# PYTHA 3D-CAD News

*Dear PYTHA customers,
dear friends of PYTHA,*

*This year we celebrate 40 years of PYTHA – celebrate with us!
With lots of special discount promotions and our large international user meeting, we want to involve you in our pride and our joy. We want to share with you the advantages that the powerful 3D CAD software PYTHA offers today – providing you with seemingly endless possibilities for intuitive planning, convincing presentation, and automatic production.
Forty years – and bursting more than ever with energy and new ideas: in this newsletter we give you a preview of the anniversary activities and present the latest news – as always, there's something for everyone.
We hope you enjoy reading and that you are looking forward to your next version of PYTHA!*

*Your PYTHA team*

## 40 years of PYTHA

Forty years of PYTHA – that also means 40 years of gathering experience at trade fairs all around the globe.
The key to making a success of any trade fair appearance is a committed team that sticks together. And every success must of course be celebrated properly! The picture below was taken at the EuroShop party after a successful week at the fair. It shows some members of the PYTHA team – look closely – do you recognize us?
We really rocked the CAD jungle!

# we celebrate: 40 YEARS

## Decisive details

### CAM "Setup interface"
The "Setup interface" dialog stores basic settings for data exchange with your CAM system. New options are available here:

### "All machining in 1 prog"
If your CNC allows machining on both sides, you can use this check to ensure that both the machining of the front side of the panel and the back side are written into a single program and marked accordingly.

### "H drill in 2nd prog"
This option ensures that all horizontal bores are generally written into the second program.
This is interesting, for example, when a nesting machine is used for the primary machining and horizontal bores are added in a second step.

### "Rotate 2nd prog about X instead of Y"
If panels have machining on both sides, it is necessary to rotate the workpiece.
Normally, PYTHA rotates the parts about the y-axis. The new option lets you force a rotation about the x-axis.

### "With nesting 2nd progs separately"
This new check can be set during the CAM export ("Export to CAM" button).
If it is active, PYTHA automatically writes separate files containing the rear machining for nested panels.

# 25 YEARS PYTHA PARTNERSHIP

Not only the PYTHA headquarters in Aschaffenburg celebrate its anniversary this year, so do our partners in Australia and the Sauerland!
**We warmly congratulate Stephan Spanke and his team on 25 successful years of PYTHA partnership.**
In 1997 Stephan Spanke founded his company "CAD-Systeme Spanke" in Rüthen (North Rhine-Westphalia) and became a PYTHA partner. The successful work of "CAD-Systeme Spanke" eventually earned it the title of PYTHA Master Reseller. Spanke looks after PYTHA customers in North Rhine-Westphalia and Baden-Württemberg.

Above: Stephan Spanke with his team.
Right: Photo of the night glow at the Warstein international balloon festival, which takes place annually near Rüthen.

**And then there's our successful dealer in Australia:**
**our warmest congratulations go to Michael Rowe and his team.**
**He is celebrating 25 years of PYTHA in Australia this year.**
To mark this celebration, the Australian PYTHA team is hosting its own PYTHA user meeting from 13 to 15 October 2022.
Have you always wanted to visit Australia? Then this might be the excuse you've been waiting for! Seize this opportunity and meet Australian PYTHA users. Besides one or two tips from Down Under in PYTHA, you'll certainly get recommendations for the best places to visit.

Above: Our Australian partner Michael Rowe (center) with his team.
Right: The world-famous Sydney Opera House, not far from the PYTHA office.

# WHAT'S NEW IN PYTHA

It's not long since we began rolling out PYTHA version 25, but we already have plenty of useful new buttons and options.
You will already find many of the functions presented here in our latest interim update. Here and there, however, we are excited to give you a preview of a new version of PYTHA.

## PYTHA + Shaper ORIGIN = a strong team

You will no doubt have heard of the hand-guided CNC routing machine "ORIGIN", which is distributed by the company Shaper Tools.
Imagine being able to transfer PYTHA drawings to your router and it would correct your hand movements to produce a precise routing. – Precisely this is possible with Shaper ORIGIN!

PYTHA offers two ways to transfer drawings to the ORIGIN:
- The PYTHA basic package already provides the command "File ⇨ Export ⇨ SVG". With the SVG (= Scalable Vector Graphics) file format, two-dimensional vector graphics are saved which the ORIGIN can read in directly. The desired machining operations are then assigned to the PYTHA chains of edges on the machine.

  Tip: Since all web browsers can display the SVG file format, vector graphics on the internet are often stored in this format.
  All common graphics programs (such as Adobe Illustrator, Corel Draw, Inkscape, etc.) can read and write SVG files. As such, the new PYTHA export format is also very well suited to data exchange with these programs.

- With the PYTHA workshop license, data exchange can be made even more convenient: Simply select "Shaper tool (.svg)" as the target CAM system during machine setup. As soon as you export parts from the PYTHA workshop, all supported workshop commands are automatically translated into the Shaper Tool language. The ORIGIN then recognizes all router commands right away. Setup on the machine is no longer necessary. Especially for recurring applications, this way is much more time-saving, as you can add machining commands directly to your library elements.



