

Pittler

OFFERS COMPLETE MACHINING OF COMMERCIAL VEHICLE COMPONENTS WITH SKIVELINE

Planetary gears date back to the beginning of the 18th century when Scottish engineer William Murdoch invented them to improve the power gear ratio of a steam engine used to lower the groundwater level in a tin mine. Today's power transmission engineering is still relying greatly on planetary gear sets, whether on bicycles, in cars or commercial vehicles with their broad range of powertrains or in electric motors for mechanical engineering. Their compact build and the option of creating a positive locking link between various drives and generators in the same vehicle make them the ideal device for transmitting the torque in hybrid and all-electric vehicles. Manufacturers however face the particular challenge of making the internal and external geared wheel whose quality standards have increased massively over the past couple of years. Under a tier 1 order for the mass production of internal geared wheels, Pittler T&S used its SkiveLine machines to supply a trend-setting end-to-end solution for machining before hardening.

Both ring gears and planetary gear sets should be as compact, lightweight, powerful and accurate as possible. These



requirements can be met only, if the sensitive component is made with highest precision and economic efficiency. Providing both attributes is particularly challenging, since the component walls are very thin and many processing steps are needed to produce grooves, oil bores or lubricant cavities on the inner and outer radius. A leading commercial vehicle manufacturer who contacted the DVS Technology Group member Pittler T&S with the task of making his existing production line much leaner and economically more efficient also confirmed this finding. In particular, the large number of six different process steps and set-ups had to be reduced significantly.

Six set-ups reduced to two

After a couple of successful trial runs on-site at the premises of the experienced manufacturer of turning and gear cutting machines based in Dietzenbach, Hesse, the combined process design had fully convinced the prospective customer. Based on the Pittler SkiveLine series of machines, an end-to-end production process was developed to cover everything from turning before hardening to gear cutting by means of the Pittler Skiving technology.

Process OP10 combines turning, gear cutting and drilling on the outside diameter. Use of the Pittler Skiving technology for internal gear cutting and all upstream lathing steps was integrated into process OP20. Thus, a component ready for installation was available after downstream nitrogen hardening. Having two SkiveLine machines plus automation unit take care of the entire machining process resulted in optimized cycle rates compared to the process being handled by separate machines and in a higher total productivity involving just two steps and set-ups. Another plus was that rigging and charging times could be kept very short although the actual machining times differed greatly.

Clamping system solution

An appropriate design of the clamping tools was essential to high-precision machining. This problem was solved in a joint effort between group business unit DVS Clamping and Pittler.



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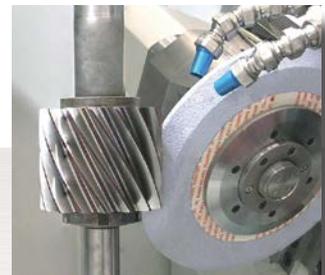
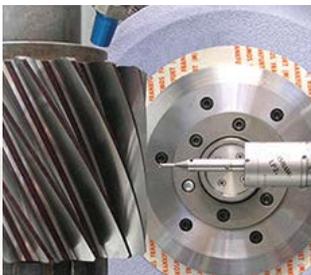
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“The first trial runs already suggested that the component walls were of greatest significance because they were very thin after all material had been removed,” says Omar Sharif, Pittler’s skiving technology product manager. “Conventional clamping would have deformed the component excessively in the machining process. A radial run-out of this magnitude would have made it almost impossible to achieve the specified final quality,” he concludes.

Instead, a fixing spindle is used to



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clamp the component in the first operation (OP10). The spindle just centers the component from the inside by three fingers holding the workpiece axially at a force of 10,000 N. This special tool helped to reduce the deformation attributable to clamping to just 2 μm. The second operation yielded a similarly successful result. A six-web diaphragm chuck also designed by DVS Clamping picks up the component at its outer diameter after the automation cell has fed the component into the workspace in the correct orientation. Introducing the force through just two points of the chuck reduced the deformation to 4 μm plus tension forces released by the workpiece and imperfections from the actual machining process. The innovative clamping tools reduced the total radial run-out of the internal gearing to just 40 μm.

William Murdoch probably could have only dreamed of such a precise and efficient solution for the production of planetary gear set components. The commercial vehicle manufacturer enjoys numerous benefits from the new production line. Fewer machines, fewer set-ups and fewer persons are needed to produce larger quantities of more accurately machined internal geared wheels of improved concentricity.

