“In the Autodesk Inventor solution, we appreciate the quality implementation. As compared with our previous system CATIA, we benefit from better functionality, generally lower operating costs and the substantial popularity of this product in the institutions of higher learning in the Czech Republic.”

— Martin Vlček, Head of Technical Department, Traction Engines Division, ŠKODA ELECTRIC a.s. 

Digital Prototyping enables ŠKODA ELECTRIC to shorten delivery time for its electric engines
Concrete project

As its newest product, ŠKODA TRANSPORTATION, the parent company ŠKODA ELECTRIC, introduced the ŠKODA RegioPanter single deck unit, for which ŠKODA ELECTRIC developed a traction engine in the Autodesk Inventor environment. The ML 3942 K/4 traction engine is a four position open asynchronous traction engine with a short-circuit armature. The engine is intended for individual drive of the wheelset of the type 7Ev suburban electric unit. The engine uses external ventilation via the air-duct of a ventilation unit located on the bogey frame.

The traction engine is designed for mounting in the bogey of the railway vehicle and is mounted firmly in the bogey frame on bases. To transfer the torque to the axle the engine has a tapered one-sided shaft on which a tooth gear is fitted upon assembly of the engine on the bogey, which is connected on the other end to the suspended gearbox. The engine is exposed to various external elements, such as dust, sand, small stones, parts of the electric line, water, salt, or snow. It is further exposed to vibrations in the vertical, horizontal and axial directions.

Development of this engine started at end of 2009, and its prototypes were delivered in the course of 2011; the first series units were delivered at the end of 2011. The biggest emphasis in its development was placed on major reduction of the engine-noise level. This was achieved by means of a suitable design reducing the acoustics output by 10-15 decibels.

Benefits of Autodesk Inventor

Digital prototypes made in Autodesk Inventor were used to design the engine. The 3D working system made it possible to prepare the data for purchase of the parts with long lead times early in the project when individual parts were still being developed. This provided a way to involve suppliers early in development to reduce costs, improve quality and shorten delivery times.

To date, the advantages of the work in Inventor have been used by ŠKODA ELECTRIC in many other projects. Similar projects include the development of an engine for the ŠKODA 671 intercity unit for Slovak Railways and the engine for the ŠKODA 675 intercity unit for the Ukraine. Other orders executed in Inventor are, for instance, development of the engine for a Caterpillar mining vehicle, an engine for the Hyundai Rotem locomotive for Turkey, an engine for the Bombardier tram for Krakow and engines for city trolleybuses in Austria, Germany, Slovakia and the Czech Republic.

In direct comparison, customers clearly prefer the Autodesk Inventor platform to the previous CATIA system. In particular, they favour the 3D modelling environment and the creation of drawings, improved refinement links between the individual elements and easier user settings. Unlike the previous system as it was configured, Inventor also supports machining in the assembly and welding, which is the key functionality for a manufacturing company like ŠKODA ELECTRIC. Thanks to advanced integration, the system structure is transferred directly from Inventor to the bill of material in the PLM system, including such items as oil or lubricant.

“Autodesk Inventor has proven to be a highly suitable solution for design of the types of products which we make. The 3D working system in Inventor makes it possible, already at the early project stage when individual parts are being developed, to prepare the data for purchase of the parts with long lead times. This should be mentioned especially today, when the customers press for quicker deliveries.”

—Martin Vlček,
Head of Technical Department,
Traction Engines Division, ŠKODA ELECTRIC a.s.