# Press Information

First-place in the category “Green” at the prestige Innovation Awards 2014

## Johnson Controls achieves 40% lighter seats through use of multi-material systems in the CAMISMA lightweight project

***Burscheid, Germany – 1 December 2014.*** *Johnson Controls, a global, multi-industry company, received this year’s CLEPA Innovation Award in the category “Green” for its cutting-edge work in the CAMISMA research project. Together with project partners from industry and science, the Johnson Controls team, working with a newly developed seat structure, succeeded in drastically reducing the use of steel and light alloys by replacing them with multi-material systems. With equivalent performance in terms of safety, the CAMISMA seats are more than 40% lighter than conventionally manufactured seat structures made of metal and can be produced at attractive costs. Johnson Controls has now manufactured and successfully tested the first functional prototypes under conditions similar to those in series production.*

In presenting the prestige Innovations Awards in Brussels on October 8 2014, the top-class international jury, comprising representatives from the German magazine “Automobil Produktion”, the supplier’s association CLEPA (European Association of Automotive Suppliers), and the VDA (German Automotive Industry Association), cited 11 winners in three categories. In the category “Green”, the jury praised the work of Johnson Controls in the research project CAMISMA as an “outstanding, future-oriented solution for sustainable $CO_2$ reduction”.

“Lightweight technologies, which save resources, reduce energy consumption, and lower pollutant emissions, are in greater demand than ever in the automotive industry. We are making great investments in working with new materials, skills, and manufacturing processes, in order to give our customers the best-possible support with innovative seating products,” said Andreas Eppinger, group vice president technology management at Johnson Controls Automotive Experience.

With the CAMISMA project (Carbon-Amide-Metal-based Interior Structure using a Multi-material system Approach), which was subsidized by the German Federal Ministry of Education and Research, the project partners Johnson Controls,

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Evonik Industries, HBW Gubesch, Toho Tenax Europe, and RWTH Aachen University, have been pursuing a holistic solution approach since 2011: “With CAMISMA, our goal is to create cost-efficient, sustainable access to carbon-fiber-based materials systems,” said Eppinger. “The recognition of our research work through the Innovation Award ‘Green’ is wonderful confirmation for our tremendous team effort and our results!”

The carbon materials group (CFRP) offers outstanding characteristics, such as great strength and design flexibility; however, is still too expensive for large-scale series use in vehicle production. Due to high costs for the source materials and the expensive, time-intensive manufacturing processes, carbon-fiber components cannot compete with present metal-forming methods.

“Moreover, until now, there haven’t been any satisfactory solutions for integrating metal parts, such as seat adjusters, which have to be strongly attached to the seat structure,” said Axel Koever, manager new technologies technology & advanced development at Johnson Controls Automotive Seating. “We have made great strides in both of these areas."

Immediately following the start of the project in 2011, the focus was on development of the multi-material system. The team worked with four different components: steel and fiberglass-reinforced plastic (FRP), as well as innovative carbon fiber non-woven and thermoplastic tapes made of carbon filaments.

The four materials are combined in a complex, multilayer structure: In a thermoplastic forming process, which was also newly developed, carbon fiber is used to produce the basic form of the seat. Carbon filaments reinforce defined zones within the structure in order to provide the required strength, as does the FRP injection-molded rib structure. In addition, fasteners for the foam, seat covers, and safety devices such as airbags, are integrated into the rib-shaped FRP parts. Specially layered steel adapter components, which are first inserted into the tool and over molded, are used to mount the two seat adjusters. The adjustment mechanisms are then fastened to the seat in a separate work stage by means of laser welds.

The subsequent project stages are focused on three tasks in simultaneous processes: the manufacture of the two carbon-based materials using production

equipment specially built for CAMISMA by project partner Evonik, the optimization of the positions of the material layers through virtual statistical and dynamic stress tests, and finally the production of the initial seat prototypes.

In September 2014, the project team reached a key milestone: The results of an initial physical crash test, which was designed to simulate a rear impact, demonstrated that the seat prototype satisfied the strength requirements. For the test, the CAMISMA seat prototype was attached to a conventional seat sub-structure. A current seat with a metal structure from large-scale series production, including the relevant strength values served as a reference for the team. “We were able to confirm our virtual dynamic stress tests with the results from the physical test – a success that underlines our development skills and makes us optimistic about the remainder of the project,” said Koever.

The advantages of this cost-optimized lightweight structure are obvious: According to the current project status, CAMISMA seats are more than 40% lighter than conventional seats made of metal. Through maximum functional integration, the manufacturing steps required in assembly are also substantially reduced through the number of attachment parts needed (from 12 to one, compared with the reference seat), which in turn compensates some of the additional cost.

An innovative industrial manufacturing process, whose volume can be estimated at about 200,000 units per production line and year, now for the first time allows the highly concentrated, efficient use of carbon fiber, which in the non woven is planned to be mainly composed of recycled raw materials. Going forward, an attempt will be made to cover the visible surfaces of CAMISMA seats during the production process and thus to enable attractive design and differentiation possibilities in the interior. According to current planning, the product should be available to customers in 2019 models.

The CAMISMA research project, with which Johnson Controls once again underlines its leading position in the area of seating technology, will run until the spring of 2015.

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**About Johnson Controls Automotive Experience**

Johnson Controls Automotive Experience is a global leader in automotive seating, overhead systems, floor consoles, door panels and instrument panels. The company supports all major automakers in the differentiation of their vehicles through its products, technologies and advanced manufacturing capabilities. With more than 220 plants worldwide, Johnson Controls is where its customers need it to be. Consumers have enjoyed the comfort and style of Johnson Controls products, from single components to complete interiors. With its global capability the company supplies more than 50 million cars per year.