CONSISTENT CAX ULTRA-PRECISION MACHINING PROCESS CHAINS

There is a growing market for freeform optical components with irregularly curved surfaces. The use of freeform surfaces makes entirely new applications possible and improves the properties of existing optical systems: small mobile phone cameras which take good pictures, street lighting that shine more efficiently into the dark corners and medical endoscopes that can see more details. There is, however, relatively little automation in the manufacture of suitable lenses via complex molds – production is therefore expensive and complex. There are, as yet, no tools for planning and designing the individual processes within the overall process chain. The result is often a defective product that has to be laboriously reworked. And this despite there exists an enormous potential in today’s machine systems for integration and automation. Our sophisticated concept makes it possible to define uniform data models and implement them throughout the entire process chain in order to avoid errors when transferring formats, resulting in a more efficient process chain.

Development of consistent CAx process chains

- Consistent computer-aided manufacturing and metrology process chains based on our own CAx software
- Representation of individual manufacturing and metrology operations using individual, task-related software modules
- Consistent data flow within the process chain thanks to the “CAx Framework” software environment
- Inspection tools to test the required tolerances that conform with the high standards of the optics industry

Optics processes with comprehensive CAx functionality

- Software modules for comprehensive CAM planning, supported by simulation-based collision tests
- Realistic simulation modules for machines, sensors and coordinate measuring devices
- Technology databases with extensive information on process parameters, strategies and machine properties

Our services

- In terms of ultra-precision machining, our “CAx technologies” department develops and optimizes CAx process chains for specific applications in the optics and precision machining industries.
- We develop solutions that improve individual processes as well as entire process chains.
- We use modeling and analysis methods to design new processes and redesign existing processes, making them efficient and practical.
- Together with our development partners in Aachen, Moduleworks GmbH and Aixpath GmbH, we offer comprehensive software solutions that can be integrated into any other software system if so required.
SPECIALIZED CAX OPTICS MANUFACTURING MODULES

We develop simulation-assisted CAM modules for ultra-precision machining processes, particularly for our clients’ machine and metrology-based processes. The different CAX modules for grinding, diamond turning or machine-integrated metrology can be combined like building blocks to form a comprehensive process chain. Should you have specific requirements, we are glad to accept the challenge!

Development of specialized CAX modules

- Simulation-assisted planning of tool paths – collision-free at optimum processing conditions
- Different path strategies such as line-by-line or spiraling machining of the workpiece surface
- Feedback of the simulation-based verification results to optimize the CAM modules
- Quick implementation of complex manufacturing processes and process chains in line with customer requirements

Specialized CAX modules for multi-axis processes

- Identification of geometry of freeform surfaces using coordinate measuring devices and with sensors integrated into the machines.
- Calculation of tool paths for different tool types – grinding wheels, mounted wheels and diamond turning tools
- Automated analysis and processing of measured data for subsequent processes
- Provisions for data interfaces to process components such as optics design, FEM simulations and metrology

Our services

- We offer the development of customized software modules that meet the specific requirements of your process.
- We implement proven machining strategies and develop new strategies to order.
- We integrate specialized software modules into the “CAX Framework” software platform that has been designed specifically for this purpose.
- We utilize a consistent data concept that is reflected in the uniform user interface in each module.
- We check the quality of the production and measured data in a closed feedback loop within the process chain, taking account of the quality standards for ultra-precision machining in the lower nanometer range.
- We develop CAX modules as autonomous, stand-alone modules or integrate them seamlessly into prevalent CAX systems such as Siemens PLM Software NX.
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