check List

GENERAL

Has a freebody been established and does it balance?

Is the load sheet current?

Is the structure stable?

Do the loads and the finite element model make good engineering sense? Do they balance?

Does your part meet applicable specification requirements?

Have deflection considerations been checked?

Is part minimum weight and cost (right material, best fastener size, no unnecessary members, etc.)?

Are load paths direct? Are load line kicks appropriately supported?

Have proper temperature and environmental effects been considered?

Are the inspections adequate for structural integrity and minimum for life-cycle costs? NDT appropriate?

Is a first article examination required? Remember, it takes manpower and increases cost.

Have buffet and or acoustic fatigue been considered?

Has proper fatigue spectrum been considered (Dynamic effects, fuel pressure, air load, etc.)?

Do you know the function of the part and all items that attach to it or affect it otherwise?

Have you combined all stresses properly (tension, sheer, bending, etc.)?

Have you considered secondary induced loads like membrane, diagonal tension, friction, beam column, etc.?

Are there any potential stress corrosion or induced stress problems because of high preloads, cold working, interference fit, lug clamp up, etc.?

Have you considered eccentric load lines including effects of friction circles on moving parts?

Have you considered effects of fastener fits on your part and on parts surrounding it - the greater the fastener clearance the more overlapping assumptions required.

Do bolts used in tension have the proper installation torque and have you avoided use of 3/16 diameter fasteners in tens ion?

Are fasteners critical in bearing rather than shear?

Are any fastener threads in bearing acceptable?

Don't mix fastener types or hole fits within a joint.

Have plate nut orientations been checked and are they clear in the product definition?

Have al l fastener cal louts been checked?

Have you considered curved flange effects?

Have you avoided one-sided doublers and single shear joints or accounted for eccentricities?

Have you considered secondary effects such as longerons bending laterally do to bulkhead loads, flanges adjacent to lugs bending; has grain direction been considered etc.?

Have you done both an ultimate and limit analysis?

Have secondary strengthening effects been accounted for so that member is minimum weight? Example, panel pressures and axial tens ion loads relieve shear panel buckling?

Are proper material and specification, gages, heat treatment called out and have the affects of tolerances been included in the analysis?

Are all manufacturing processes called out correctly and do any of them affect the strength of your part?

Are the standard parts that are called out acceptable for the loads associated with your part?

Is the minimum tolerance and tolerance accumulation acceptable (project should establish minimum margin of safety but tolerance buildup should be evaluated) from a minimum cross-section and load line standpoint?

Have you attempted to eliminate or reduce stress risers whenever possible?

Have you considered fastener fatigue including effects of the end fasteners having the highest load in a multirow joint?

Have the correct proof and burst pressure factors for pneumatic and hydraulic systems been used?

Are mechanism rigging procedures clear and such that undesirable loads are eliminated?

METALS

Have you checked for combined stress concentrations?

Has the effect of surface finish been included in the fatigue analysis?

Have you used the proper casting factor for analysis and test? Check applicable specification for number of static tests required.

Has the material and product form been selected for optimum strength, cost, corrosion resistance, machinability, etc?

Do you have excessive stresses in short transverse direction or across forging parting plane? Some fatigue improvement methods cause problems - cold working, interference fit fasteners etc. Have you checked for residual tension stress problems caused by compression yielding?

Have field repairs been considered?

Have tooling hole plate nut and drain hole stress concentrations been considered in your fatigue analysis?

Do you have any knife edge conditions?

Have you checked for inter-rivet buckling?

Is your structure corrosion resistant? Avoid water traps and galvanic problems.

Have you analyzed for press fit stress effects?

Have you considered thermal effects (including effect on room temperature material properties) or creep effects?

Has Dynamics or Strength analyzed for flutter and acoustic fatigue?

Have you considered handling loads? Don't be overly conservative.

Can the machining be sheet metal or pressing to reduce costs?

Have you checked for potential galling or sliding contact between parts (particularly between stainless steel parts or titanium parts)?