

Bishop GmbH – Aeronautical Engineers



Certified



Corporate Member



Engineering Working Group Member



Corporate Member

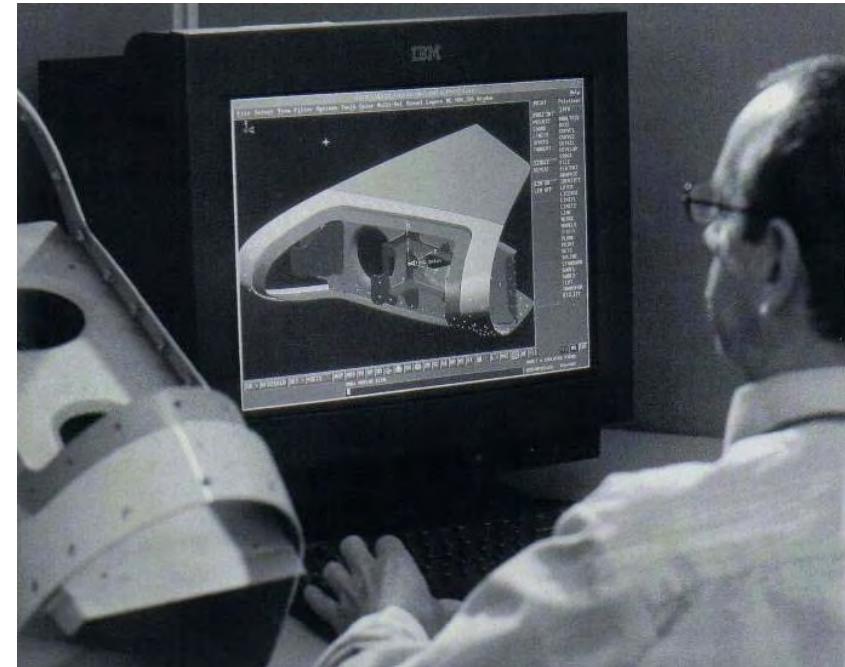


TGA-ZM-07-91-00

Certified

Bishop GmbH – Aeronautical Engineers

- **Aeronautical Engineers**
- **Global Supplier Network of Companies in Europe, the Americas and Asia Pacific region (circa 2000+ Engineers)**
- **Annual sales of circa € 7 M***
- **Employs circa 100 Aeronautical Engineers**
- **Certified DIN EN ISO 9001:2000**
- **Certification EN 9100:2002 in preparation (expected 2nd half / 04)**



*Awaiting 2003 final figures

Specialist Aeronautical Engineering Company

Company Capital

Human Capital

- **Experience**
We have some of the world's greatest international experts in our company.
- **Diversity**
We enjoy a highly diverse mix of English speaking staff (age, race, religion, etc).



