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## C4 PROGRESS REPORT II

The Flight Design C4, the advanced, four-place GA aircraft currently in development by Flight Design has seen substantial progress this Spring, culminating in exciting announcements during displays at Sun'n Fun and Aero Friedrichshafen.

### THE FLIGHT DESIGN VISION TOUCH

At Sun'n Fun Flight Design announced the Vision Touch Avionics suite at its annual press-conference with the complete system on display in the C4 interior mock up. The Vision Touch suite is based around the Garmin G3X Touch ® system as PFD and MFD (Primary and Multifunction Displays).

The G3X Touch is a new product offering from Garmin that features both advanced synthetic vision capabilities and a choice of touch screen and conventional button/knob input as well. The inclusion of this system will give C4 owners the greater situational awareness afforded by synthetic vision and the simplicity of operation through the advanced touch screen displays.

**FMI:** <http://www.garmin.com/us/products/intheair/sport-aviation/g3x-touch/>



The Vision Touch suite also includes other super capable equipment such as the Garmin GTN 750 Black ® Nav-Com-GPS system for primary navigation and also as a touch screen input device for entering flight plans, either manually or with a pre-programmed flight plans on an SD card. The convenient positioning of the GTN 750 will allow comfortable inflight data input. Entering a flight plan will automatically populate the information up to the PFD and MFD screens.





Other components include the Garmin GNC 255 Nav-Com as a secondary navigation system and back up radio, the Garmin GMA 350 audio panel and the Garmin GMC 305 autopilot. To top off this impressive list are centrally located RC Allen solid-state digital Directional Gyro, Attitude indicator, full-size airspeed and altimeter.

The Vision Touch avionics suite uses a combination of TSO'd and non-TSO'd components. The certification plan of the Vision Touch installation follows the precedence EASA had established with type-

certification of our CTLS at end of 2013. The use of this system requires analysis of the airframe level architecture in a different way in the certification process than for a TSO qualified system. The system will make use of two completely independent air data sources for all functions: Total pressure, static pressure, angle of attack sensing along with separate redundant electrical busses. The resulting additional redundancy can be of a higher level than for a simple TSO qualified system.

When flying at night or in IMC, additional precautions have to be provided. This is achieved by adding standard TSO approved instrumentation as a backup. To ensure that the TSO qualified information is available for the pilot, these instruments are located in plain sight and high up on the panel. This is the reason for the arrangement having the backup analogs in the center stack right on top. The careful choice of avionics allows for a significantly lower price point and much higher flexibility for future system enhancements and upgrades. With this selection of a major cost driver for an aircraft of this class, Flight Design has taken another major step to confirm the anticipated price tag of the C4.

## THE CONTINENTAL IO-360AF

An update from Michael Gifford of Continental Motors at Aero Friedrichshafen was that the IO-360AF 180 HP Alternate-Fuels capable engine is progressing towards FAA Part 33 certification, which is expected in August 2014. The IO-360AF will be one of the standard versions available under the engine's FAA type certificate. "We are very pleased with the cooperation we have gotten from Continental Motors on the C4 project" said Flight Design President Matthias Betsch. They have been proactive in the C4 design process and we look forward to expanding our cooperation for the Diesel powered version of the C4 in the future."



## SAFETY BOX PROGRAM

Another interesting development involving the C4 is the advanced occupant protection research and testing using the C4 as the first example. This program is called the "Safety Box".

The Safety Box program made its public debut at the Aero Friedrichshafen convention held in April. The German Ministry of Economic Affairs granted funding for a research project that aims at development of a modular "Safety Box" cabin safety system for light aircraft. The new system will provide a safety cage around the occupants of an aircraft, whose functionality builds upon several concepts, namely intelligently designed and located crash absorbing components, a stiff cabin structure with dedicated load paths for the majority of crash scenarios, advanced seat installation and restraint systems. This is significantly supported by optimized cabin ergonomic designs and enhanced fire protection concepts.

The concept goes significantly beyond current aircraft designs, where the certification requirements only ask for consideration of accelerations to the seat and restraint system, regardless of the capability and level of energy absorption of the surrounding fuselage cell. With the new approach selected in this research program, the Safety Box project team is optimizing the interaction of all the available elements early in the design phase of an aircraft. This will lead to a system of modular design elements that subsequently can be tailored to multiple applications in various aircraft designs. With this, the Safety Box team is leading a path that is fully in line with the intentions of the current FAA Part 23 re-write activity which is jointly driven by all major aviation authorities, aircraft industry and aircraft users.