The ORIGIN router from Shaper Tools combines computer-controlled routing technology with a hand-held power tool. 2D contours that you have designed in PYTHA can be milled with breathtaking precision.
More information about the ORIGIN is available at www.shapertools.com

## Decisive details

### Groups: "Keep closed"
When creating a new group, a dialog for defining the group properties appears. Three options are now offered under the heading "Keep closed":

- "In parts list" = Use this check to force the group to behave like a single part in the parts list. It then appears even if the group tree is deactivated.

- "In functions" = If this check is active, all parts of the group are always automatically selected when making selections. This means it is no longer possible to select an individual group part separately.

- "Geometry" = Activate this new check if you want to ensure there can be no accidental changes to the geometry of the group parts.
  You can still move the parts, but commands like "extend", "cut", etc. are disabled.

### Group dimensions in parts list
Another new check in the dialog is called "Lengths as group angle". It defines how group dimensions are sorted in the parts list. If it is set, a local coordinate system is calculated using the group angle. The group size parallel to the local x-axis is entered in the first dimension column of the parts list, the size parallel to the local y-axis in the second column, and the z-dimension in the third column.
If the check is not set, the largest group dimension always appears in the first column, the second largest in the second, and the smallest dimension in the last column.

# Decisive details

### Bore hole depth

Holes that you create in the PYTHA workshop are shown in simplified form as circles.

In order to be able to check drilling direction and depth later on, you will now find the new command "Bore hole depth" in the "Info" drop-down menu.

Once you have selected and confirmed the parts you wish to check, PYTHA displays the properties of all drill holes in the workpiece.

Alternatively, the drill holes are selected directly.

### Drilling direction

By popular request, the command "My holes" in the PYTHA workshop now also indicates the drilling direction with an arrow. If this is not as desired, it can be corrected with the "Invert direction" button.

### SCM Maestro (.xcs)

Since Maestro does not independently select the correct drill for 5-axis machining, PYTHA now takes over this task.

To do this, create the available drills in the PYTHA tool definitions and activate the option "Drill swiveling".

Now PYTHA decides during data export which tool will be used for which hole.

### 2D DXF export

With the commands "File ⇨ Save as... ⇨ Select Faces" or "Using Pen 19/20", PYTHA has long offered a simple way to transfer construction data to CAM systems. These two commands have been revised and combined into one.

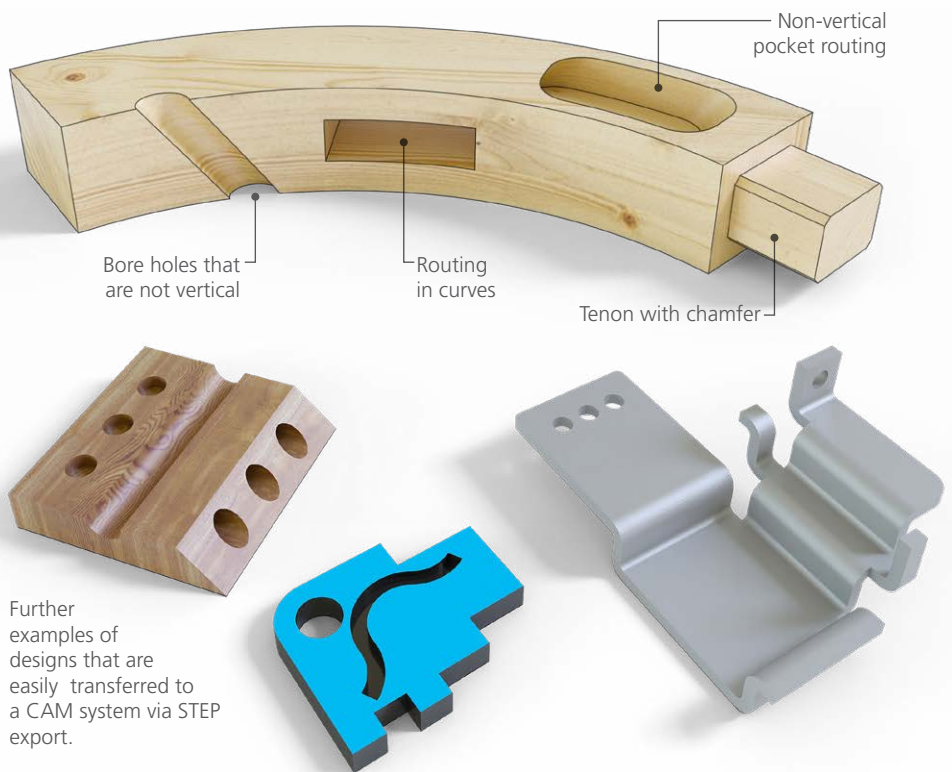This can now be found here: "File ⇨ Export ⇨ 2d DXF".

## New STEP export enables 5-axis machining

PYTHA now offers another interface for data exchange with other CAD and CAM systems. In the "File ⇨ Export" drop-down menu you will find the new **STEP** interface (= **ST**andard for the **E**xchange of **P**roduct model data). This is a standardized data format that focuses primarily on the exchange of production data.

What's special about the STEP format is that it exchanges not only polygons, but also parametric surfaces. For example, a cylinder drawn in PYTHA also appears in the target software as an editable cylinder and not just as a segmented 3D part.

This fact means the STEP format is perfectly suited to transfer complicated 3D parts to a corresponding CAM system. In this, the required 5-axis machining is then derived by feature recognition.