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Höganäs and Dontyne Gears

COLLABORATE WITH CAR MANUFACTURER ON PM SOLUTIONS

Lighter metal powder components with complex designs can bring substantial cost savings for car manufacturers and system suppliers in the automotive industry. Through a newly formed cooperation, Höganäs and Dontyne Gears offer a complete package of services with the aim to drastically improve driveline solutions.

Cutting weight both from electric and traditional internal combustion engine and driveline solution vehicles continues to be a major focus for the automotive industry. Getting more miles per gallon and increasing the range of plug-in vehicles to relieve range anxiety will be a key for carmakers to differentiate as the whole industry is being disrupted into the era of electrification.

“We help car manufacturers and system suppliers design, test and prototype new, light-weight powder metal driveline solutions that are a much better fit for the hybridization and electrification of the automotive industry,” says Eckart Schneider, director powder metallurgy (PM) business development at Höganäs AB.

“As materials and production techniques continuously improve, there are many applications that benefit from being looked at again to find much simpler and more cost-efficient alternatives,” says Mike Fish, CEO of Dontyne Gears Ltd.

The push towards light-weight materials brings new opportunities to create completely new solutions. In this context, the two companies’ cooperation makes perfect sense. Höganäs has a deep and vast materials knowledge and experience of metal powder component applications for automotive driveline solutions, while Dontyne Gears is an expert in uniting gearing and system design, and manufacturing practices to reduce time and resources and promote efficient production in the gear industry.

“Our cooperation with Dontyne



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Gears means we can become even better partners for our customers in developing and prototyping PM components in general and drivelines in particular,” Schneider says.

Dontyne Gears contributes with system design analysis, manufacture of machined prototypes and bench-testing of gears with a very flexible test rig.

“Car manufacturers will benefit greatly when switching to components made out of PM instead of solid steel. We see a number of new applications where PM brings big advantages, such as weight and inertia as well as noise reduction,” Fish says.

The two companies have started a joint concept development towards hybridizing a pick-up truck to take advantage of PM gearing and electrical motor solutions. So far, the project shows promising development and could potentially have a big impact on a large scale for design-optimized drivetrains based on powder metal solutions.

For more information:

Höganäs
Phone: (814) 479-3500
www.hoganas.com

FVA-Workbench 5.5

OFFERS DETAILED TRANSMISSION CALCULATION RESULTS

FVA-Workbench Version 5.5 of the simulation platform for transmission systems, released in May, accelerates development processes and provides even more detailed calculation results.

This unique software includes the latest results from the FVA research network — new calculation methods for fast, precise results.

The new *FVA-Workbench* is significantly faster and easier to use. Individual gearbox components to complete systems can be developed in the shortest time possible. During the calculation process, built-in wizards automatically suggest suitable values which can then be adjusted manually.

Even complex planetary stages can

now be modeled at lightning speed thanks to add-in wizards. Users can model very complex planetary gear designs (e.g., Ravigneaux and Wolfrom sets), from consideration of installation conditions to automatic calculation of dependent variables (such as center distances and addendum modifications), in the shortest time possible.

Values automatically assigned by wizards can be adapted to individual requirements at any time, so that symmetrical systems as well as planetary gears, in which the planets are distributed asymmetrically, can be calculated. Variations, such as bore tolerances for planet pins or stiffness-dependent load distribution, can also be considered.

In the new version of the software, load spectra are considered in system-level calculations for the first time. Users can determine the service life of cylindrical and bevel gears as well as rolling bearings, enabling operationally stable gearbox designs.