**9 employees from
9 different countries:**

Financial Capital

- **€126,700.00**
- **Product liability insured to US\$ 500,000,000.00**

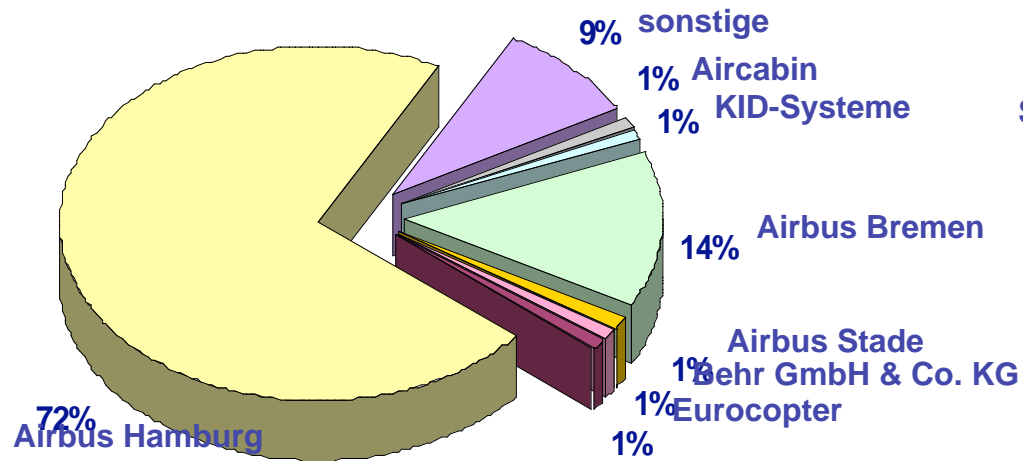
Germany
France
UK (Jersey)
Nepal
Italy

Malaysia
Australia
Spain
Belgium

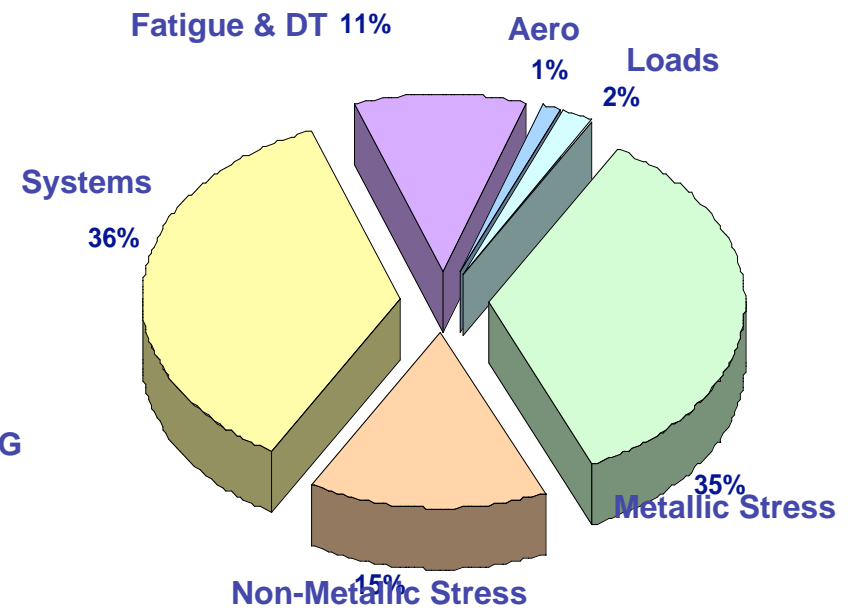
Experience, Commitment, Financial, and Human Capital

