Solution problem of the determination of fail fasteners and structural joints

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Abstract

A complete airplane structure is manufactured from many parts. These parts are made from sheets, extruded sections, forgings, castings, tubes, or machined shapes, which must be joined together to form subassemblies. The subassemblies must then be joined together to form larger assemblies and then finally assembled into a completed airplane. Many parts of the completed airplane must be arranged so that they can be disassembled for shipping, inspection, repair or replacement and arc usually joined by bolts or rivets. In order to facilitate the assembly and disassembly of the airplane, its desirable for such bolted or riveted connections to contains as few fasteners as possible. For example, a semimonocoque metal wing usually resists bending stresses in numerous stringers and sheet elements distributed around the periphery of the wing cross sections. The wing cannot be made as one continuous riveted assembly.

Keywords: fail fasteners, structural joints, determination problem

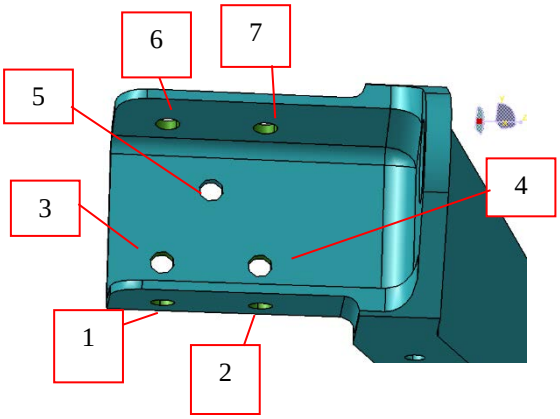
1 Introduction

Evaluation of design safe life of the elementThe main concept of the paper is to create inspection bolt for the purpose of disassemblies prevention.

Compare of two different old and new technology Hi-Lock fastener and inspection bolt.

As an example we have analysis of connection of the bracket with neighboring elements that have minimum fatigue life margin. The Rib 8 of Aileron Flange connection fatigue analysis have conclusion that connection with minimum service life is located at the bolt №6

2 How to identify most significant element in the structure



Value of σR0 (MPa) for underloaded element connections made of Al-alloys (7050-T7451) for single-row fastening is 177MPa.

Evaluation of design safe life of the element is 40 000 FH.

In advance we consider that bolt 6 would be inspection bolt.

3 Comparisons of two fasteners

In order to prevent subassemblies of the joint we have inspection bolt that can identify fracture effect overlapping with paint.