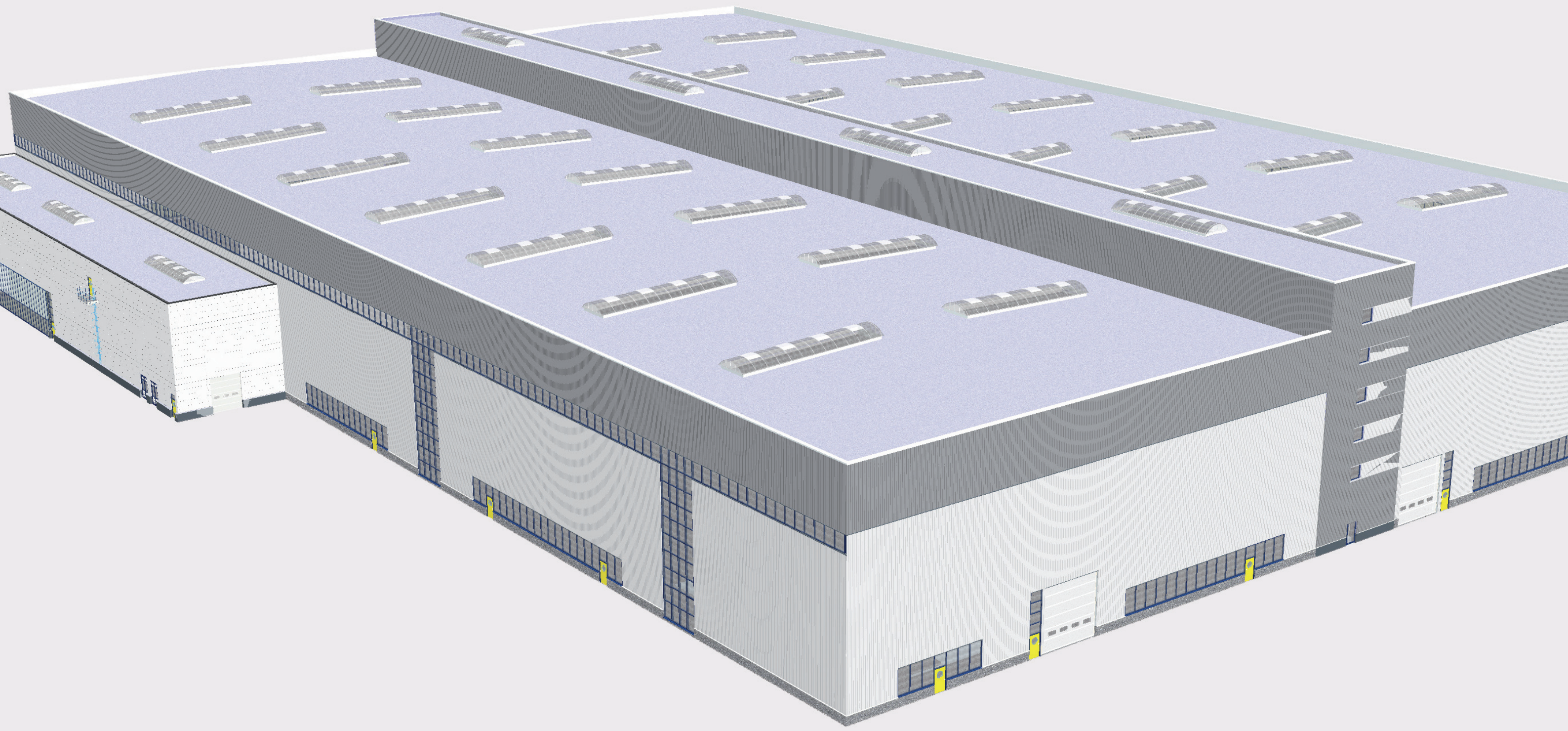


Airbus Production Hall, Stade/Germany

SHI Planungsgesellschaft mbH, Oldenburg/Germany

Built from the outside in

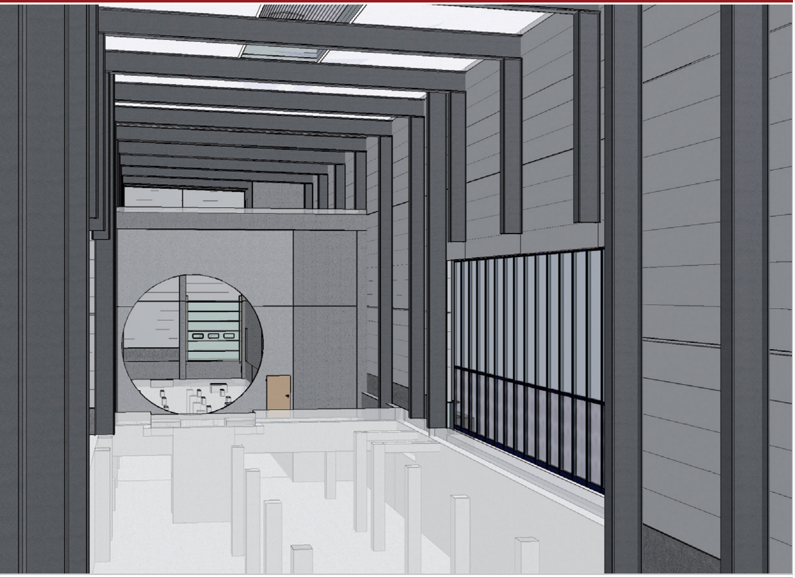
The maiden flight of the Airbus A350 is scheduled for 2012: like a jigsaw, this wide-bodied aircraft is made up of numerous parts. In Stade, in the state of Lower Saxony in Germany, a portion of the fuselage is currently being built in a production hall which was designed using Allplan.

The various parts of the aircraft are being prefabricated in different locations across Europe to then be assembled in the delivery center in Toulouse, France. In Stade, SHI Planungsgesellschaft mbH (SHI) the Oldenburg-based urban planning, structural and civil engineering company built a modern production hall for a single aircraft component - a 17 meter long, 4 meter wide fuselage shell. The company used the CAD platform Allplan, installed on 25 workstations, to design the hall. Established in 1976, the general planning office now employs 55 members of staff, of which 30 are architects. The team also includes civil engineers, environmental engineers, technical designers and technicians. Whether it