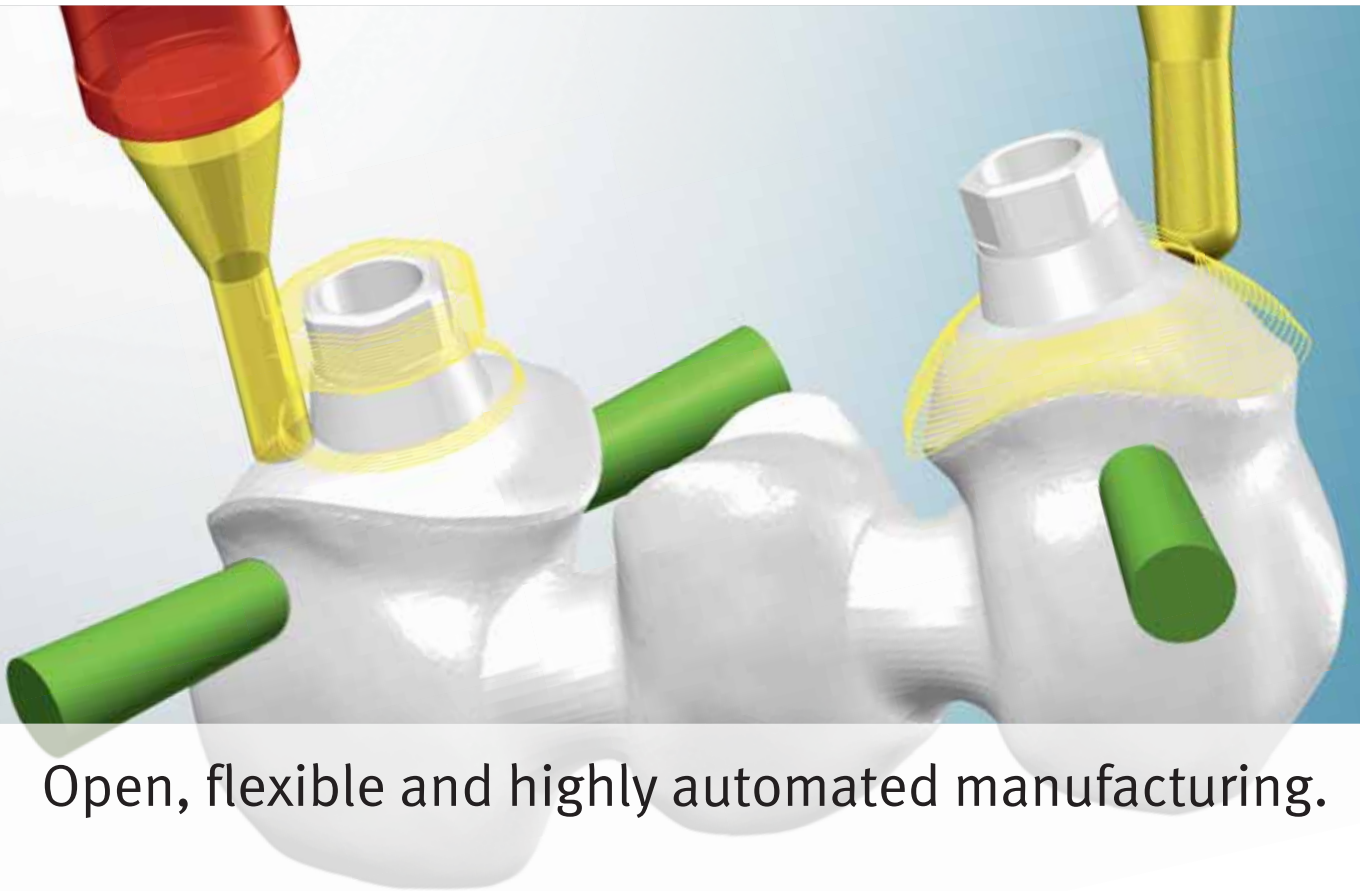


hyperDENT®



Open, flexible and highly automated manufacturing.



hyperDENT[®] is probably the most powerful and most intuitive production software on the dental market. It could only be created through the combination of OPEN MIND's milling algorithms and the expertise of FOLLOW-ME! in dental-industry-specific processes and development.

hyperDENT[®]: Open to the best solutions.

hyperDENT[®] is an open and highly automated programming system. It is geared towards processes in dental laboratories and enables the digital precision manufacturing of dental prostheses. Only a few mouse clicks and keystrokes are needed to create entire NC programs. This is made possible through an automated menu design, easy-to-use interface and a host of automated functions.

hyperDENT[®] offers you all of the requirements to react to challenges quickly and in a cost-efficient manner. As an open system, it ensures considerable flexibility, for example, when:

- Selecting raw materials
- Structuring a production environment (e.g., a milling unit)
- Using milling tools
- Importing data from other systems
- Implementing 3D machining strategies, strategies for fixed-axis milling and 5axis simultaneous machining.

A solution for everyone:

Thanks to its high degree of automation, the system is ideal both for small laboratories as a 'one-button solution' and for highly specialised milling centres.

Users with limited CAM experience can work reliably with the fully automated inputs and processes in the basic version. Experienced users can use the expert version to precisely optimise machining.

The world's leading CAM technology:

hyperDENT[®] integrates the machining strategies of the internationally successful CAM software *hyperMILL*[®]. Known for its trend-setting technologies, this software is used in innovative industries such as the aerospace industry, Formula 1 and medical technology. In the dental industry, the technology is already being used to manufacture implants and pre-machined abutments



Digital production processes in *hyperDENT*® are based on proven procedures.



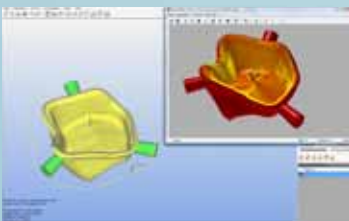
One more printing today, maybe a scan tomorrow? *hyperDENT*® is well suited to almost all production environments.



CAD data from various systems can be imported into *hyperDENT*®.



hyperDENT® can largely automatically generate milling programs from CAD data.



A high-performance CAM system like *hyperDENT*® reduces costs throughout the entire process ...



... and offers the opportunity to tap new market areas.





Reinhard Sroka, Dental Project Manager,
FOLLOW-ME! Technology Systems GmbH

“We are experts in orthodontics.
This is reflected in our *hyperDENT*[®]
machining templates.”

hyperDENT[®]: Everything is possible.

With *hyperDENT*[®], a broad range of dental prostheses can be milled reliably and economically. Being able to save machining templates reduces programming effort and ensures the highest possible process reliability. This spectrum is of course being expanded according to demand. *hyperDENT*[®] therefore offers you a forward-looking foundation with which you can tap into new markets. The expert version of *hyperDENT*[®] also offers experienced users the option of customising individual machining templates or creating new ones. With *hyperDENT*[®], you are optimally prepared for the requirements of today and tomorrow.