**SAFETY-BOX INTERIOR DESIGN**

THE NEW SAFETY STANDARD OF A SAFETY-BOX HAS TO COME ALONG WITH A HIGH-CLASS INTERIOR AND ENGINEERING-DESIGN AS A CENTRAL FACTOR IN TERMS OF PASSENGER-FRIENDLY FLIGHT AND OPERATING REQUIRES.

ALONG THE OPTIMIZATION OF VIEW-FIELD, CONTROL, PANEL AND ASPECTS OF HUMAN FACTORS, THE COMPLETE WORKSPACE OF THE PILOTS HAS TO BE CONSIDERED BY AN INTEGRAL DESIGN STUDIO-HAMBERG/LINDE.

FOR MORE INFORMATION VISIT [WWW.IDS-HAMBURG.DE](http://WWW.IDS-HAMBURG.DE)






**OUR KNOW-HOW**


THE DEPARTMENT OF AERONAUTICAL AND AUTOMOTIVE ENGINEERING FROM HAWAIIAN UNIVERSITY OF APPLIED SCIENCES PERFORMS CAE SIMULATIONS BASED ON FINITE-ELEMENT AND UNIT CONFORMANCE FROM LIGHTWEIGHT DESIGN WITH MODERN MATERIALS.

STATIC AND DYNAMIC FINITE ELEMENT ANALYSES ARE CARRIED OUT FOR PREDICTION OF COMPONENT BEHAVIOUR AND OPTIMIZATION REGARDING ENERGY ABSORPTION.

FOR MORE INFORMATION VISIT [WWW.IDS-HAMBURG.DE](http://WWW.IDS-HAMBURG.DE)



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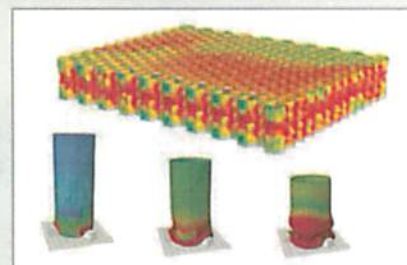
**INNOVATIVE STRUCTURE AND SYSTEMS**

BY MEANS OF A FLEXIBLE INTEGRATION OF NEW IT STRUCTURES, THERE IS A NEED FOR A NEW ARRANGEMENT AND INTEGRATION OF SYSTEM MODULES FOR A BETTER COORDINATION AND COMMUNICATION.

IN CASE OF USING A COMPUTER-AIDED FLIGHT CONTROL, NOT BY WORD, THERE IS THE CHANCE OF A FURTHER WEIGHT REDUCTION BY LOWERING WEIGHT RESERVE AND MECHANICAL STRESS.

THIS HAS DEFINITELY A POSITIVE INFLUENCE FOR THE ACTIVE AND PASSIVE SAFETY.


FOR MORE INFORMATION VISIT [WWW.IDS-HAMBURG.DE](http://WWW.IDS-HAMBURG.DE)

**OUR CONTRIBUTION**

- DEFINITION OF POSSIBLE CRASH SCENARIOS
- ANALYSIS OF STRUCTURAL LOAD-BEARING
- STATIC AND DYNAMIC ANALYSIS OF THE COMPLETE AIRFRAME
- DETAILED SIMULATION OF CRASH-ABSORBING ELEMENTS AND THEIR INTEGRATION INTO THE AIRFRAME

FOR MORE INFORMATION VISIT [WWW.IDS-HAMBURG.DE](http://WWW.IDS-HAMBURG.DE)



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**IDS HAMBURG**

A PHYSICAL ENVIRONMENTAL TEST OF A SEAT SUPPORTS THE DEVELOPING PROCESS. BEYOND BEING TO THE SEAT DEVELOPMENT FOR A BETTER COORDINATION OF DESIGN, STRUCTURE AND THE PARTNERING DEVELOPING PARTNER.

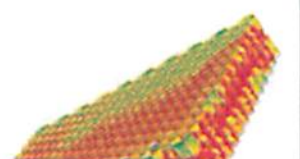
THE ADVANTAGES OF THE DEVELOPING PARTNER, NOT ONLY TESTS AND EVALUATION OF PROTOTYPES, BUT ALSO SUPPORTS IN THE DESIGN AND REALIZATION OF THE FINISHED AND SUPPLY OF THE DEVELOPMENT.