BISHOP Services

Customer

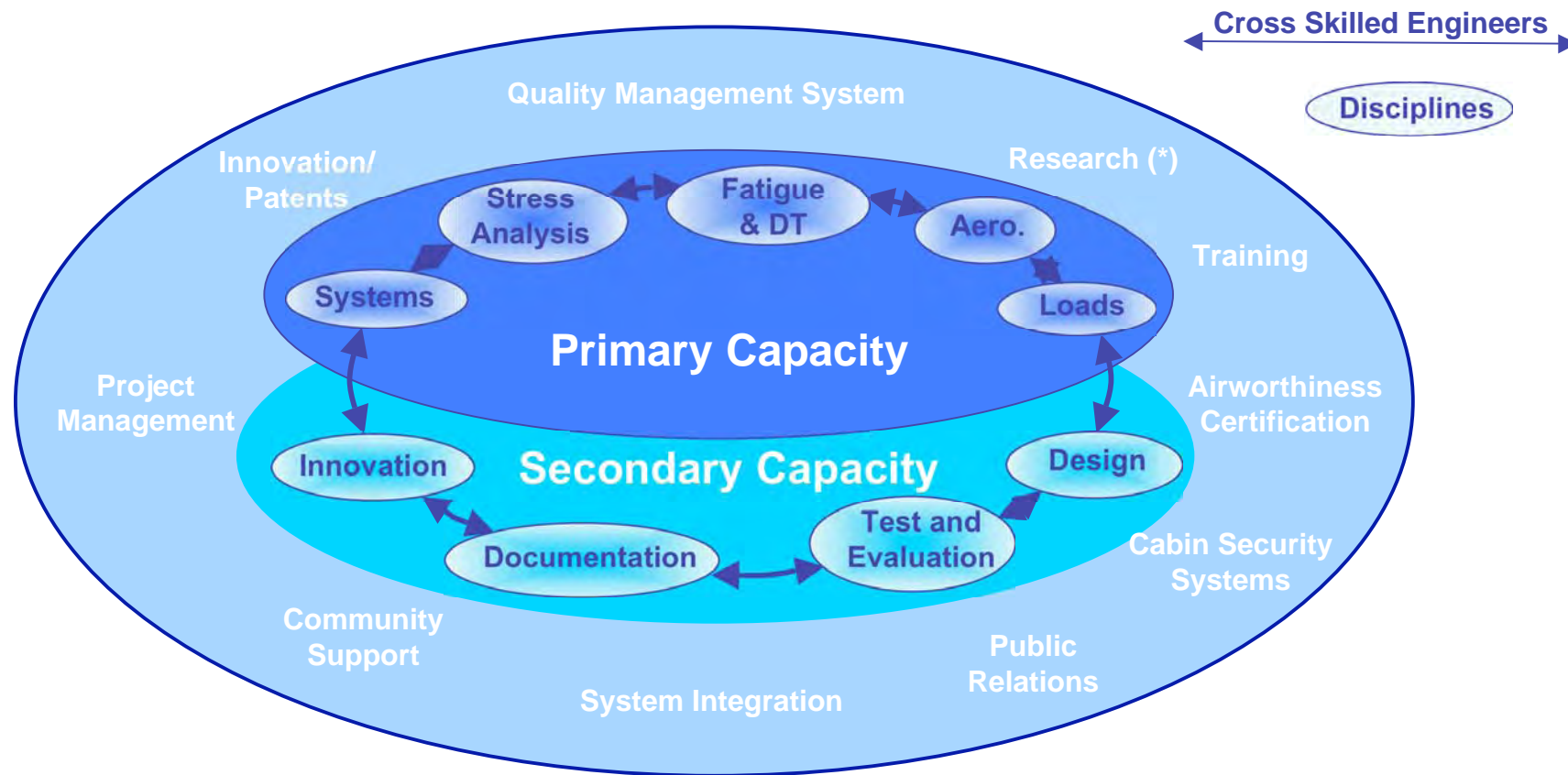


Services



Specialized in Aeronautical Engineering





Primary - Capabilities backed by depth.... in other disciplines

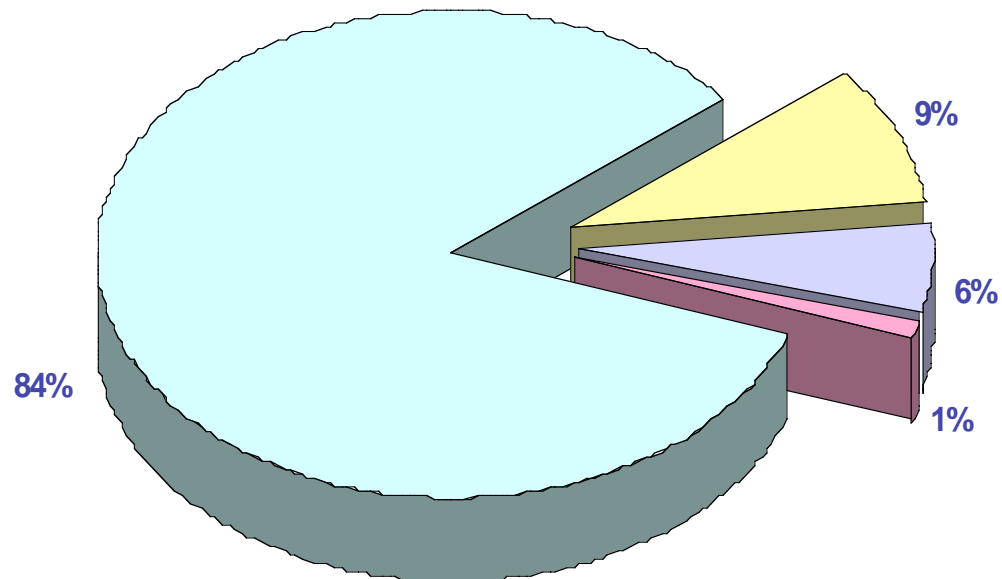


(*) Example Tango, CRC-ACS Composite defect

Synergies from Multi-disciplined Teams

Engineering Staff Qualification

-  Doctor in Engineering
-  Masters Degree in Engineering
-  Professor
-  Dipl. - Ing. / BSc (Eng.) Hons.