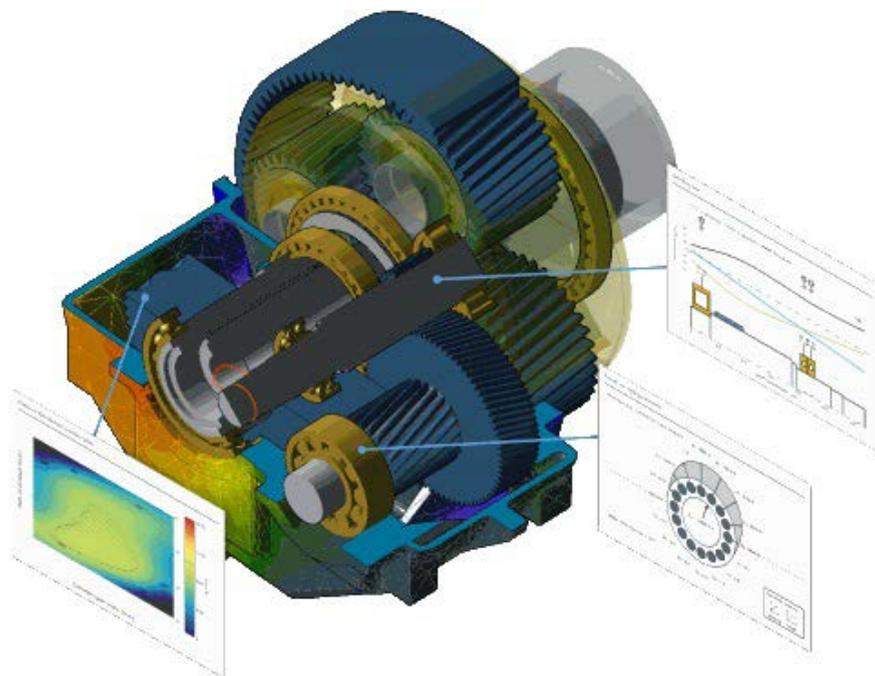
In addition to planet carriers and gearbox casings, wheel bodies can now also be imported in many common CAD formats. First, the wheel body is automatically adapted to the FEM mesh of the gear. The FEM meshing as well as positioning and connection to the gear model are then performed in just a few seconds. Automation, interactive user navigation, and user-friendly assistants make these steps extremely simple.

“Efficient FE methods are indispensable for optimizing the power density of gear stages. For this reason, WZL has been working on the successful development and validation of FE-based tooth contact analysis for more than 30 years. With the release of *FVA-Workbench 5.5*, free wheel body geometries can also be considered in the FE tooth contact analysis feature. The wheel body is imported as a CAD model and automatically connected to the FE model of the gear. Thanks to FVA GmbH’s exceptional cooperation with the Universität Bayreuth CAD research institutes and the Laboratory for Machine Tools and Production Engineering (WZL) of RWTH Aachen University, software users can now easily and efficiently achieve weight saving potentials by adjustment of wheel body geometries,” said Dr. Christoph Löpenhaus, chief engineer gear technology, Laboratory of Machine Tools(WZL) of RWTH Aachen.

Live demonstrations will be available during the Motion + Power Technology Expo 2019 in Detroit from October 15–17 at Booth #3737.

For more information:

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United Grinding

EXPANDS TWO-IN-ONE GRINDING CONCEPT

Based on a highly efficient and productive two-in-one concept, Walter Helitronic Vision Diamond 400L, Helitronic Power Diamond 400 and Helitronic Diamond Evolution tool grinding machines, from United Grinding North America Inc., integrate both eroding and/or grinding capabilities into single grinding machine platforms. From a production standpoint, the two-in-one concept lets users completely erode tools (PCD) and completely grind tools (carbide) using the same machine to eliminate the time-consuming task of moving workpieces to a second machine.

The Walter two-in-one concept is especially beneficial in the production of modern PCD tools in which the tool's carbide blank already has soldered PCD. The ability to erode, grind or even do both operations in one clamping gives users an unparalleled level of flexibility and reliability for their tool production applications. The machines process any PCD tool, whether for the wood, automotive or aerospace industry sectors, in addition to special/custom applications.

With the ability to perform both eroding and grinding or combinations of the two processing methods on one machine, tool makers can also expand into the PCD tool-producing field to increase new business and growth without incurring additional risk or threatening cost effectiveness.

All Walter two-in-one machines feature the company's Fine Pulse Technology, which has set new standards in terms of achievable surface quality,



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cutting-edge toughness and process reliability for PCD tool production. A tool made with Fine Pulse Technology shines on its free surface, similar to a polished/ground tool. Even coarse-grained PCD types, which previously could not be fine finished, are effortlessly eroded with Fine Pulse Technology.

In some cases, entire steps in the production chain have been omitted because the eroded tools no longer require re-sharpening or polishing. And in addition to PCD tool productivity, the machines work with *Walter Helitronic Tool Studio*, a software solution that makes tool shaping even easier and clearer, especially for PCD tools.

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Star SU LLC is pleased to announce it has expanded its comprehensive gear manufacturing product offering to include a line of horizontal hobbing and gear shaping machines available in the North American market.

Star SU technology partner, Samputensili, has recently signed an agreement between its Machine Tools Group and CLC, a reputable Italian producer of hobbing and shaping machines. The newly created company, Samputensili CLC S.r.l. can now offer new machines from its manufacturing plant located near Bologna, Italy.

The agreement helps complete Star SU's line of gear hobbing machines for shafts and long workpieces, as well as the addition of gear shaping, strengthening its position as a globally recognized leader of gear manufacturing solutions.

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