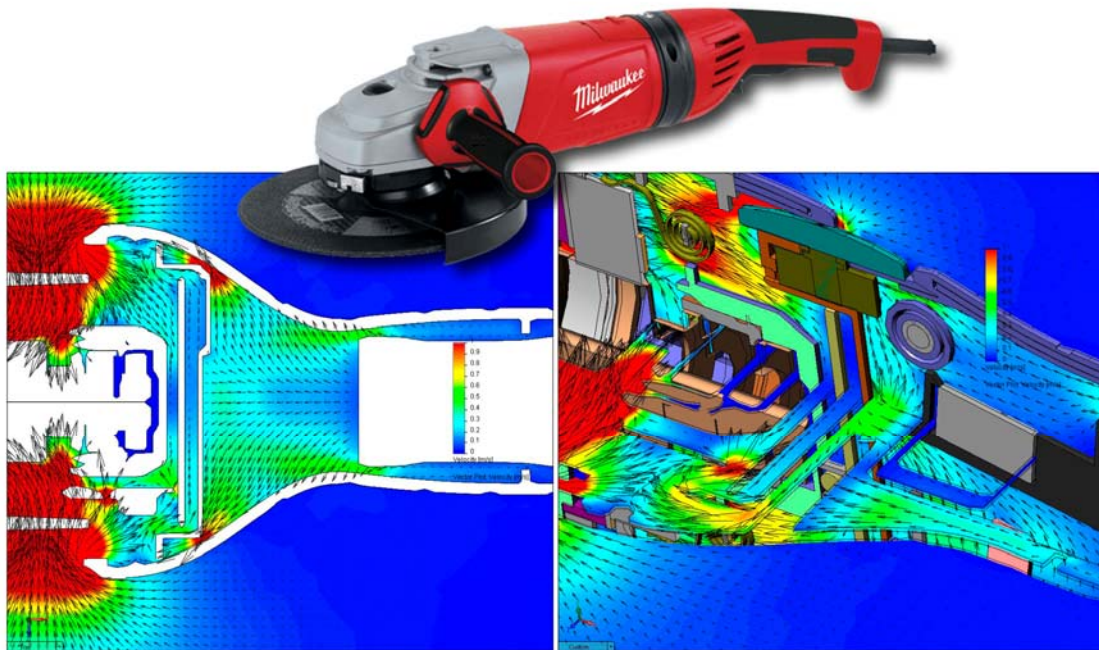


AEG Electric Tools GmbH Creates Cool Power Tools Faster with Flow Simulation



The AEG brand is synonymous with quality and reliability. Their portable power tools are tagged as the best tools for professionals around the world. Professional power tools have been developed and manufactured to meet “professional” or “trade” standards. Recognized as a member of the “Top 100 Most innovative companies in Germany’s SME sector,” AEG’s product portfolio includes more than 100 different tool types including hammers, percussion and diamond drills, angle as well as straight grinders, jig- and circular saws.

According to the Freedonia Group, the world power tools market is estimated at about \$23.4 billion. The market is estimated to grow 4.1% annually through 2011. Professional users account for the majority of the world power tool market and AEG is well placed to continue capturing its lions’ share of the market sector by being one of the suppliers of choice. This market sector is extremely brand loyal and users often do not make purchase decisions based only on price – features, functionality and quality weigh prominently in their decision making process.

All tools designed at the AEG Winnenden South Germany facilities are meticulously tested before market introduction to ensure high quality and reliability. Even under heavy operating conditions, these tools offer a long and productive life. For example, AEG recently introduced a new series of two-handed grinders that feature advanced 2400 watt abrasion-protected motors with

epoxy resin coated field and armature (Protector) for longer tool lifetime. The new design protects the motors from abrasive dust while the optimized airflow prevents dust accumulation in sensitive areas such as the switch and electronics and guarantees a better cooling effect – all of which lead to a longer tool lifetime (up to 10 times longer than competitive angle grinders with metal dust chambers).

“We optimize our new tools from the start of the project” said Markus Wörner, design engineer. To maintain their high product quality standards, the engineering team uses computer-aided design and engineering software. They use Pro/ENGINEER Wildfire 2 from PTC for design alongside EFD.Lab from Flomerics Ltd. for airflow and thermal analysis. “We use EFD to simulate the volume flow of air through machines” added Wörner. “Motor cooling problems are investigated in order to better understand the effectiveness of the cooling method used. We used to rely on past experience or on the results we had obtained from physical prototype testing but now we use EFD.Lab; therefore, we have a much better idea of how our products perform well in advance of the physical prototyping stage.”

The AEG engineering team is in a very unique position as they have a vast amount of information on their products so they can use that knowledge to start with a prototype that has already been optimized to a certain degree. “By using EFD.Lab we are able to further tweak our designs to reach an improved design much faster than previously possible. On a recent project, we reached our goal for improved airflow with the very first prototype. On another project we were able to get the engine running 15% cooler than previously thought possible and we achieved the improvement much faster than before.”

As a design engineer, Wörner had never used computational fluid dynamics (CFD) software before. “I am a mechanical engineer by background and had used structural analysis software in the past but I had had very little exposure to CFD. We chose EFD.Lab because it was easy to use. For example, I found meshing and the addition of boundary conditions extremely easy to do.” The EFD.Lab mesher can handle complex geometries with tight crevices and sharp angles easily due to the adaptive shape of its cells. Also, the EFD.Lab user interface is geared towards the needs of an engineer as opposed to analysis specialists. Therefore, instead of technical jargon, EFD.Lab deals with terms such as walls, inlets or outlets. “In addition, with EFD.Lab we don’t need to create the fluid area so the program is quite intuitive to use” added Wörner. Most traditional fluid flow simulation programs require users to create “phantom” solid parts to represent the (empty) fluid regions – an extremely time consuming process since users need to identify each region manually and then create geometry to fill it. EFD.Lab saves users time and effort by automatically differentiating between solid and fluid regions for internal and external flows to create the fluid domain.

AEG also uses EFD.Lab to optimize thermal issues. “With EFD.Lab we can investigate thermal tasks regardless of whether we are interested in the thermal behavior of a single component or the entire tool. EFD.Lab is a great tool for solving these issues as well” said Peter Henske, CAD Manager.

Aside from dealing with engineering design issues, the AEG design team faces another challenge. AEG Electric Tools in Winnenden develops tools for Milwaukee Electric Tools and AEG Power Tools. Using a modular design for the machines and the platform strategy makes it possible to achieve the different needs of different users in a fast and efficient way without losing quality. Even small changes in components affect the airflow. “Different exterior design and internal components result in completely different airflow in the machine. Testing each configuration would take a lot of time. But with simulation we can identify the effects caused by all the different design options and ensure proper performance for all machines based on the platform” said Henske.