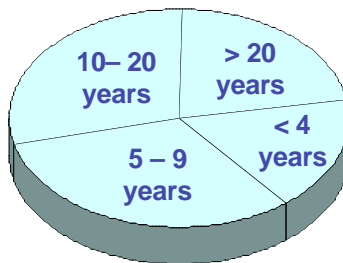


Our Engineers – are qualified

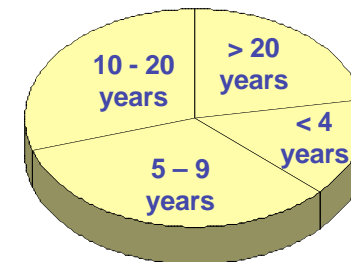
Our people today

Experience

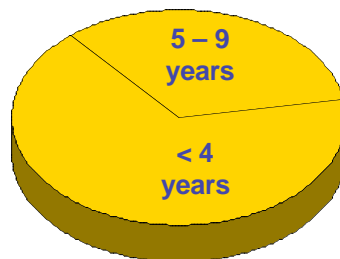
Stress Analysis



Systems







Loads



58%

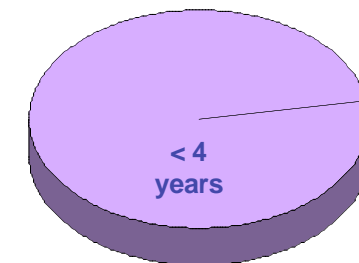
38%

1% 3%

-  Stress Analysis
-  Systems
-  Loads
-  Aerodynamics

(*): Employees Experience

Aerodynamics

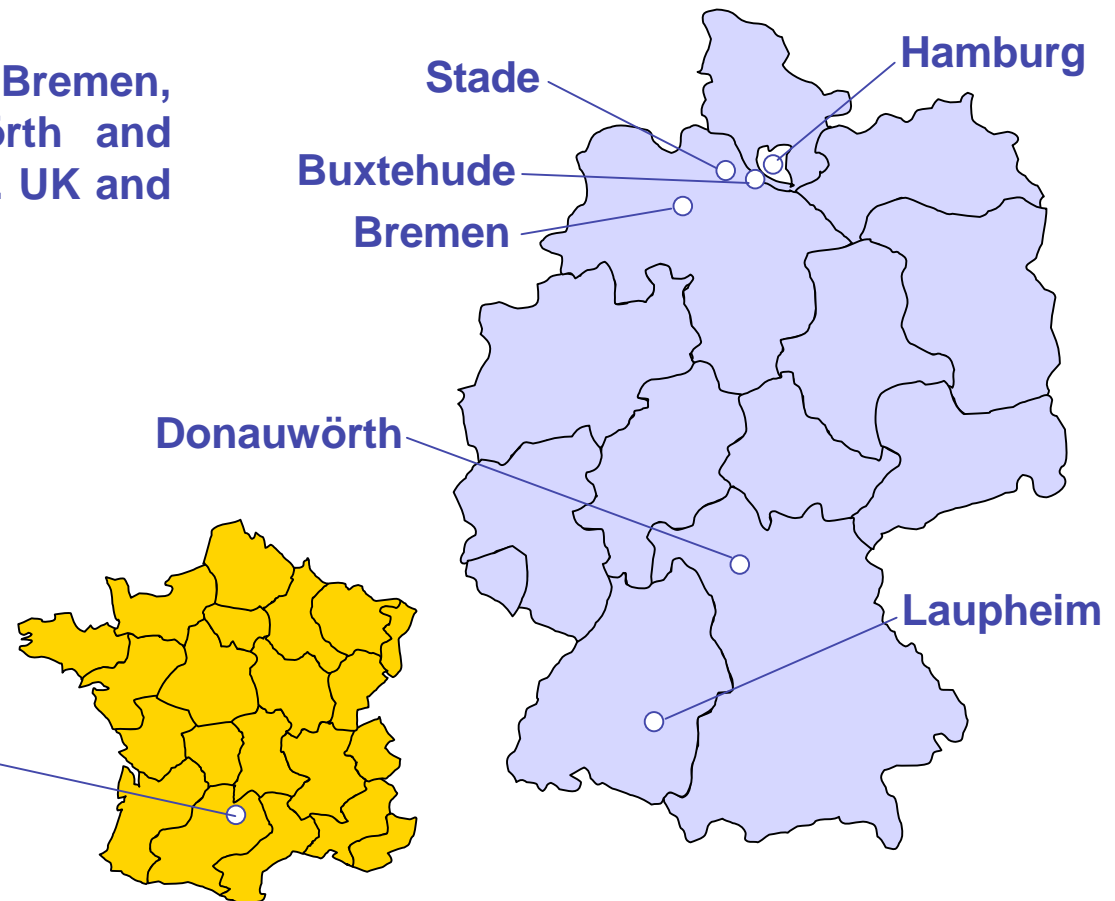


Our Engineers – are experienced

Distribution of BISHOP activities

Activities are at Hamburg, Bremen, Buxtehude, Laupheim, Donauwörth and Toulouse (since September 2002). UK and Spanish activities in preparation.

Our Toulouse office



Transnational distribution of staff

What we doing todaysome examples

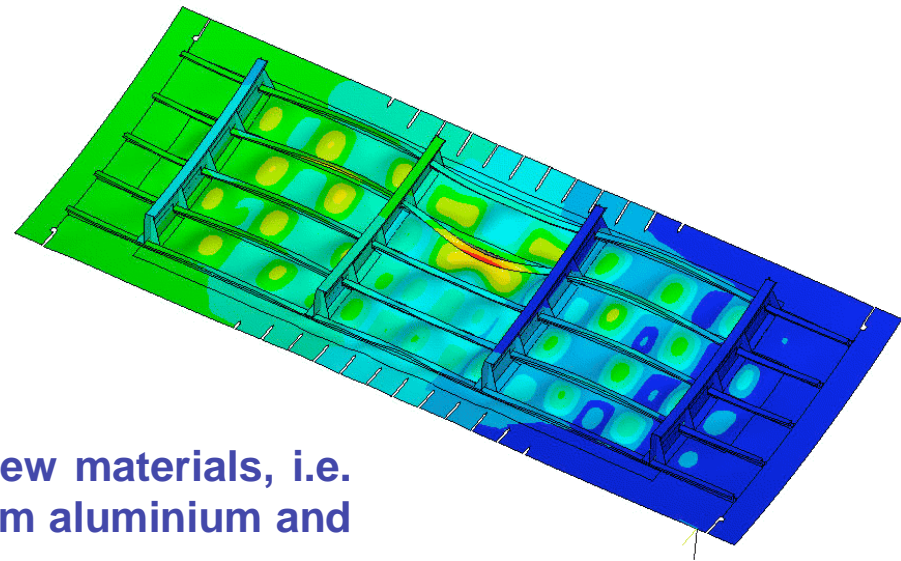
- **Single-aisle & Wide body**
Russian Certification, Stress Reports, ISSY Training, Fatigue & DT, Laser Welded Beam (LWB), Systems etc.
- **A380/A380F & A400M**
FEM, Shell, Floor, Stress Reports, ISSY Quality Control, A380 Barrel, Systems, Optimization of composite Fin Skin/Stringers, PATRAN/NASTRAN, Fatigue & DT, Systems etc.
- **Research Programs**
TANGO, A380 Barrel, GLARE, Composite Defects with CRC-ACS etc.
- **ISSY**
Quality control, code writing, training of Airbus and supplier staff in the application of ISSY on A380 and A400M.

Main Airbus Activities

What we are doing today..... some examples

Fuselage Shell Stress Analysis

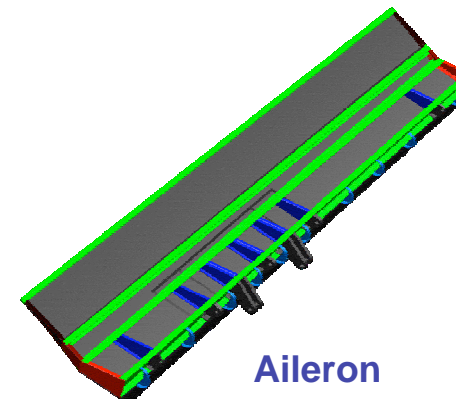
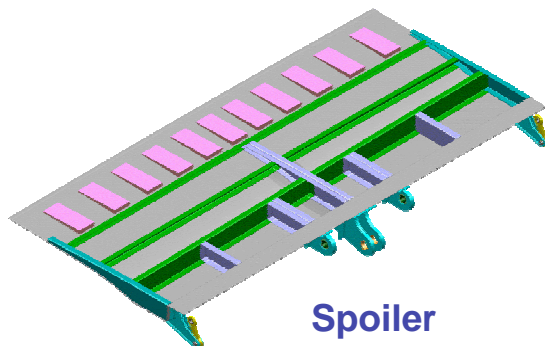
- Adaptation and improvement of an new simulation and calculation tool:
 - “Virtual Test Rig” (ViTAI) for the testing of stiffened curved panels
 - Analysis tool for floor-crossbeams
- Accompanied the new introduction of new materials, i.e. GLARE (a Laminate material build up from aluminium and composite).
- Determination of static allowable stress values
- Analysis and investigation