A machining template defines the object to be machined, the material and the milling strategies. The *hyperDENT*[®] basic version contains fixed predefined machining templates that are automatically assigned according to the object and the stock. If necessary, the user can also manually assign the object, machining template and machine with a click of the mouse. The expert version allows the experienced user to configure these templates individually.

The following machining templates are already saved in *hyperDENT*[®] or are being systematically expanded:

- Crowns and bridges
- Telescopic crowns – primary parts
- Fully anatomical crowns and bridges
- Inlay/onlay
- Inlay/onlay bridges
- Maryland bridges
- Customised abutments with connection geometry or for pre-machined basic adhesive components
- Fixed implant bridges
- Implant-supported bar structures

Data imports:

Typically, models of the prosthetic to be manufactured are scanned and processed with a CAD system. *hyperDENT*[®] can further process STL data records from any upstream scan and CAD process. Additionally, you can optimise processes with *hyperDENT*[®]. This is because the CAM solution also offers direct interfaces to different CAD systems, such as

DentalDesigner™ (3Shape) exocad or Dental Wings. Objects can be imported via these direct interfaces from CAD systems with supplementary information, such as the direction of insertion, tooth preparation limits, screw channel or emergence profile. This simplifies the workflow and saves work steps.





Inlay/onlay



Maryland bridges



Telescopic crowns – primary parts



Three-unit bridge



Bridge framework



Abutments





hyperDENT[®] allows users to obtain excellent milling results while using different materials. The benefit directly impacts your productivity and financial return.

hyperDENT[®]: Free choice of materials.

Materials are a decisive cost factor. Many traditional systems for the digital production of dental prostheses only permit the use of certain materials and/or material from one supplier. Here too, *hyperDENT*[®] gives you flexibility. Never again will you be limited by the choice of providers, materials or their shapes, such as round stock or cylinders. This flexibility means that you will always purchase the materials that you want to use. And you purchase them from suppliers that offer you the material you want at the best price and at the required standard of quality.

hyperDENT[®] supports the following materials with stored milling strategies:

- Zirconium oxide
- Cobalt-chromium alloys
- PMMA (plastic)
- Titanium
- Glass ceramics

High process reliability:

Particularly when machining materials that are difficult to cut, such as cobalt-chromium or titanium, *hyperDENT*[®] offers special mechanisms to improve the quality of parts. The automatic stock tracking, for example, ensures process reliability during rough milling and rest machining.

The filleting of tool paths on corners can reduce stress on the tool. This optional function can be selected for the machining template in the case of hard materials. The cap-specific machining orientation also yields precise milling results for cobalt-chromium alloys or titanium.

High process reliability independent of the material is also ensured by the following performance features:

- Optional bottom limit of tools and automatic selection of the proper tool length for the object and stock height
- Automatic collision check and avoidance in the 3axis and 5axis modes

with optional tool collision check against the stock, as well as the stock and tool holder

- Axis limits of the machine are checked in advance and, if necessary, the calculation is discontinued
- Automatic recognition of the screw channel. As part of this process, the internal geometry of *hyperDENT*[®] is regenerated to remove scanning errors.
- Automatic expansion of the milling area boundary in case of machining using inclined tool orientations and/or short tools

Upgradeable at any time:

Stock materials, geometries and colours are administered in a database. The database can be expanded at any time to include new materials and formats. This makes the system able to be upgraded very quickly to accommodate new raw materials that appear on the market. This flexibility guarantees that you can meet new market requirements quickly and flexibly.



Zirconium oxide and cobalt-chromium alloys



Plastics



Glass ceramics



Cobalt-chromium alloys

Reusable:

A stock is not always completely exploited. This is why *hyperDENT*® allows partially machined stocks to be reused. The stock management facilitates the fast and convenient selection of these stocks. The 'Preview' function enables used stocks to be clearly displayed. This permits them to be quickly and easily identifiable and reusable.



Andreas Bremsthaler, Application Technology,
EMUGE-FRANKEN

“We have developed special tools for use in high-performance milling centres that produce dental prosthetics.”

hyperDENT[®]: Lots of space for individual processes.

hyperDENT[®] is a CAM system that is completely open. This allows dental laboratories to compile a solution that is customised to meet their needs. It is possible to combine a scanner, CAD/CAM system and milling machine from different vendors in accordance with individual requirements.

Open for data input:

Thanks to the standardised STL data exchange format, *hyperDENT*[®] can import data from different scanners and CAD systems. Direct interfaces to specific scanner and CAD vendors already exist or are being provided as required.

Flexible for the milling unit:

The market currently offers milling units with widely varying production capacities – starting from ‘small’ laboratory machines to high-performance milling centres for automated high-volume production. In order to be able to optimally process the powerful CAM

program on the machine, a special post-processor is available for every machine. This postprocessor takes into consideration the requirements resulting from the machine’s kinematics and controller.

Custom tools:

