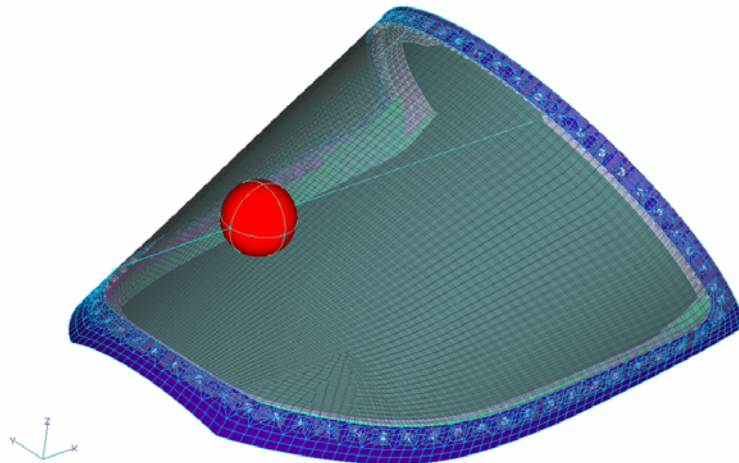


L-39 Windshield Birdstrike Analysis

Problem Description

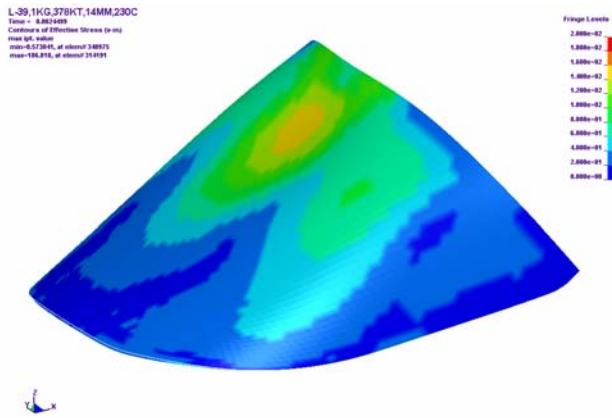
- The BREITLING display team experienced a heavy birdstrike event on the windshield with bird penetration into the cockpit
- The windshield shall be improved to withstand a 2lb bird impact with 378kts relative speed
- The windshield frame shall be maintained or only a limited change shall be implemented



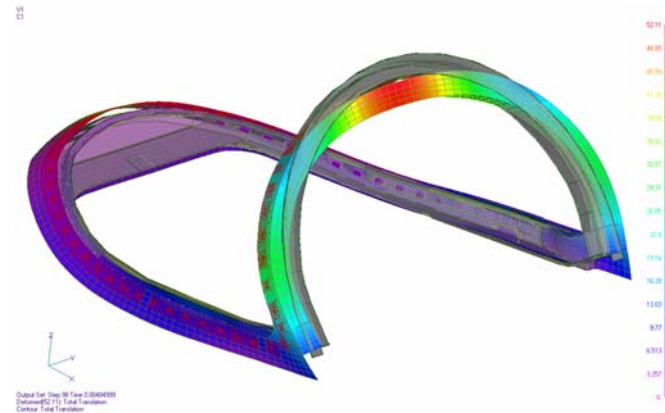
Solution Path

- Development of three different solutions for the design improvement:
 - Solution 1:
Change of the transparency using stretched acrylic instead of cast material with increased thickness
 - Solution 2:
Change of the transparency as for solution 1 and design improvement for the rear bow
 - Solution 3:
Complete windshield redesign
- Numerical analysis of the bird impact event using **LS-DYNA** to study the 3 solutions and to define the design improvement

L-39 Windshield Birdstrike Analysis

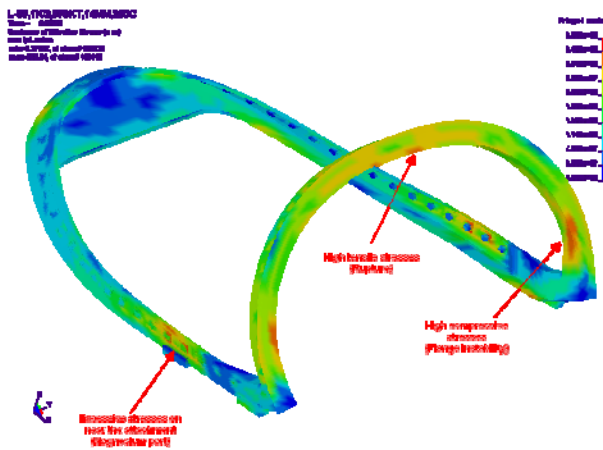


Transparency thickness definition

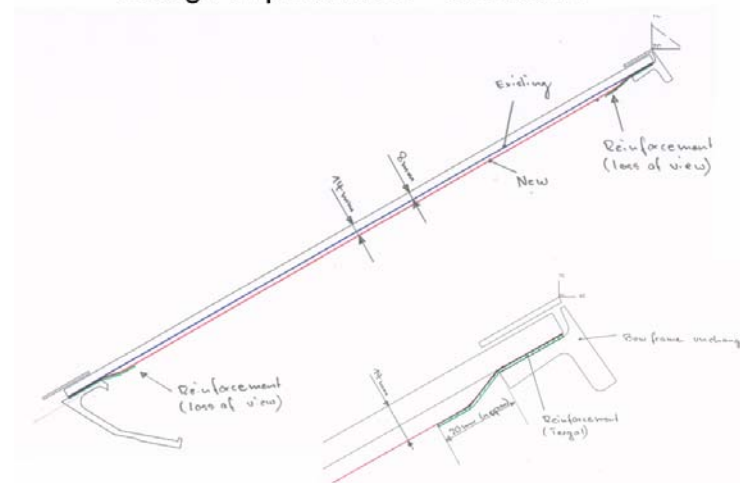


Windshield frame deformation analysis

Design Improvement – Solution 1



Windshield frame stress and plastic strain analysis



Design improvement proposal