The bar shown here is an example of some machining operations that until now could not be transferred to a CAM system. Thanks to PYTHA STEP export, this is now possible without any problems!



Non-vertical pocket routing

Bore holes that are not vertical

Routing in curves

Tenon with chamfer

Further examples of designs that are easily transferred to a CAM system via STEP export.

## Special cases

With the help of the PYTHA workshop, more special cases are supported in type automatic and CAM output. So PYTHA now also generates dowel holes correctly in sloping panels:
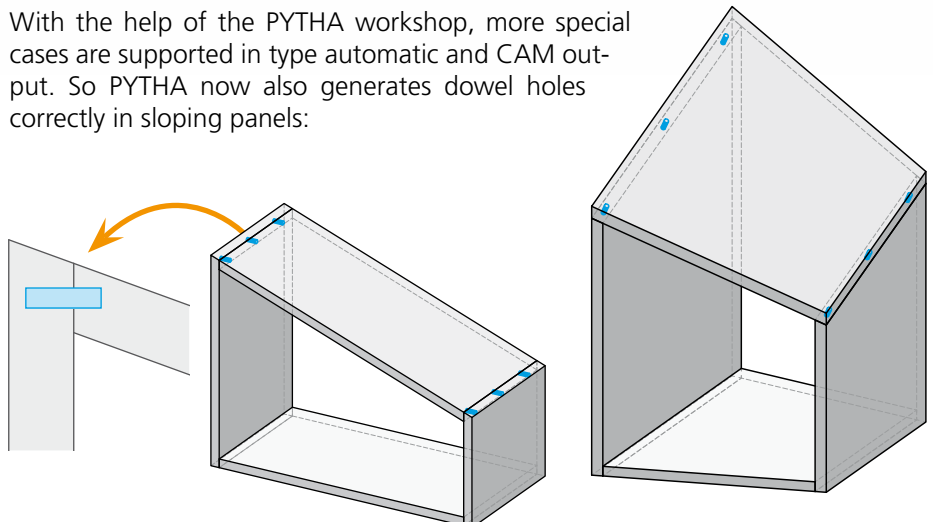
## Automatic routing with recognition of cut-outs

In the "Settings" menu of the PYTHA workshop, you can use the "Router Rule" button to specify that parts automatically receive a toolpath at the outer edge of the part during nesting and CAM export.

New here is the check "Also cut-outs". Once it is set, PYTHA detects holes and cut-outs that have been booleaned into the panel and automatically creates a router path for them. This means that the same (booled) 3D model can be used for production as for visualization and technical drawings. – This saves an enormous amount of time, especially with complex parts.

Tip: Automatic routing only works if suitable rules are defined in the "Strategies" in the "Machine Setup".
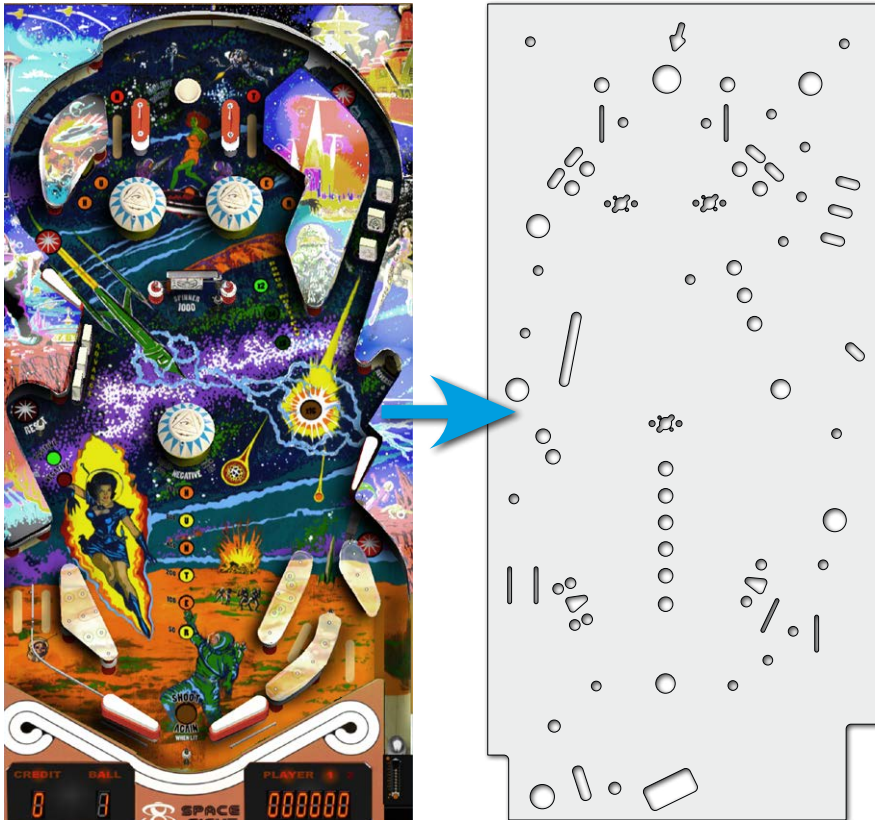


These graphics show the layout of the pinball table "Jupiter Crush". The panel to be routed requires numerous cut-outs for actuators and lighting. Thanks to PYTHA's new cut-out recognition, the boolean holes can be used directly. It is no longer necessary to draw toolpaths separately.

