

Case Study

RT-CNC Develops Motor Sport Precision Parts with SpaceClaim

Reconstructing the legendary Honda CB 900 with the easy-to-use 3D tool

Raimondo Berger, designer, manufacturing expert and lover of sport motorcycles, heads the firm RT-CNC. They design and build forward controls, triple trees and other precision parts for sport motorcycles of various brands that meet the criteria "light, stable, precise." SpaceClaim Engineer serves him as a 3D tool to rapidly give shape to ideas and develop them to the production stage with minimal inconvenience. With SpaceClaim as his tool, Berger is daring even to reconstruct the legendary Honda CB 900 Bol d'Or Super Sport from 1979.

"I have the enormous advantage of bringing my love of motorcycles to the production technology. I design parts that I know can be produced reasonably and quickly," says Raimondo Berger. In the 1980s, Berger produced his designed parts on the milling machine himself and sold them to his fellow motorcyclists. So in the 90s he and a colleague founded the company RaiRoTec, and they successfully designed and sold parts for sport motorbikes. These parts realize the full potential for improvement of standard products and improve them with respect to function, weight and sporty look.

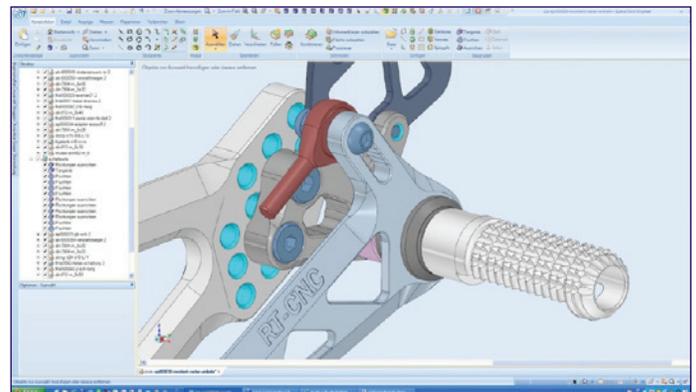
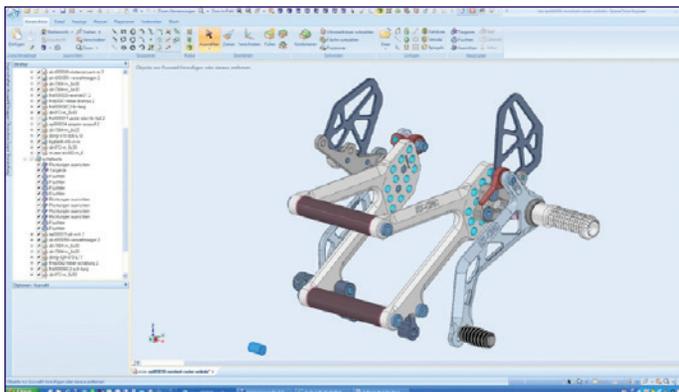
Following the acquisition of RaiRoTec by another company in 2009, Berger remained associated with the company as chief engineer, but he had already founded RT-

CNC, his own company for construction services, many years before. The main focus here is on continuing with what Berger does best: forward controls, triple trees and other precision parts for motorcycles.

The exceptional "technical" appearance of a Berger forward controls are characterized by their elaborate and sophisticated design and high quality manufacturing. Although the difference in weight compared to the mass market is usually only slight, riders equipped with a Berger footrest enjoy several improved features: individual adjustment from comfort to sporty, shorter, more precise shift travel, fine-tuned braking and more grip on the sole of the foot when it rains - all factors that are of high importance when riding a sport motorcycle.

About RT-CNC

RT-CNC in Höchberg, near Würzburg, Germany develops precision parts for sport bikes, especially forward controls, triple trees, accessories and special products. RT-CNC footrests have proved themselves on the racetracks of Europe over many years. The kits available for many motorcycle models are lightweight, strong and custom-fit. RT-CNC triple clamps stiffen the front structure of selected sport bikes while saving weight. Raimondo Berger, founder and manager of RT-CNC, is also chief designer at RaiRoTec, a specialist in CNC-manufactured motor sports accessories. RaiRoTec is one of the production services of RT-CNC. Many of the RT-CNC racing parts have a TÜV certificate for the street bikes market. For more information please visit www.rt-cnc.de, www.rairotec.de.