is transport facilities, industrial buildings or environmental protection concepts, SHI provides everything from basic assessment right through to construction management - all from a single source.

Parallel design

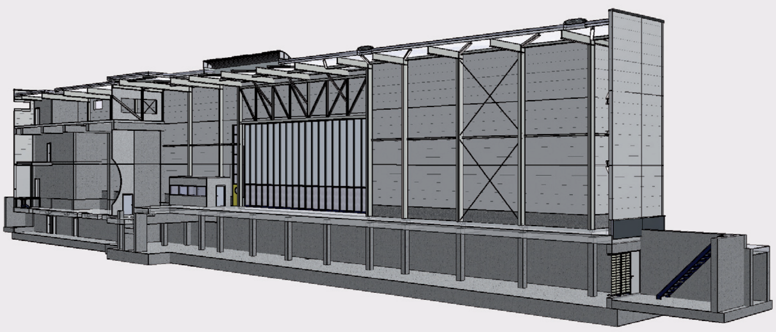
The Oldenburg-based designers are experts in their field: SHI has been working for aircraft manufacturer Airbus for ten years now. Together they have built nine production halls for aircraft components. The designers began working on the production hall in Stade at the end of 2008. It took approximately nine months to create the building shell, before they continued on with further design work. „We work from the outside in, so to speak, while the client is still busy developing the aircraft components,“ explains Axel Wilken, one of the SHI architects responsible for this project. The aircraft is developed in parallel to the production hall – and vice versa. Hence the designers have to be able to design and react with the greatest flexibility. „A production facility for aircraft components is not just a hall with four walls and a roof. It has to be modular in structure in order to allow expansion at any time,“ adds Mr. Wilken.