This function saves a lot of work, especially with complex parts. It is not necessary to construct a separate production model.



Automatically extracted tool-paths from the window on the right.

Workpiece outer edge

Automatically generated toolpath

The cut-out resulting from the router process
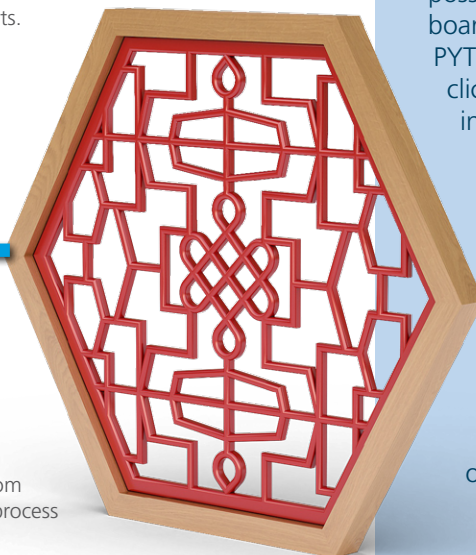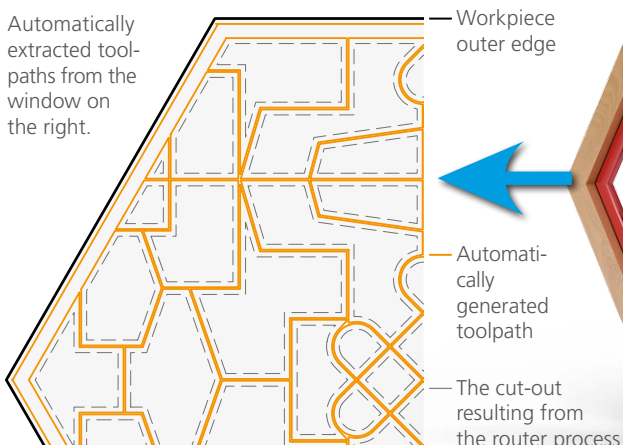
## Decisive details

**2D text**
Before you can start entering a 2D text, you first need to define the position and size of the new text field with the left mouse button.

What is new is that you can skip this pick with the middle mouse button. The point picked in this way defines the upper left corner of the text field and text input can start immediately.

**Project tree**
The PYTHA project tree shows all elements of the current project. Groups can be displayed here in two different ways:
- Expanded = you see all group parts
- Collapsed = you only see the group name. The parts it contains are hidden.

Now you can close all groups in the list in two mouse clicks: At the top of the project tree is a house icon followed by the word "Project". Right-click on this entry and select the command "Collapse".

**Shortkeys**
Since version 25 it has been possible to set up individual keyboard commands (shortkeys) in PYTHA. To do this, simply right-click on the relevant command in the vertical menu.

Functions that are located exclusively in the drop-down menus (e.g.: "View ⇨ Preview Render") were not previously accessible in this way. Now there is a new category, "Extras", in the main menu, listing the most important commands of the drop-down menus.

## Instructors


**Theo Weber**


**Simon Ries**


**Veit Edelmann**

At the GS Ravensburg, CAD/ CAM training is provided by Theo Weber and Simon Ries as workshop teachers, and Veit Edelmann for the theoretical side.
We are very pleased that such dedicated teachers are getting the next generation of carpenters excited about PYTHA and hope to continue working closely with them for many years to come.


GEWERBLICHE SCHULE RAVENSBURG

# PRACTICAL APPLICATION IN TRAINING

In the training sector, there is a high demand for 3D CAD software that offers young people an easy introduction to technical drawing and is fun at the same time.
For more than 25 years, the way PYTHA has been developed has considered the requirements of schools and training centers. It was in close liaison with teachers, lecturers and trainers, for example, that we developed the PYTHA schoolbook, which is distributed free of charge to schools in class batches.

We are proud that today there are over 3,000 student licenses in active use. In Germany alone, PYTHA is part of the curriculum at more than 300 vocational & technical colleges and universities. And internationally, too, more and more schools are teaching with our software.

The commercial school (GS) in Ravensburg has been using PYTHA in class since 1996. It trains around 120 students as journeyman and master carpenters every year. What's more, the school also offers further training, e.g. as a CAD/CNC specialist. We were allowed to look over the shoulders of the CAD teachers Mr Edelmann, Mr Ries and Mr Weber as they worked on various projects.
In daily lessons, students design and plan independently in PYTHA, with the support and guidance of their teachers. The workpieces can then be manufactured on the in-house CNC and nesting machine or – a new development – with the Shaper Origin CNC router.
The school is also on social media (Instagram: bfs_holztechnik), where it regularly provides insights into everyday school life and its projects.

One exciting class project, for example, was the task of creating a brand new company logo, sketching it and finally "immortalizing" it in wood. Encouraged to let their imaginations run wild, the students came up with their own individual company logos.
To start with, they vectorized their hand drawings in PYTHA. The generated chains of edges were then edited and defined as router contours in the PYTHA workshop. The PYTHA Shaper export interface made light work of transferring the logos to the Shaper Origin. For the students, the best part of the project was working with the hand-guided CNC machine!

We were thrilled to learn more about the exciting work of these dedicated teachers and students – and we look forward to their next projects!