Saving weight using a “Virtual Test Rig”

Key Competencies Engineering Design with Composites

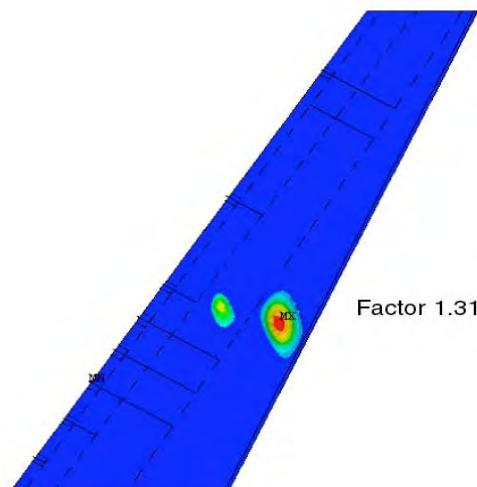
- Ability to apply various FEA techniques for the optimisation and design of composite trailing surfaces
 - Composite lay-up Optimisation (MSC.Nastran)
 - Topology, Buckling, Thickness Optimisation (MSC.Construct and MSC.OptiStruct, ANSYS)
- Detailed design of advanced composite structures to meet aerodynamic, buckling and composite failure requirements



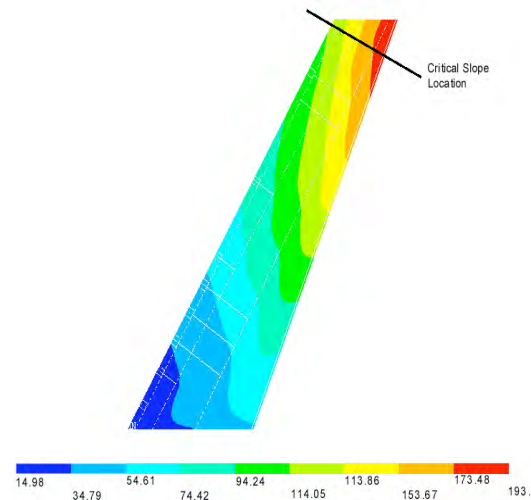
Experienced in all Contemporary Software Analysis Tools

Key Competencies Design Process – Analysis

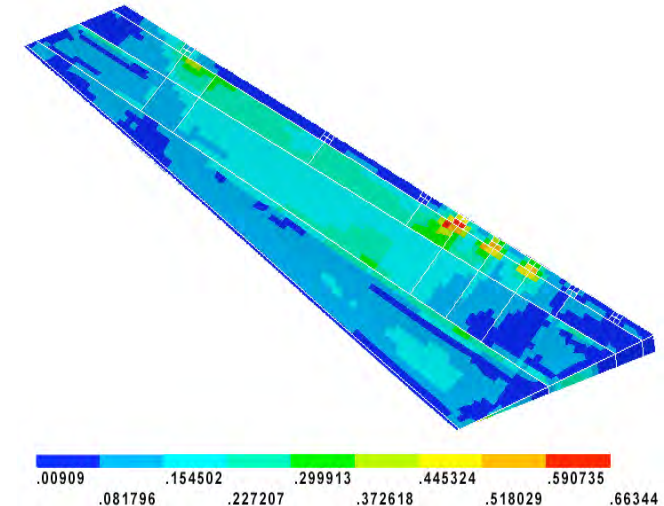
- FE model is updated from the optimization model to include composite material properties and lay-up sequence
 - Static buckling analysis (e.g. at limit load)
 - Surface slope analysis (aerodynamic requirements)
 - Failure analysis (composite strength)