The completed building in Stade is now a two-bay hall, 120 meters wide. In the central aisle, there are five reinforced concrete towers that serve to brace the hall and create openings to the office, social and technical areas. To exploit as many synergies as possible, stairways and riser shafts are also installed in this area. The second and third floors contain offices and social rooms. They form a bridge between the towers, thereby creating the hall‘s special architectural feature. Large overhead lighting strips in the roof area provide plenty of light for the bays and long bands of windows give the internal office space an airy and bright feel. The third floor houses the building services for the offices and social rooms while the fourth houses those for the hall, including supply and return air as well as heat recovery equipment. „Compared with a normal factory hall, the requirements for cooling, compressed air and electricity are very high,“ emphasizes Mr. Wilken. For example, CFRP components have to be hardened under pressure and heat in a large oven known as an autoclave. The A350 is one of the first aircraft to be almost entirely manufactured from such carbon fiber composite components. Such innovative technology, however, makes supplying the required machinery a complex affair. „Because the machinery gives off a lot of heat during production, meeting the required Airbus internal climatic conditions is very energy-intensive,“ explains Mr. Wilken. To make sure no energy is lost, the waste heat is recovered and re-used in the next process. Not only does this method optimize energy resources, it also lowers the operating costs. In these days of increasing energy and maintenance costs for buildings, this is a significant advantage for the building client. In addition to the sustainability requirements, the design company also had to overcome a number of logistical hurdles during construction of the hall. For example, a crane and a shuttle system had to be fitted in the hall in order to handle large components. The 28,000 square meter hall floor is also the production area. To ensure the entire floor area could be used, the hall foundation areas were reduced to a minimum. The hall building is supported from underneath with 160 piles – each one bearing up to 100 tons. Production on a large scale: approximately 20 different machines are used to manufacture the fuselage shells. Individual, complex foundations had to be designed and constructed for every single machine.



Technology is the key

The new Airbus A350 XWB (Extra Wide Body) passenger jet will carry up to 350 passengers over distances of up to 15,000 kilometers. The wide-bodied aircraft is capable of traveling at 917 kilometers an hour and has a fuselage diameter of 5.97 meters. The aircraft is designed for long haul flights and is equipped with the latest technology. This includes new fuselage panels made from carbon fiber reinforced plastic (CFRP), which are easier to maintain and offer greater weight savings. The special requirements that have to be met with respect to the high fuel prices, rising passenger expectations and stricter environmental regulations in this market segment were all taken into account during the design stage for this new family of aircraft. The maiden flight of the A350 is scheduled for 2012 and the first deliveries will be made in 2013.



Consistent method of working

For professional implementation of their designs, the SHI team relied throughout on object-oriented work in 3D. „From the outset, Allplan provides us with a transparent design system capable of supporting us through even the most complex tasks. It is not without good reason that we have been using this software for 15 years,“ explains Mr. Wilken. The designers create a three-dimensional model right at the start of the design process. 2D is only used for preliminary drafts and small details. The advantages of the object-oriented working method are obvious: three-dimensional building models make it possible to quickly and reliably execute difficult designs that would otherwise require a huge amount of time. Based on the design data entered just once in the model, all relevant types of plans can be derived at the click of a button. The software automatically transfers any changes to all the plans and lists. In addition, the 3D view provides optimal design control. „We divided the building into several areas and horizontally sliced it so that numerous members of staff could work on the building model simultaneously,“ explains Mr. Wilken. To achieve uniform management and organization of the project data, drawings and plans, SHI uses the Workgroup Manager from Allplan. This guarantees a smooth workflow within the design team. Hence during peak periods, 12 designers can simultaneously access the project from any workstation. This parallel working within the team offers numerous advantages for SHI: the architects and engineers work together to develop the design services on an interdisciplinary basis. This means all participants are always kept in the picture with respect to the current design status. All working drawings are derived directly from the building model, thus avoiding discrepancies between the design and implementation plans. „We can constantly keep track of all the data in one central location, which saves us from the error-prone and time-consuming task of maintaining parallel sets of data,“ explains Mr. Wilken.

For optimal data exchange between the design partners, SHI uses the Allplan interfaces, which enable consistent data transfer. „Allplan allows genuinely consistent networking with all those involved in the construction process. It's as if we had our external partners with us in the office,“ explains Mr. Wilken.