GS Ravensburg journeyman carpenters vectorizing their logos in PYTHA
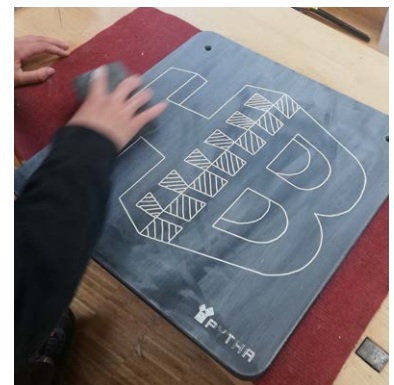

Sanding after filling the toolpaths with white filler


Finished logo panel after painting

## Shaper Box Challenge

For the "Shaper Box Challenge" on social media, the three teachers Mr Edelmann, Mr Ries and Mr Weber submitted their specially created "Feather Pillow", a beautifully balanced pen box.

The inspiration for the design of the "Feather Pillow" pen box came from childhood roly-poly toys, which sway and stop wobbling thanks to a weight.
The small stationery box moves freely on its sides and can be closed with a roller shutter.
From the PYTHA drawing, all parts of the design were exported directly to the Shaper Origin and could then be milled effortlessly.

## Feather Pillow
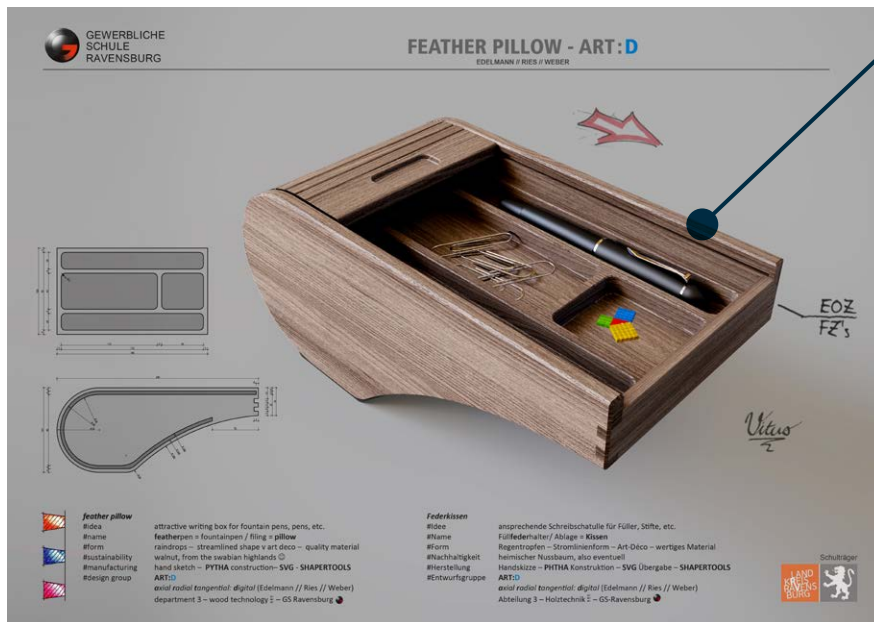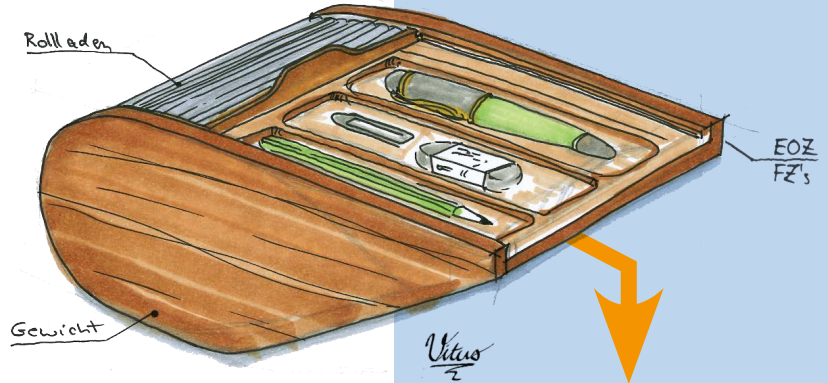


### PYTHA 3D model

After brainstorming and sketching by hand, a detailed 3D model was created in PYTHA.
Technical drawings, visualizations (see picture to the left) and of course the toolpaths for the CNC router ORIGIN were derived from this.
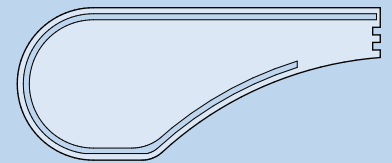