**OUR GOALS**

WE SET OUR FIRST PRIORITY IN IMPROVING OVERALL PASSENGER'S SAFETY BY USING OUR KNOW-HOW FROM THE AUTOMOTIVE INDUSTRY. A DESIGN GOALS ARE TO BE DEVELOPED FOR CRASH-SPROVED LIGHT AIRCRAFT.

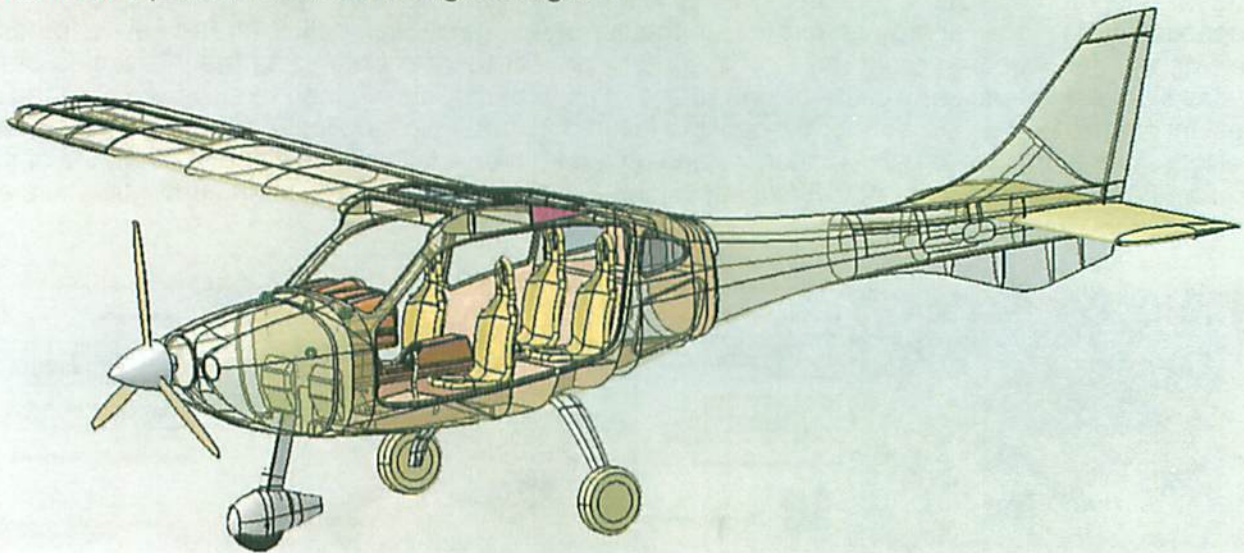
IN ORDER TO ACHIEVE THAT FLIGHT DESIGNERS CAN BE SEEN AS AN IMPROVED STOPPING STONE FOR THE INTRODUCTION OF INNOVATIVE CONCEPTS IN CRASH ABSORPTION.




The Safety Box project team has selected Flight Design's new C4 aircraft as the first aircraft for the application of the system. Development times of the Safety Box system match naturally with the development times of the C4 project. The full development will culminate in full scale testing of a completed aircraft under controlled conditions in 2015, to validate the superior suitability of the new system. The system is designed as modular system and will be offered to other aircraft manufacturers on the market, application is not limited to Flight Design products.

### C4 PROOF OF CONCEPT

The C4 Proof of Concept flight test prototype is being final assembled looking towards its first flight expected this summer in Kamenz Germany. Flight Design made the decision early on to build more than one airframe for the proof of concept stage of development. This allows a higher level of structural testing of the design without the potential of damaging the flight test airframe. The proof of concept prototype will undergo numerous ground tests including ground vibration testing (GVT) from an independent consultant engineering firm.



Flight testing of the C4 will be performed by an FAA approved Swiss test pilot, Damian Hischier. Damian did the certification flight testing for the EASA certified version of the CTLS and is a graduate of the National Test Pilot School (NTPS) located at Mojave, CA.

### C4 CONFORMING MODEL

Design work continues with the staff of Flight Design engineers to complete the design of the conforming C4 with the expectation to achieve certification early in 2015. A conforming model of an aircraft is one that is used to show compliance to EASA or the FAA. Work on production specification molds has started and expert consultants from Germany and the USA have been participating in the design review process to optimize the C4 design for performance, stability and control.