Buckling analysis results



Displacement contour at LL

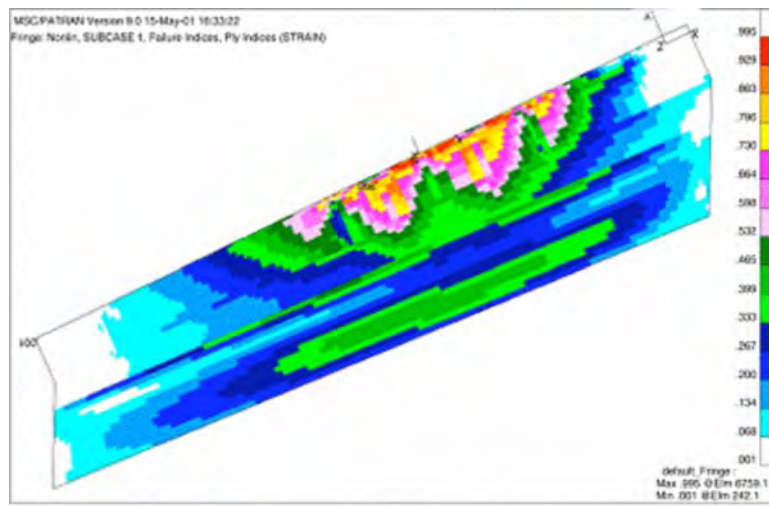


Failure index distribution

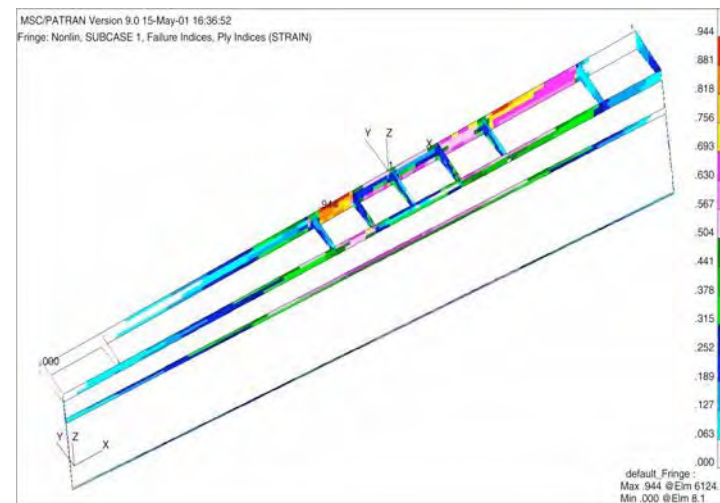
We offer both Design, and Stress Analysis services

Key Competencies Design Process – Failure Analysis

- Non-linear analysis at ultimate load
- Strength criterion plotted for trailing edge skin surfaces and internal structure
- Application of composite failure models and theories to the structure e.g. Tsai-Wu, Tsai-Hill or Maximum Strain



Failure Index on Upper Skin

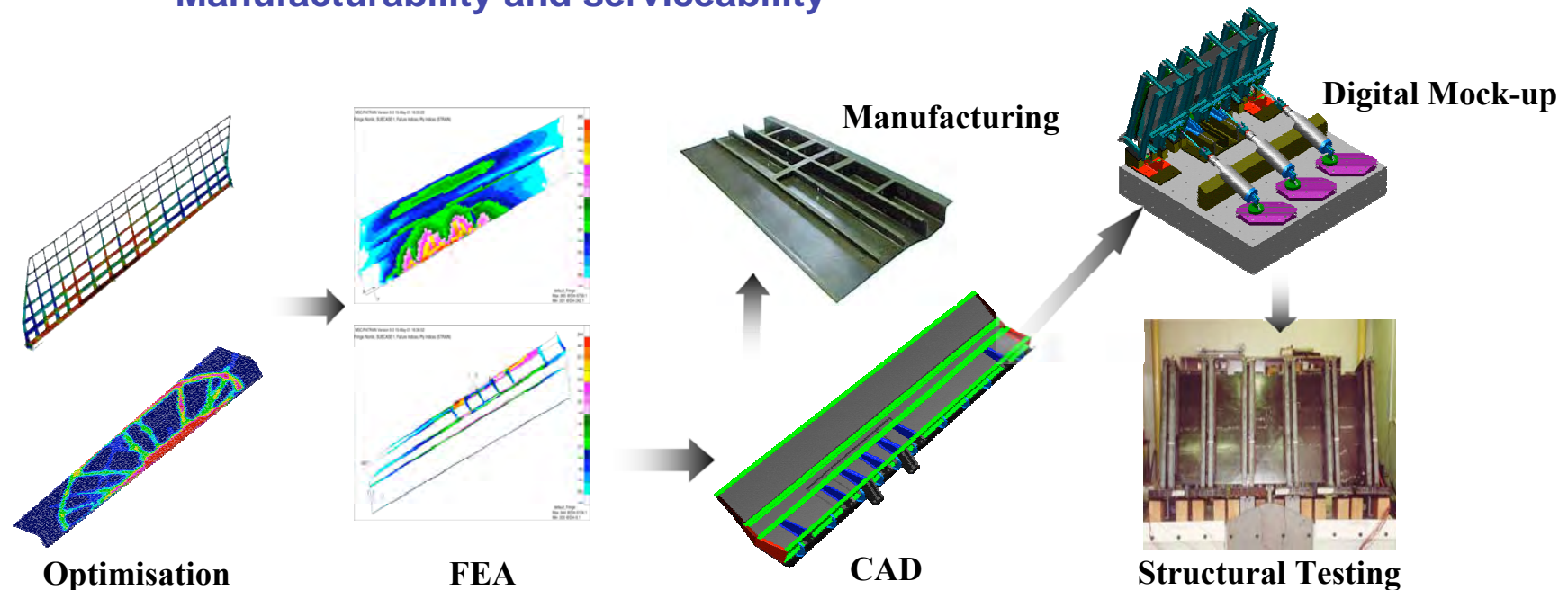


Failure Index on the Ribs and Spars

Specialist Aeronautical Engineering Company

Key Competencies Total Process Design

- **Structural design considerations:**
 - Aerodynamic and design constraints (buckling, strength, surface waviness)
 - Cost and weight drivers
 - Manufacturability and serviceability



Total Process Design – From Conceptual to Structural Validation

New Business Activities Advanced Aircraft Security Systems

Project Management

System Definition

Customer Requirements

- Aircraft Section
- Threat Level
- Add- On / Integrated System

Ballistic Requirements

- Protection Level
- Multihit / Cluster Spec.
- Ballistic Certification

Material Specification

- Costs & Weight
- Processing Properties
- Supplier Selection



Development

Package Studies / Layout

- Digital Mock Up
- Weight Calculations

Design

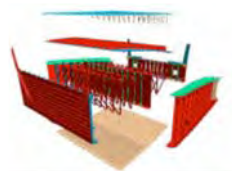
- Ballistic Components
- Structure Reinforcements & Mounting Brackets
- 3D CAD Model & Drawings