Footrests designed by Raimondo Berger for an Aprilia motorcycle in SpaceClaim.

3D Design Without a Manual

As Berger himself says, he thought about developing sophisticated product such as footrests in 3D for many years, but was deterred by the high cost. A colleague from production who is always on the lookout for inexpensive 3D systems that can be used without a manual introduced Berger to SpaceClaim. Since Berger liked the system's look and feel and the price was very attractive for a 3D system with extensive functionality, Berger then decided to attend a one-day training at German SpaceClaim reseller Lino in the summer of 2011. "I was persuaded by the fact that I could open my extensive and sometimes old DXF files easily, put them together, and build a 3D model in SpaceClaim," says Berger. He was also determined to put the performance and skills of the Lino staff to the test and proposed working with one of his most complex DXF drawings. However, loading, editing and design of the 3D model went perfectly with the support of Lino professionals. "Everything else I've done since then with SpaceClaim I've accomplished simply by doing it because the user interface is so intuitive."

Above all, it is the directness and immediacy of SpaceClaim that convinced Berger, who has worked with many 3D CAD systems, that he had found the right tool for the job. "What I can handle in SpaceClaim in five steps would take me ten steps in a traditional CAD system," He declares. The first 3D part Berger designed in SpaceClaim was based on an existing DXF file. This part with complex geometry stiffens the motorcycle front end, saves weight, provides a more comfortable seating position and can be mounted within 30 minutes. "It is simply impossible to explain the structure of the triple clamp just based on a DXF file," says Berger.

Kit for Design Parts

The designer and entrepreneur then built a 3D-parts kit from a wide variety of parts. Now, if he wants to create a new forward control for example, he first works out the basic design in connection with the bike frame (the mounting points vary constantly from manufacturer to manufacturer and from model to model), then pulls the other components from his kit and builds up the final part. "If you build a model from external data in another 3D system, it is only a dumb model. In SpaceClaim you instantly have a real model that you can continue working on directly, either on the constructive side, or in the production pipeline."

The production partner then creates the 5-axis programming from the 3D STEP and IGES data supplied by Berger. Based on his many years of manufacturing experience, Berger drafts his designer pieces so that they can be produced with a minimum of fixtures and clamping.

Design Features Proven in Day-to-Day Design Work

For the design of the complicated geometry of the footrest, Berger appreciates how he can easily and intuitively execute design changes like the addition of a brake cylinder or various changes in form such as slants, angles, and the changing line of a chamfer along a support and thus "cast" his ideas in a solid form. Put simply, SpaceClaim supports him in the realization process, instead of obstructing him. His response to the four command buttons "Pull, Move, Fill, Combine": "Absolutely great."

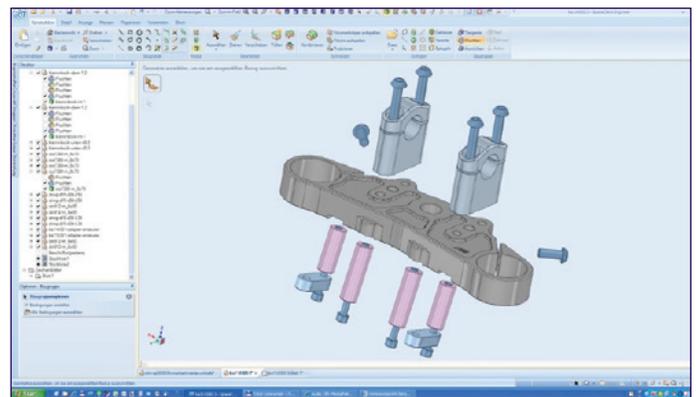
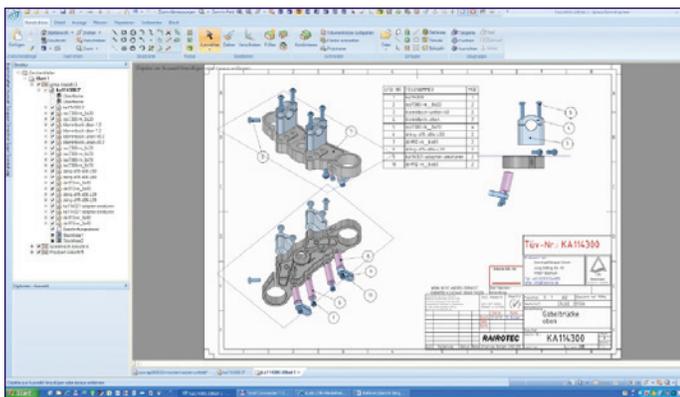
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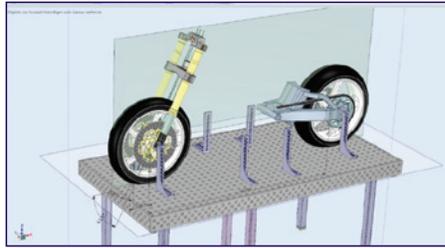
— **Raimondo Berger,**
Founder and Managing Director, RT-CNC