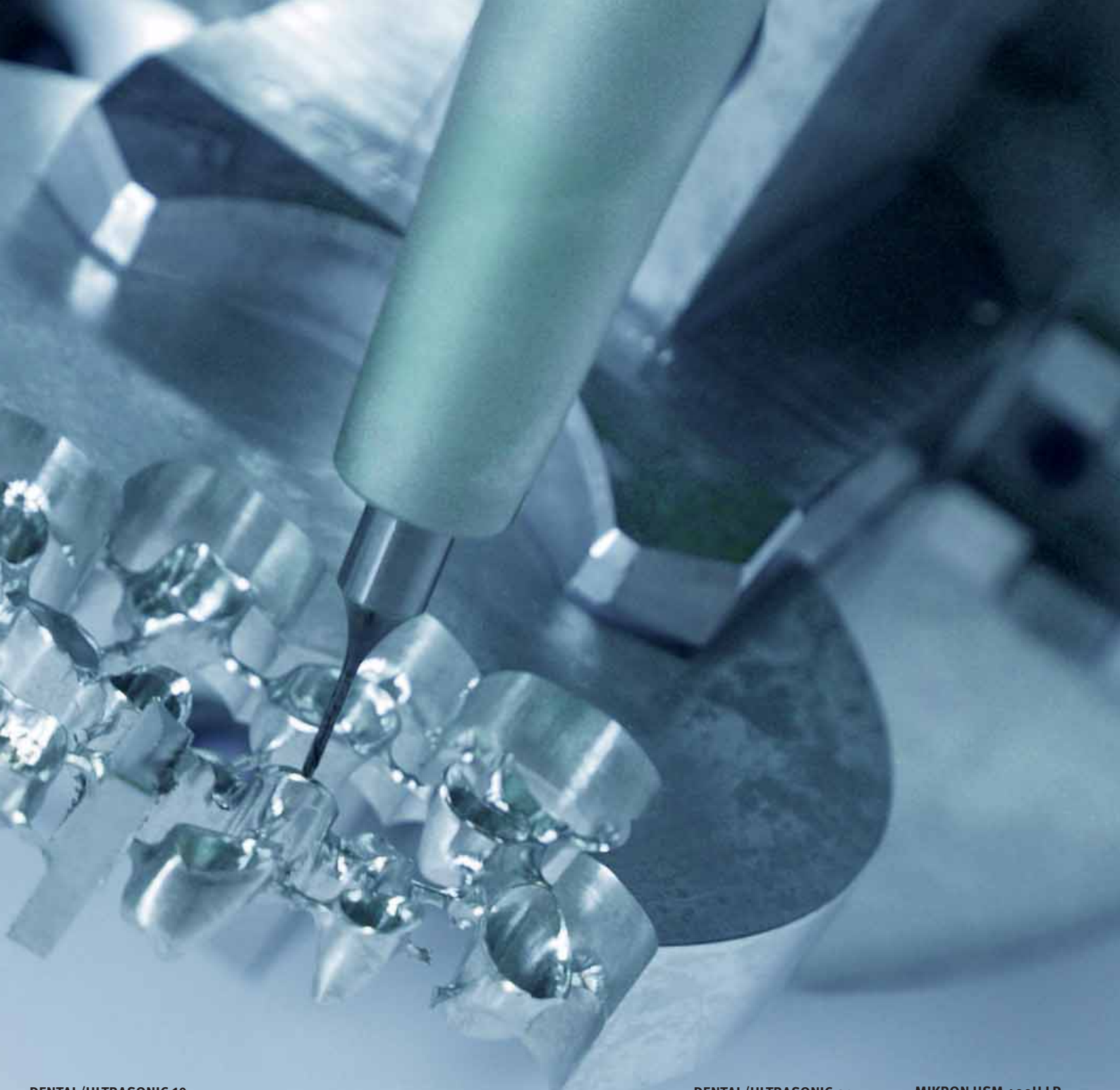
The tools used influence productivity and quality to a significant degree. Here too, *hyperDENT*[®] offers you flexibility in the selection of tools from different manufacturers – determined on the basis of the material, the object to be milled and the machining strategies.

Advantageous for automation:

hyperDENT[®] supports manufacturing automation. Increasingly more milling machines are being equipped with a unit for automation. Objects are automatically separated from the stock, set aside in little shells identified by codes and stored in a magazine. This allows, for example, unmanned manufacturing at night.

ULTRASONIC machining
of a tooth crown in HIP[®]ed
zirconium oxide
(Source: DMG/SAUER)





DENTAL/ULTRASONIC 10 (DMG/SAUER): Compact 5axis precision machine with 800 x 1,800 mm (W x H) insertion size.



RXD 5 from Rödgers with automation for cost-efficient dental manufacturing.



The objects are separated from the stock on the Rödgers RXD5 in a fully automatic manner.



DENTAL/ULTRASONIC 20 linear (DMG/SAUER): Stable 5axis portal machine with *size 2 g* for all dental materials.



MIKRON HSM 400U LP from AgieCharmilles for flexible manufacturing in high-performance milling centres.



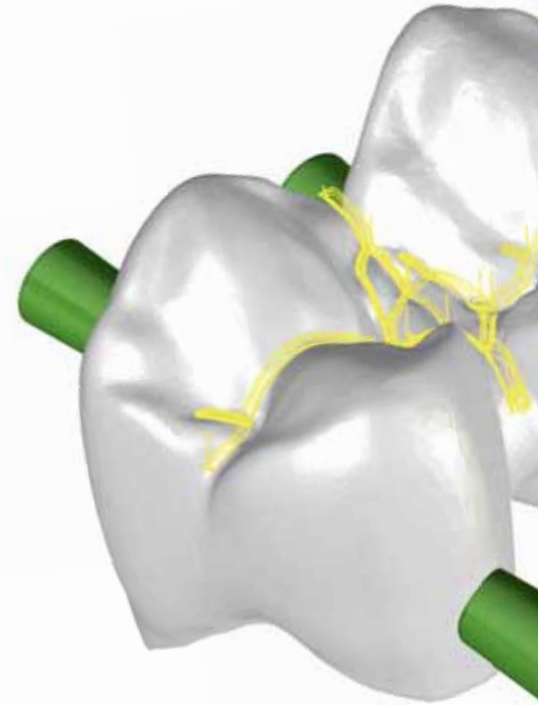


Günter Linseis, Head of Software Development,
FOLLOW-ME! Technology Systems GmbH

“*hyperDENT*[®] should offer users the greatest possible flexibility and maximum automation!”

hyperDENT[®]: Finish an NC program in three steps:

Automatic operator guidance, a clear user interface and many fully automated functions ensure the program is reliable and easy to use. CAM and milling expertise aren't required. The use of well-known technical terms ensures fast learning. With the basic version, users with little CAM experience can produce milling programs quickly and easily.



Load stock: The stock is selected from a predefined list (stock management).



Load object: Objects can be quickly and reliably loaded, thanks to the measuring function of the preview.



Calculate toolpaths: Toolpaths are calculated with full collision checking and avoidance.

Flexible workflow.