Planning

- Production & Installation

Other

- Installation Instructions
- Manuals



Test & Certification

Ballistic Certification

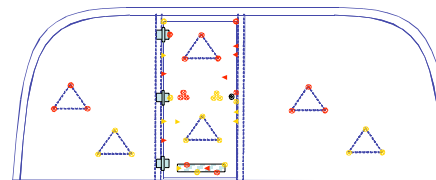
- Full System Certification up to Required Ballistic Standard
- Certification by German Ballistic Laboratories

Structural Analysis

- Stress Analysis
- Fatigue & Damage Tolerance
- Reports

Aviation Requirements

- Flammability
- Decompression
- ...



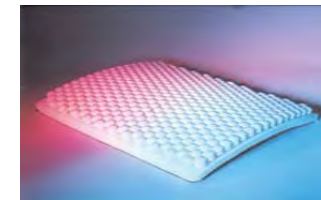
Kit Production

Ballistic Components

- By certified Suppliers

Reinforcements & Brackets

- By certified Suppliers



Protection Kit Delivery

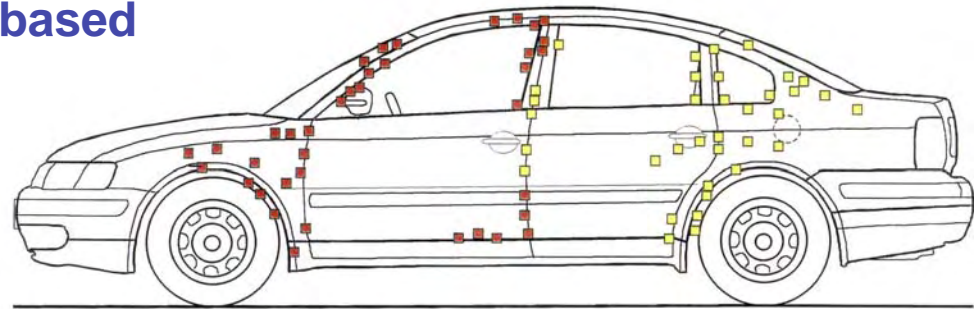
Installation Service Management

Full Service Supply

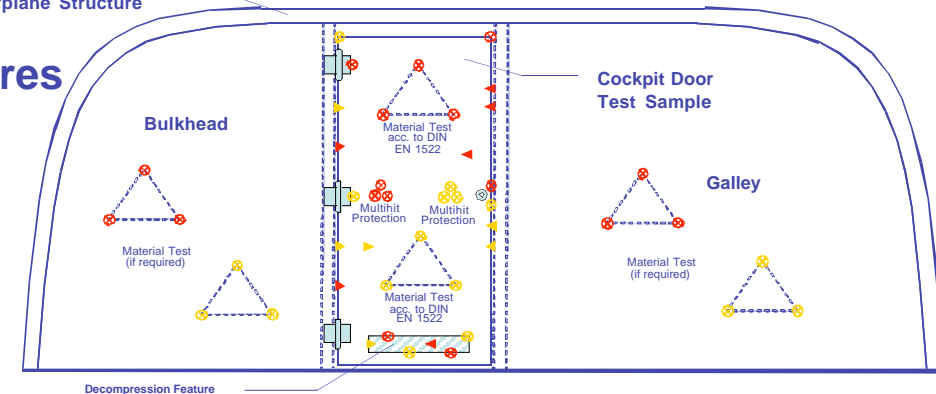
Protection System Design

Aircraft Protection System Design based on Automotive Experiences

- threat level analysis
- ballistic material selection
- framing of lightweight materials
- door gap and overlap area layout
- transfer of automotive test procedures



Representative
Airplane Structure



Learning from the Automotive Industry

Innovations The Flexible Seat Arrangement System FSAS

▪ Flexible Seat Arrangement

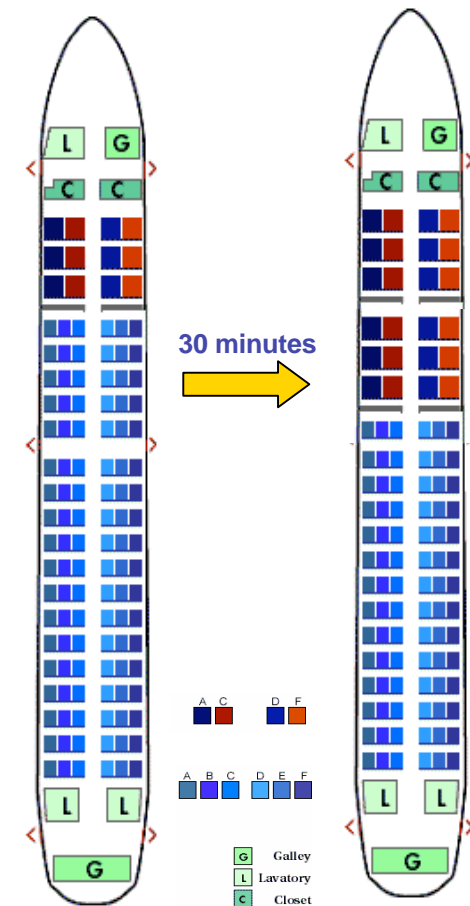
- Adjustment of seat pitch depending on rate of capacity utilization
- offers best comfort for customers
- offers greatest flexibility for airlines

▪ Automation of Seat Adjustment

- by moveable seat rail sledge and positioning control
- automated control of seat to rail locking
- operated by cabin crew via Central Control & Display Unit (time target approx 10 – 15 min.)