Triple tree set in a 3D drawing and parts list.



Footrest kit for rapid 3D design.



Project 2012/13: reconstruction of the sport bike Honda CB 900 Bol d'Or from 1979.

He uses SpaceClaim very much as a sketch tool to note ideas and concepts. "Before I sketch what I'm thinking with paper and pencil, I prefer to build a model in SpaceClaim and then my business partner understands what I mean. This 3D work costs me almost no time." The engineer and designer also likes the ability to rapidly place logos and lettering on the 3D model.

Next, Berger plans to develop motorcycle tanks and manufacture them in aluminum. The benefits include less weight, organic shape with an attractive, memorable appearance. In the design of free-form surfaces, the direct interface between SpaceClaim and the 3D free-form modeling tool Rhino is extremely useful, allowing him to open Rhino files directly in SpaceClaim, edit and then re-send them in their native format to Rhino. In addition, SpaceClaim includes free-form surface features as well.

Reconstruction of the Honda CB 900 Bol d'Or Supersportt

In 2013, Berger will present his most ambitious project at a trade show: the reconstruction of the sport motorcycle Honda CB 900 Bol d'Or Super Sport from 1979. The Bol d'Or (French for "golden bowl") is in fact one of the most famous 24-hour motorcycle races. In the course of 2012 Berger will reconstruct the bike completely in 3D using SpaceClaim and then have it manufactured by contract fabricators. He has already created a modified frame with modern geometry and additional components to stiffen it, the fork, wheels, chain, sprockets and more. In his next step, he will recreate the installation space of the engine with the screw points on the frame. The goal is to completely map the bike in 3D - of course with its own crown and footrest controls. Berger probably wouldn't tackle this project with another 3D system: "This is the first 3D system with which I can work professionally and with minimum inconvenience. Its greatest advantage is its ease of use."

About SpaceClaim

SpaceClaim was founded in September 2005 to create solutions that would enable engineers to leverage 3D design to innovate, win more business, and get products to market faster. Since then, SpaceClaim has become the leader in 3D Direct Modeling solutions for rapid concept design and geometry manipulation, with adoption rates within engineering, product development, and manufacturing companies soaring.

Customers include three of the world's largest auto makers, and industry leaders across aerospace, medical devices and machine tool manufacturers. SpaceClaim has OEM agreements with TRUMPF and Flow International Corporation as well as a licensing and distribution agreement with ANSYS, the global leader in simulation software.

SpaceClaim's world-class board and management team combines deep experience in 3D and design software – including the inventors of feature-based modeling – with proven track records in successfully bringing new design software to market.

About Lino GmbH – Leading Innovation

Lino GmbH, based in Mainz, Germany, has accumulated over 50 years of development and project experience, which it dedicates to serving companies from machinery and plant engineering, automobile manufacturing, packaging, automation, electrical engineering, plastics and wood, medical technologies and design and engineering services sectors.

Lino offers practical technology consultation and implements innovative system solutions for customers in IT, development and production contexts. The consulting company Lino specializes in premium R+D consultation, 3D-CAD and integration with products from configuration, FEM, PDM/PLM, ERP and classification. MultiCAD systems such as SolidWorks are also supported.

Customers include companies like Applied Materials, Carcoustics, Coko Werk, Fraunhofer Institute, Kranunion, Robert Bosch, Salzgitter Mannesmann or Zodiac Cabin Controls. Lino GmbH is an authorized SpaceClaim, KeyShot, Tacton and Simus Classmate reseller as well as a TactonWorks Certified Service Partner.

www.lino.de/spaceclaim.html



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