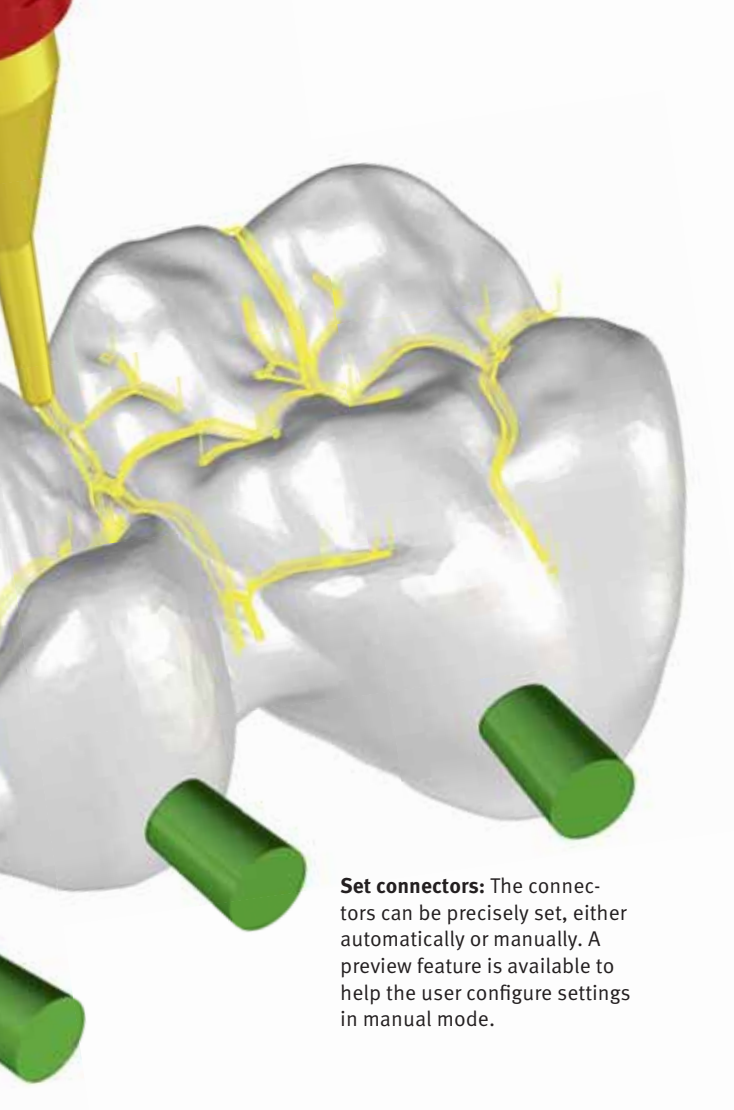
Despite the high level of automation, you remain flexible thanks to *hyperDENT*[®]. Each job step can be modified subsequently through individual intervention.

Automatically placed connectors can be realigned at any time or even be deleted one by one. It is also

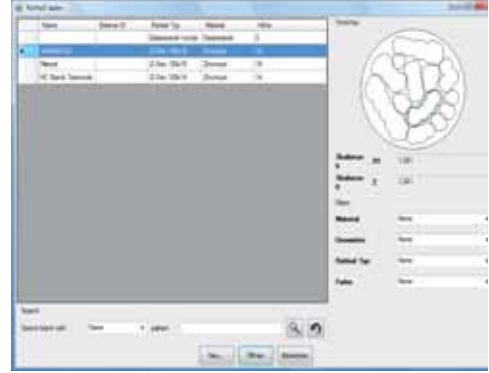
possible to apply split cuts subsequently to connectors of objects that have already been placed in the stock.

Stocks can also be modified after the nesting process. In such a case, all parameters, such as the shrinkage factor, can be adjusted automatically.

The automatic setting of the machining plane to minimize the height of objects in the stock allows for the use of multiple stocks of lower thickness, making more efficient use of the stocks.



Set connectors: The connectors can be precisely set, either automatically or manually. A preview feature is available to help the user configure settings in manual mode.



Stock management: Thanks to search, filter and preview functions, partially machined stock can be managed in an extremely efficient manner.



Load part: Alternatively, parts can be moved directly from the browser window to the required location using drag and drop.



Select milling unit: Machine and holder are selected from an existing list with a click of the mouse.



Align object: Objects are easily aligned using undercut detection.



Specify object properties: *hyperDENT*® automatically detects the tooth preparation limits.



Place object: The object can be tilted to minimise the necessary stock height. In this case, the machining occurs with fixed tool angles.

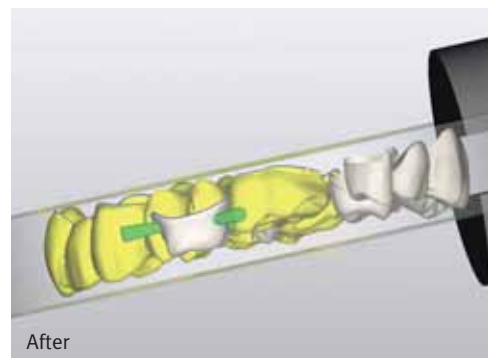
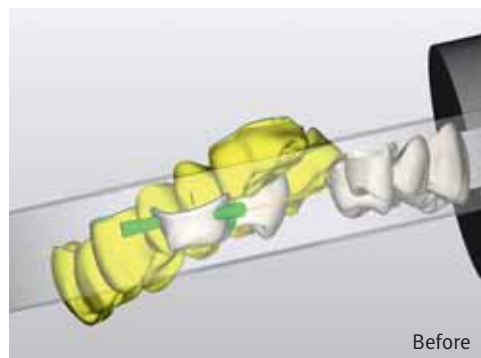


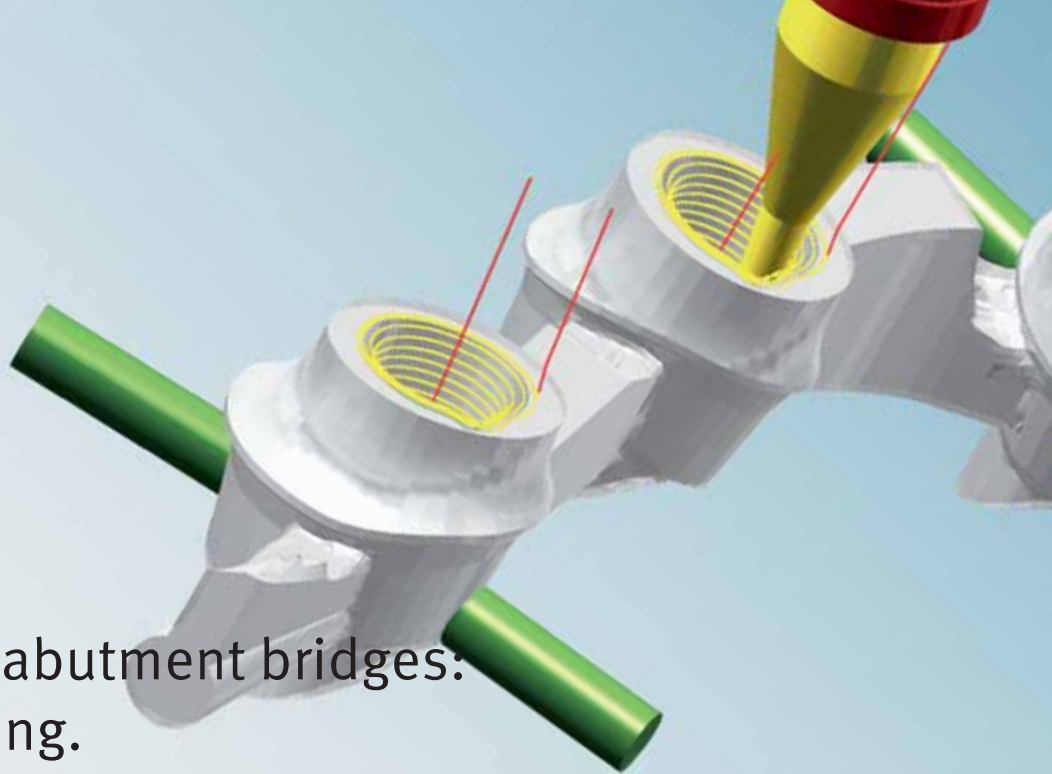
Select milling strategy: It takes only one click of the mouse to assign the best machining strategy to any object.