Thanks to the PYTHA SVG export, the required contours are transferred to the ORIGIN in just a few mouse clicks and the milling work can begin.
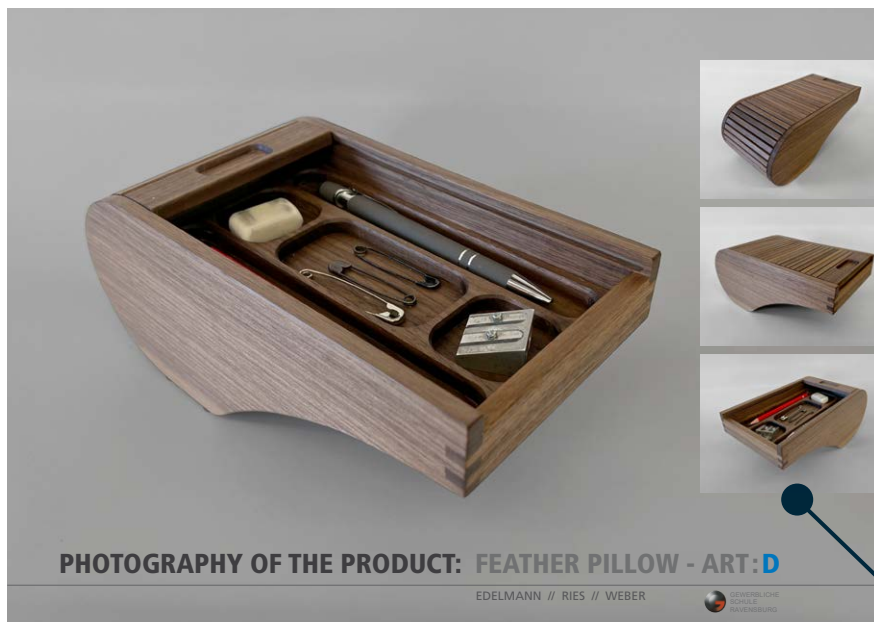
### Final photographs



PHOTOGRAPHY OF THE PRODUCT: FEATHER PILLOW - ART:D
EDELMANN // RIES // WEBER

## Decisive details

**Microsoft Store**

The free PYTHA Viewer is now also available for download in the official Microsoft Store. This makes it even easier for your customers to view PYOs they have received from you on their computers at home.

The download link isn't hard to find: Press the Windows key on your keyboard. The Start menu opens. Here you enter "store" ⇨ ENTER key.

The Microsoft Store opens.

Enter "PYTHA" in the search field. The appropriate download page appears immediately as a suggestion.

Also use the possibility to save protected PYOs for the Viewer!

**Engraving text**

For some time now, in the "Edges" menu PYTHA has provided the function: "Engraving text".

This converts any entered text into a chain of edges which is perfectly suitable as a contour for a router or laser.

It is recommended to use a so-called one-line font (or single-line font). In these special fonts, the letters are not formed by outer contours, as is usually the case, but from a central line. The font thickness is determined by the properties of the router or laser.

In future, PYTHA will offer its own one-line font, which will automatically be available with the "Engraving text" function.

No more wasting time looking for a suitable font on the internet!

## PYTHA plug-in for surface subdivision

An interesting new plug-in that is not part of the official PYTHA setup can be found at https://github.com/fabian-flassig/Voronoi. It calculates a so-called Voronoi diagram at the push of a button.

These diagrams are used in a wide variety of scientific disciplines such as biology, geography, chemistry, etc. to show the range of influence of points on a surface on their surroundings.

If the starting points are distributed irregularly, this automatically creates interesting, seemingly randomly structured surfaces. These are also appealing from a design perspective. This is why, in architecture, such diagrams often form the basis for the design of modern façades, windows and wood paneling.

As you would expect with PYTHA, you can edit the calculated surfaces as you wish and give free rein to your creativity.

Examples of PYTHA Voronoi diagrams that were processed further using commands such as: profile, bend, NURSS, points "on surfaces".

## Custom Dialogs

As of PYTHA V25, you can adapt the RadioLab program interface to your own needs (= vertical menu ⇨ "My RadioLab").

In an easy-to-use editor, all available commands are listed and can be combined into new dialogs according to your preferences. Keep an eye on this command list, because it grows and grows and new functions are added all the time. For example, commands are now also available with which you can edit the background or the exposure of the scene.

A nice touch here is the fact that many of the new settings can be edited using the mouse wheel, e.g. the brightness of the background or of an HDR image.

What's more, it is now possible to color the buttons of the user dialogs individually. For example, you may choose to structure them visually by theme.

# PYTHA VISUALIZATION

## High-Performance Denoising

A modern ray tracer – such as the one PYTHA offers – shows the final result of the calculation after only a few seconds. However, this is still very noisy to start with (image below, left). Calculations follow that minimize this noise step by step until it is eventually no longer visible. This process usually takes several minutes or – depending on the scene – even hours.

But not in PYTHA! Both the PYTHA modeller and RadioLab offer a function for automatic denoising of the image. At the push of a button, a noise-free result is displayed, as shown in the picture on the right.