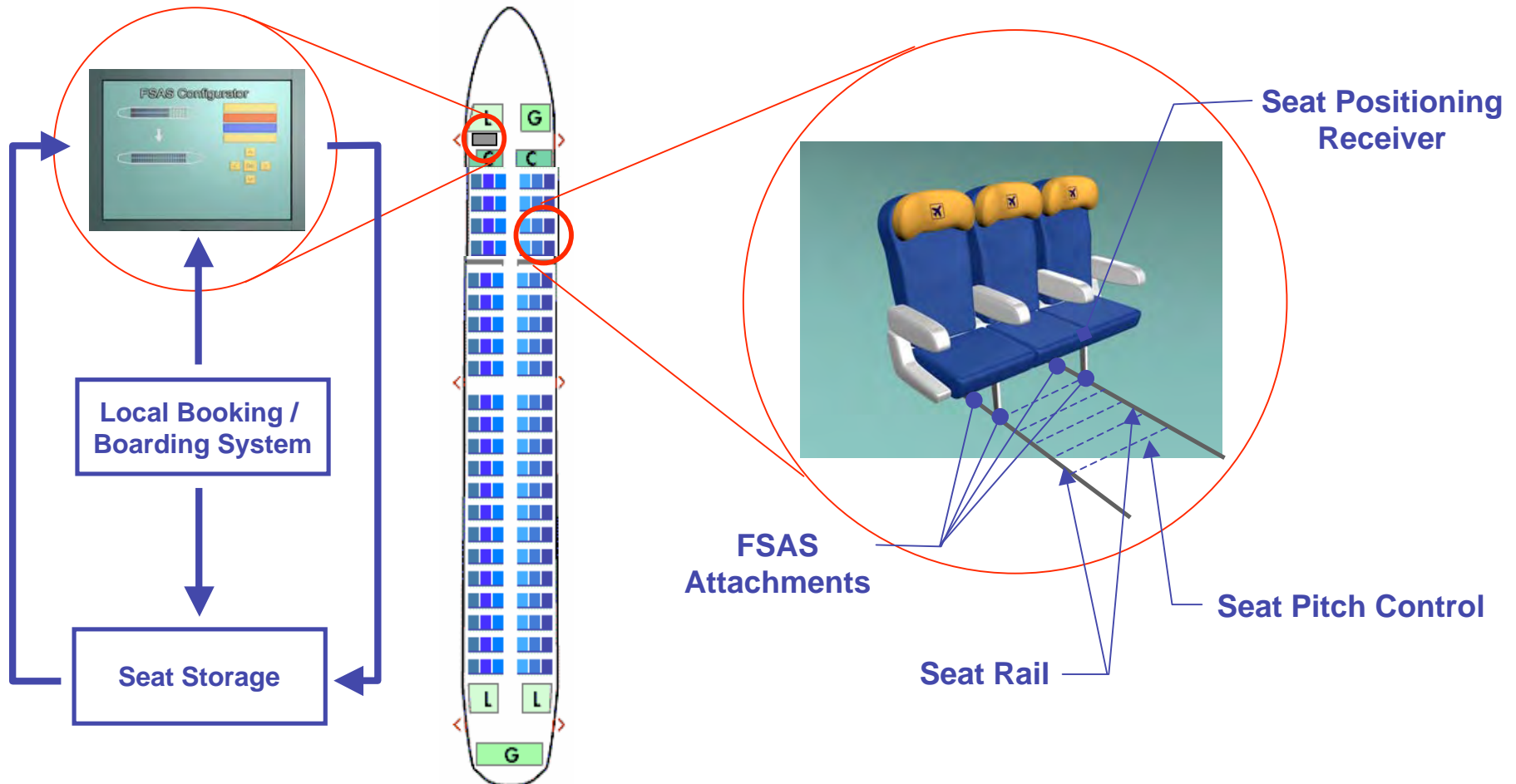
▪ Seat Storage and Change Management

- via Central Planning System with interface to booking / boarding system
- seat storage on main airports
- time target for reconfiguration approx. 30 – 40 min.



Offering new Ideas and Innovations

The FSAS Components



Existing components combined with new Ideas

Exhibitions & Trade Shows

Le Bourget Air Show June 2003



Aircraft Interiors Expo April 2004



Public Relations & Communications

Contact Data

Germany:

Head Office

Bishop GmbH – Aeronautical Engineers
z.Hd. Peter Bishop
Oesterleystraße 3
D-22587 Hamburg
Germany



France:

Bishop - Aeronautical Engineers France

InSitu Centre
Bâtiment Thalès – BP10051
17, Avenue Didier Daurat
31702 Blagnac Cedex
France



Technical Office:

Blankeneser Bahnhofstr. 21-23
D-22587 Hamburg
Germany



Contact:

Tel.: +33 - (0)5 67 31 00 15
Fax.: +33 - (0)5 34 60 50 40

Contact:

Tel.: +49 - (0)40 - 866258-10
Fax.: +49 - (0)40 - 866258-20
Email: bishop.peter@bishop-gmbh.com