Set sintering pins: Sintering pins are moved with the mouse to the required position.

Align object: Thanks to this innovative function, objects can be optimally placed in the stock.





Abutments and abutment bridges: Easy programming.

hyperDENT[®] offers users the option to create a machining template for abutments with interface geometry. It is then possible to produce many customary abutment types using this template.

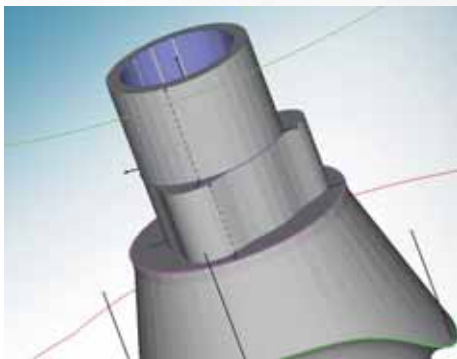
Abutments and abutment bridges, both bonded and screwed together directly, can therefore be milled. The interface geometry can be processed section by section as well as in a tool- and geometry-specific manner. Optionally, individual settings for the abutment and

emergence profile or occlusal side can also be defined.

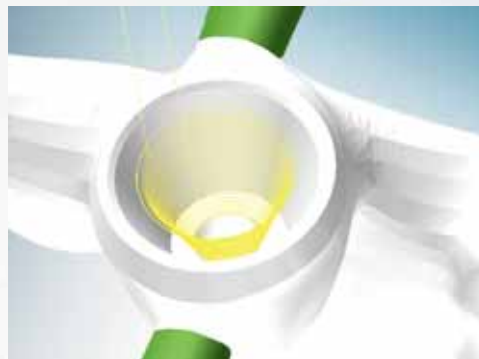
Another highlight is screw channel machining. The screw seat area can be milled separately as needed. The machining operations available for this are drilling, roughing and finishing. Thanks to the automatic

screw channel diameter recognition and the corresponding allocation of the drilling tools, the machining process is greatly simplified.

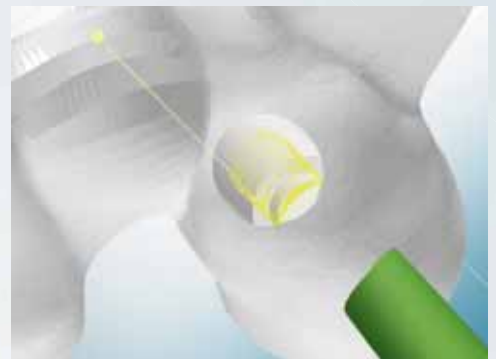
The automatic collision check of all tools ensures a high level of process reliability.



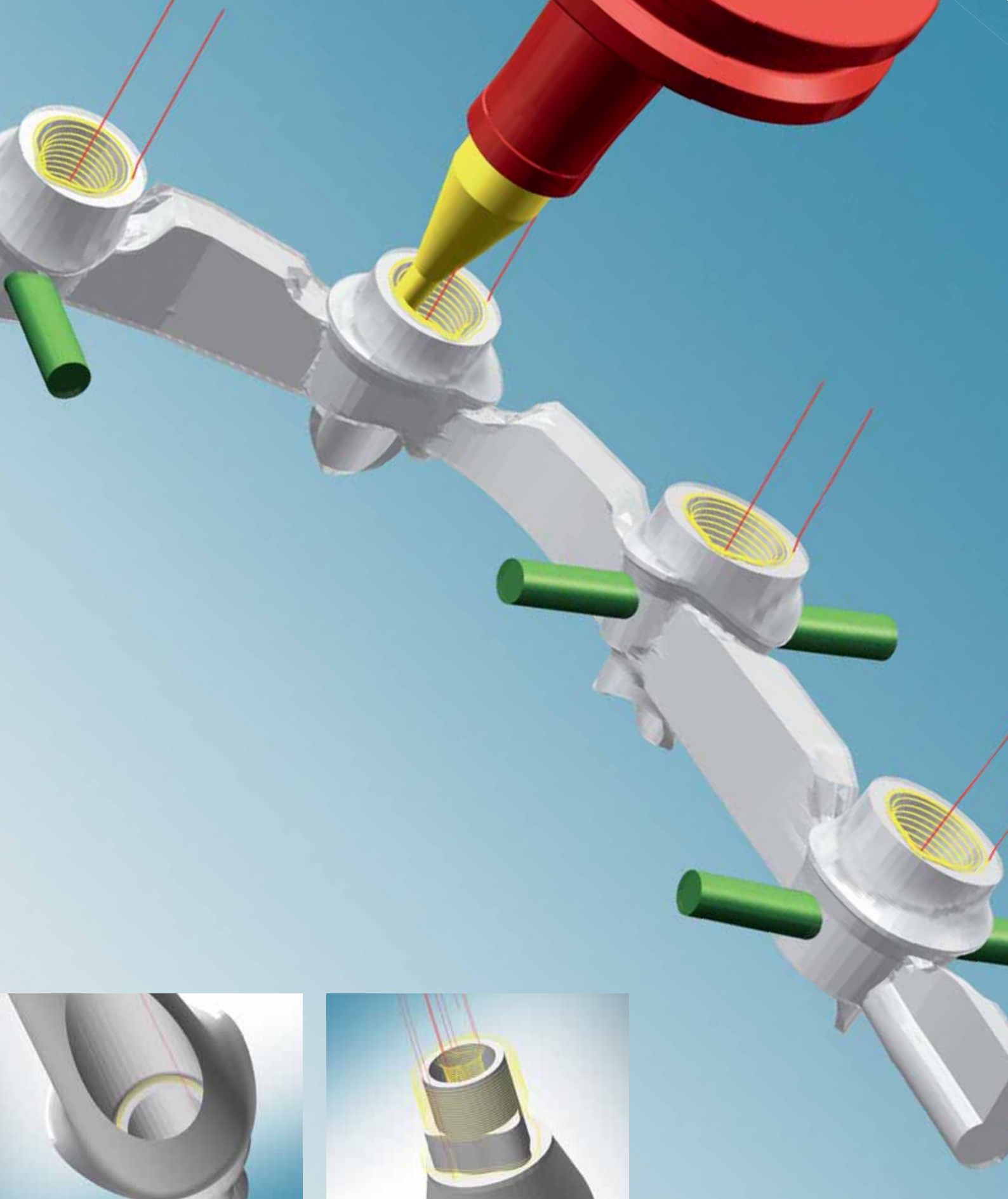
Abutment: Many customary abutments can be milled by means of the *hyperDENT*[®] abutment module.