**1 SECOND**
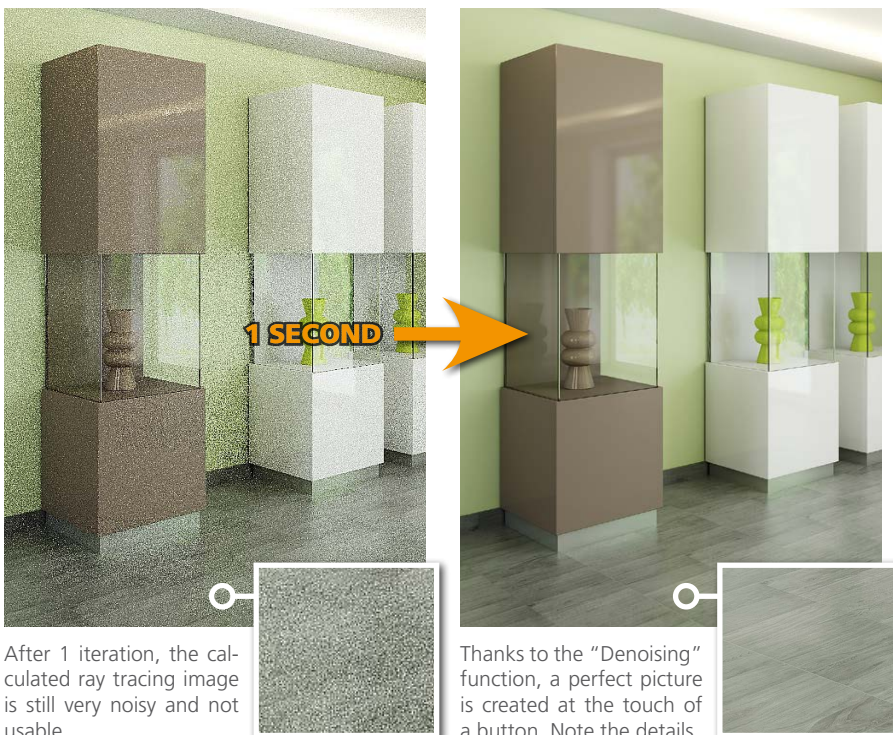
After 1 iteration, the calculated ray tracing image is still very noisy and not usable.

Thanks to the "Denoising" function, a perfect picture is created at the touch of a button. Note the details.

This is made possible by AI denoising, a technology for denoising digital images using artificial intelligence. Here, a self-learning algorithm trained on thousands of images from 3D projects analyzes your scene. It understands what your visualization would look like following a long calculation period – and shows you this result almost in real time.
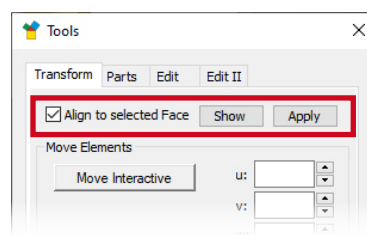
It is remarkable how the finest details of the wood grain are preserved in the example above.

## Transformations parallel to surfaces

All interactive transformations using the gizmo function are parallel to the coordinate axes. As soon as objects are at an angle in the room, it is virtually impossible to work with this in a useful way.

In RadioLab, you will be able to define any surface at the top of the dialog to which the gizmo will orient itself.



If "Move Interactive", rotate or scale is then activated, the transformation will take place parallel to this surface (previously, this was only possible when moving.)
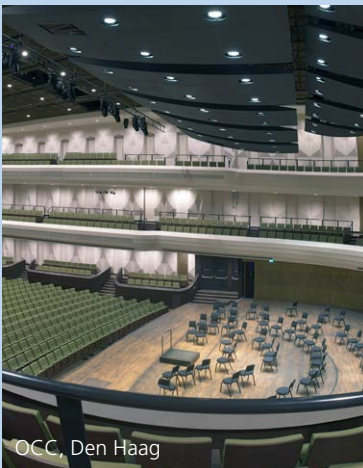
# PYTHA News

## PYTHA users

With over 300 employees, Gielissen realizes around 1,500 projects per year worldwide.

It has offices in Amsterdam, Atlanta, Dubai, Eindhoven, Hanover, Helmond, Las Vegas, London and Stuttgart.


National Nederlanden Workspace


OCC, Den Haag


Exhibition design: Nexperia

## PYTHA customer: Gielissen
Interiors | Exhibitions | Events

Our newsletter series focussing on impressive PYTHA customers wouldn't be complete without the Dutch company Gielissen!

Founded in Eindhoven in 1937, Gielissen is now one of the leading international exhibition and interior design companies, with eleven branches on three continents. At Gielissen, the focus is not on a single sector, as is usually the case. Rather, competence in exhibition stand construction, event and exhibition planning, as well as in all facets of interior design are combined in one company. This broad positioning provides clients with a competent, reliable partner, especially for large projects – a partner able to fully take care of all aspects of project conception, planning and implementation.


Construction of houseboats for the marina: MaasParc Asselt


Yacht interior: Zeelander


Exhibition design: Abbott

www.gielissen.com

# Virtual Reality (VR) **& Augmented Reality** (AR)

Since the release of the first commercially usable virtual reality headset, the Oculus Rift, PYTHA has offered an interface to it in RadioLab.

Here, the scene viewed in RadioLab is transferred to the headset and can be wandered through completely freely.

As soon as you put on the headset, you have the feeling that you really are standing in the room. You are free to turn around, kneel down, jump up, walk around and see your project in full size in real time. Besides designs and details, this lets you realistically assess distances and dimensions before you even start building.

The current successor to the Oculus Rift is called "Oculus Quest 2" and is of course also supported by PYTHA.

PYTHA V26 brings virtual reality to the PYTHA modeller, because now you can easily transfer the perspective view of the design area to a VR headset.

To do this, activate the new "Start AR/VR" function in the "Graphics" drop-down menu. This new feature is perfect if you want to quickly present a design or check proportions and sizes. It is therefore only necessary to switch to PYTHA RadioLab when you require a photorealistic representation of the VR scene.

AR glasses:
Microsoft HoloLens 2

Speaking of photorealistic representation: RadioLab now also passes the spherical 3D background to the VR headset and displays mirrored textures. Furthermore, movement actions are supported, allowing you to open doors in VR, for example.