Detail machining: *hyperDENT*[®] also enables inner geometries to be precisely manufactured.



Abutment machining: The machining template can be created individually.



Screw channel machining: The screw seat can also be milled separately as needed.

The interface geometry can be produced section by section as well as in a tool- and geometry-specific manner.

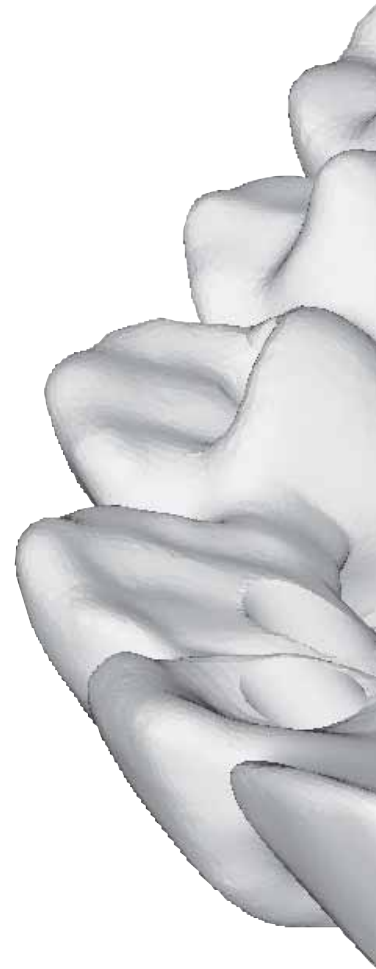


Sören Hohlbein, Master Dental Technician,
millhouse GmbH dental laboratory

“We produce individual dental prostheses. With the expert version, we configure precise machining strategies for this.”

hyperDENT[®]: Flexibility for experienced users.

The expert version of *hyperDENT*[®] is the high-end solution for experienced CAM users. With the expert version, every step can be adjusted to individual requirements, settings can be configured and machining rules can be defined for specialised tasks. *hyperDENT*[®] also provides highly qualified milling centres with multiple milling units with a flexible solution for taking on new challenges and economically optimising processes.



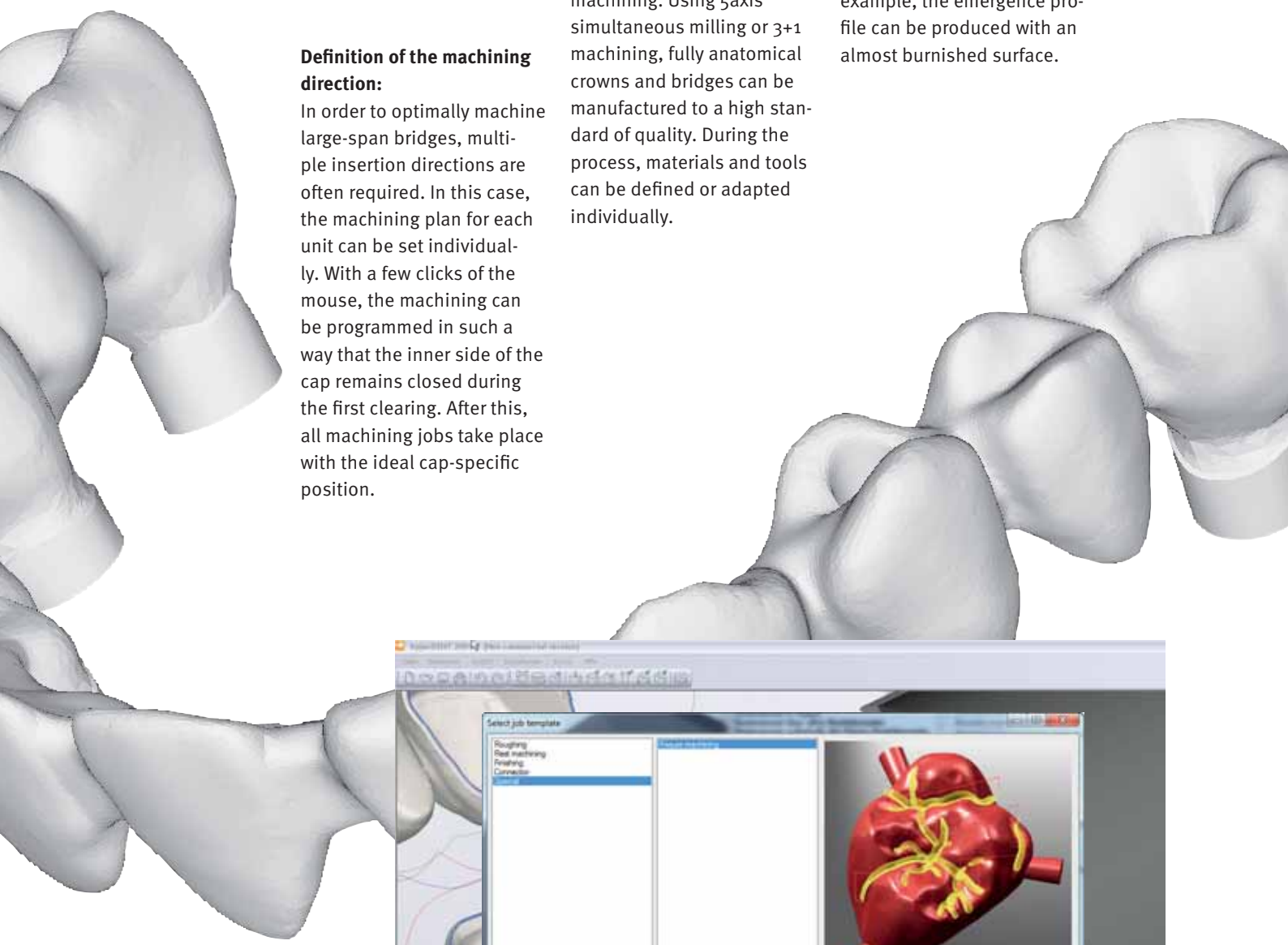
Individual programming:

With the expert version, you can create powerful CAM programs in accordance with your manufacturing spectrum and your expertise. The expert version offers the following powerful functions:

- Freely configurable materials for stock types
- Freely configurable tools
- Freely configurable tool holders
- Special function for cap-specific orientation
- Special function for developing inlay/onlay bridges
- Machining templates with freely configurable milling strategies to adapt to the needs of the object type at hand
- Machining templates with standard parameterisation for zirconium oxide, cobalt-chromium, PMMA and titanium

Configuring milling strategies:

With the expert version, you can create your own machining templates. This allows milling strategies and machining parameters to be optimally adapted to individual requirements. Defining machining strategies by modifying the parameters also allows the user to individually configure the machining paths as required to meet the quality standards.

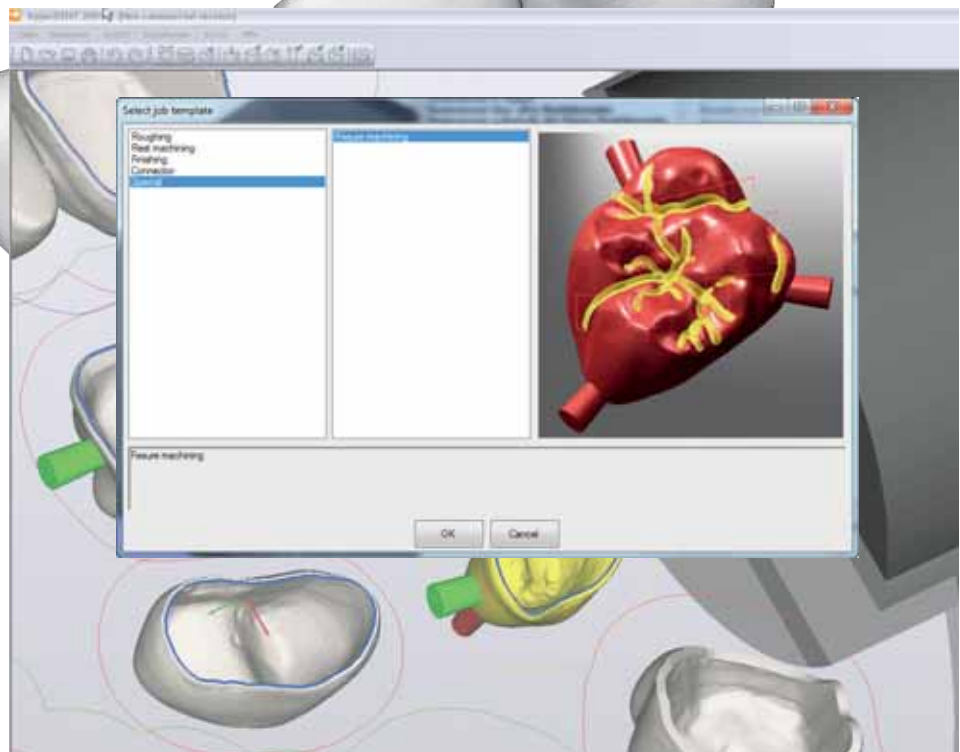


Definition of the machining direction:

In order to optimally machine large-span bridges, multiple insertion directions are often required. In this case, the machining plan for each unit can be set individually. With a few clicks of the mouse, the machining can be programmed in such a way that the inner side of the cap remains closed during the first clearing. After this, all machining jobs take place with the ideal cap-specific position.

Optimised undercut machining: Almost every area of an object can be individually programmed with undercut machining. Using 5axis simultaneous milling or 3+1 machining, fully anatomical crowns and bridges can be manufactured to a high standard of quality. During the process, materials and tools can be defined or adapted individually.

Special object machining: The machining of the objects can also be individually controlled. This often permits a significant reduction in machining time and improves the quality. In the case of an individual abutment, for example, the emergence profile can be produced with an almost burnished surface.



Machining strategies can be configured from the job selection dialogue in a user-friendly and structured manner.



René Aumüller of Reger Zahntechnik, one of the leading orthodontic laboratories in Germany

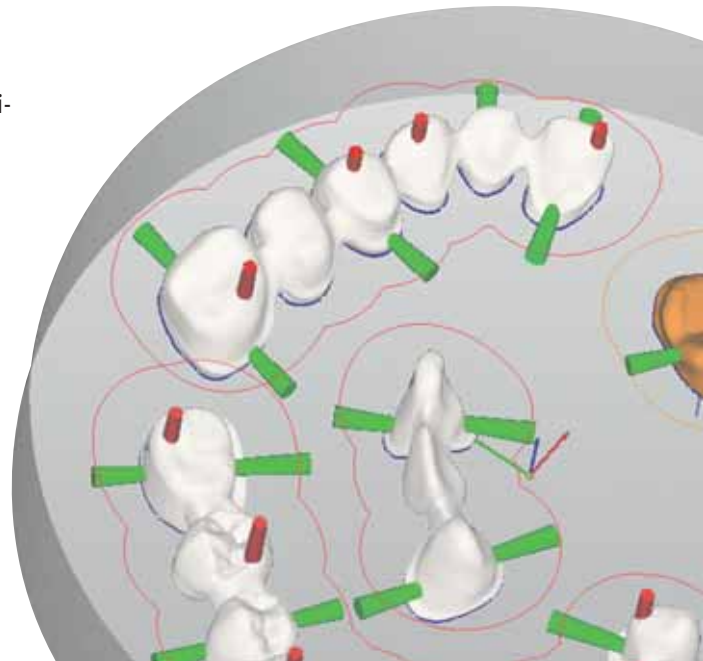
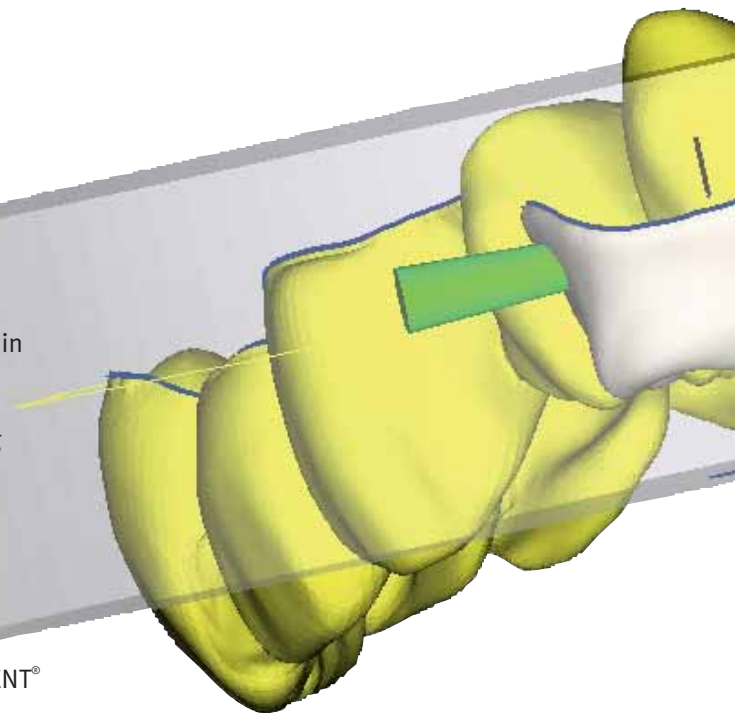
“*hyperDENT*® is an open, user-friendly solution that helps us to automate the entire process. As a result, we can exploit the potential of our milling machines to the utmost degree as well as use different materials from a variety of manufacturers. The software affords us the opportunity to produce flexibly and in a cost-effective manner.”