**Good to know:** The PYTHA team chose the open programming interface "OpenXR" for the PYTHA modeller's new VR connection.

This allows you to use not only Oculus equipment but also headsets from other manufacturers that support this standard. Even AR headsets, such as Microsoft's "HoloLens 2", can thus be connected to the PYTHA modeller.

### VR? AR? What's the difference?

VR stands for "virtual reality". It uses headsets that are closed and replace your vision.

The real environment is completely blocked out. All you see is the 3D space, which is completely virtual.

AR is the abbreviation for "augmented reality".

AR uses headsets that allow a fusion of the real environment with virtual objects.

For example, if you are in your client's new building, you could use AR to hang your cupboard design on the bare wall. But if the building doesn't exist yet, you could use VR to invite your customer to take a look around the new premises before construction begins.

VR glasses:
Oculus Quest 2

## *Texture Browser*

In PYTHA RadioLab, open the texture catalog with the "Textures" button (vertical menu).

A number of useful functions have been added to the context menu, which you reach by right-clicking in the preview area of the dialog.

The commands listed depend on whether the images of the scene, a directory or the mirror textures are currently being displayed.

Furthermore, the menu shows additional entries if surfaces are selected in the scene window. For example, the new (much desired) command "Delete textures" appears, which removes the texture from the selected surface.

Also new is the possibility to rename or move the external image files of the textures via the context menu. The file names in the interfaces are also updated automatically.

If you do not have software for viewing panoramic images installed on your computer, you can simply use RadioLab for this purpose:

Right-click on the panoramic image in the texture catalog and select "Show with panoramic viewer".

The image will be displayed in the scene window and can be closed again by pressing the ESC key.

Furthermore, the texture catalog has an input line in the upper area for filtering the dialog preview.

You can now open this to select useful filter operations such as texture size or transparency.

# PYTHA News

## Decisive details

### Spherical 3D background

In RadioLab you can create a 3D background whose image envelops the scene like a sphere and realistically follows the camera movements.

Previously, quite a few settings needed adjusting in order to set this up. Now it's very easy:

Drag a 360° panoramic image (in 2:1 format) onto the background area of the RadioLab scene window. – Done!

Whether from the "Texture Browser" or directly from Windows Explorer, the image will immediately appear correctly in the background.

By the way: If you drag a normal image from Windows Explorer or the texture catalog onto the scene background, this will also be used as the background image.

## Imprint

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## Drag & Drop from Explorer

For some time now, you have been able to drag images that you want to use as textures directly from Windows Explorer into the RadioLab program window. Here RadioLab distinguishes whether you drop the texture over a surface or over the preview image of the surface editor. In the first case, only the corresponding surface is colored, while in the second case all parts that are linked to the surface are colored.

In the new version of PYTHA RadioLab you can also drag the image file from Windows Explorer into the texture catalog. If this is in the "Directory" display mode, it automatically changes to the folder of the image file and displays the complete folder contents.

Furthermore, in future you can also simply drag and drop adjuster files into the RadioLab program window in order to install them. These can be e.g. .SURF files that contain surface materials, or .TXT files in which your user dialogs or your individual context menus are stored.

In this way, settings can also be transferred very easily from one computer to another.
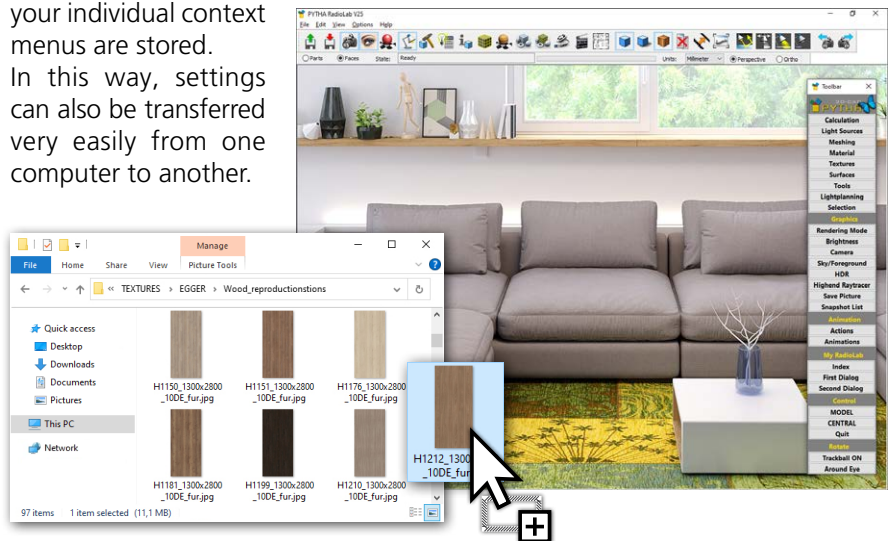
## Edit scene background

In PYTHA RadioLab, you can load a photo as a scene background with the help of the "Rendering Mode" dialog ("Background" tab). What is new is that this background image can now also be edited interactively. To do this, press the "Edit" button at the same point in the dialog. Then use the left mouse button to move the picture or the mouse wheel to change its size.

This is how the graphic below was created: The black cabinet is a 3D model rendered in RadioLab. The wall, floor and other objects are a photograph of the existing space and were used as a background image.