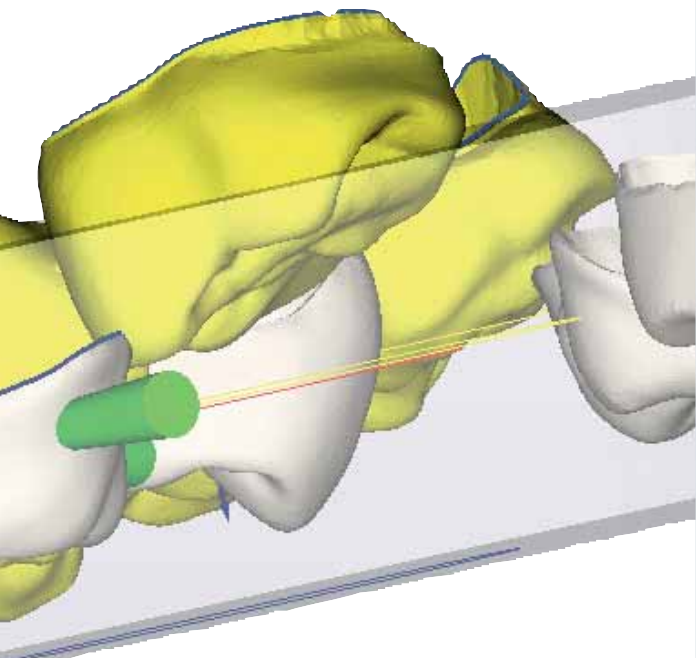
hyperDENT®: Automates the manufacturing process!

Quick programming with time-saving features such as drag & drop, shortcuts and mouse clicks. Users can move the model in any direction within the 3D view. This ensures highly accurate programming using a user-friendly interface. All programming steps can be repeated at any time or edited at a later time in order to obtain the best possible results. For this purpose, *hyperDENT*® provides users with an UNDO/REDO function.

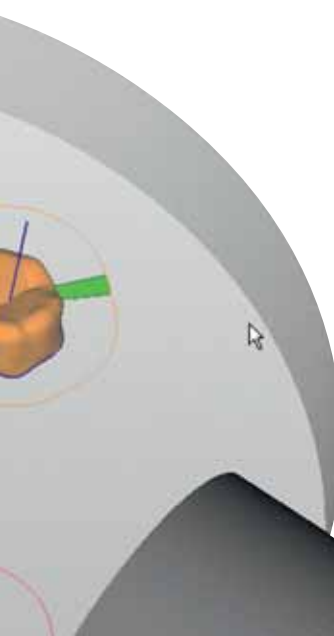
The comprehensive collision check and avoidance in *hyperDENT*® guarantees the highest level of process reliability.

This also includes fixtures in the collision check. Likewise, the machining simulation feature performs a thorough and detailed check of the generated programs before these are released for machining. Where required, each step can be checked individually. All of these features provided by *hyperDENT*® ensure exceptionally high quality parts and reliable production.



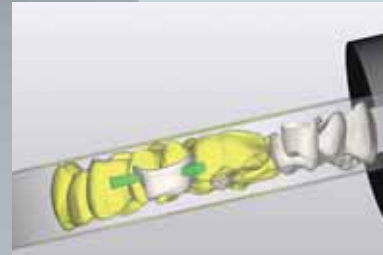


Nesting: Multiple objects can be placed anywhere within a stock using drag & drop or by rotating them with the help of the mouse. For instance, parts to reduce the length of sintering pins can also be moved in the Z direction. *hyperDENT*® automatically checks to ensure the position of the parts is complete and that milling is possible.

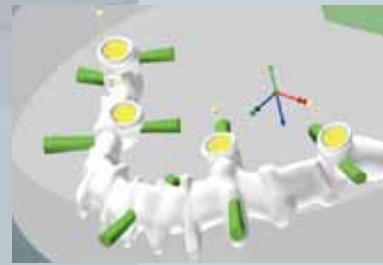


Tilted machining: Very tall stocks are required for multi-unit bridges with an unfavourable direction of insertion. The 'Align object' function automatically turns the bridge in the stock so that space requirements are minimised. For tilted machining, one can either

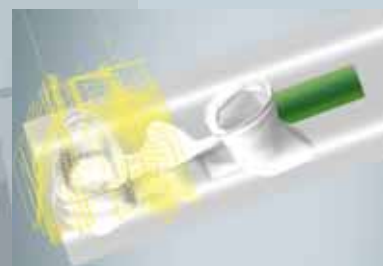
- rotate the entire machining axis
- or only tilt the inner area of the cap
- and machine the remaining areas orthogonally to the stock.



Abutments: A strong point of *hyperDENT*® is the new optionally available module for abutments with interface geometry. This way, almost all customary abutment types can be manufactured automatically.



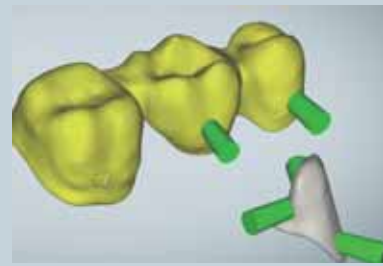
Bar machining: *hyperDENT*® also allows for the production of bar-shaped stock. For example, bridge structures can be processed section by section.



Loop module: There are special optional looping strategies for the safe machining of lithium disilicate (glass ceramics).



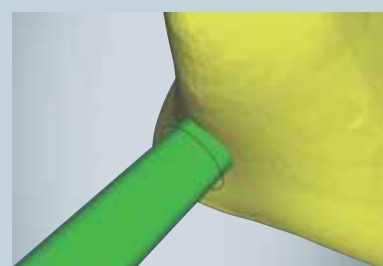
Connectors: Connectors can be modified in the graphical view or by editing the parameters. These may also be reconfigured as required at any time according to the object type in use.



Sintering pins: Simply click the mouse to place sintering pins at any location on the occlusal side of the model. These can be modified at any time in the CAM drawing itself or by editing the parameters.



Milling cuts: *hyperDENT*® allows the user to separate the connector either completely or partially after the milling process is complete.



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