RhinoCAM at PBE

PAUL BERNHARD EXHIBIT DESIGN & CONSULTING

What do the Museum of Natural Science in Houston, a World Heritage Site and Quentin Tarantino all have in common? They have all benefitted from the expert design and consulting work of PBE - Paul Bernhard Exhibit, Design & Consulting.

Located in Austin Texas, PBE with over 100 employees, brings together a diverse team of designers, fabricators, technicians, and content specialists, all collaborating to produce a wide variety of projects across many different media. Their work reflects this diversity: whether the task is creating movie sets, exhibit halls or digital media, PBE provides unique solutions to meet their clients' needs.

Whether they're creating killer props and set pieces for "Kill Bill" or "Spy Kids", detailed topography maps, or futuristic museum display pieces, PBE turns to RhinoCAM from MecSoft for their CNC machining needs.

Images from left to right: Prop piece for Quentin Tarantino's "Grindhouse", Garden of the Gods Visitor & Nature Center – Colorado Springs, John P. McGovern Hall of the Americas – Houston Museum of Natural Sciences

Why RhinoCAM?

The engineering team at PBE uses Rhinoceros 5.0 for their CAD and 3D modeling needs. For CNC machining, PBE turns to RhinoCAM to program the toolpath strategies and generating the g-code that drives their Precix and Laguna Shop Smart 2 CNC machines.

Want to see how RhinoCAM can help you? Click here to download a demo.

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> **We do everything in Rhino! What we love is that it provides us a seamless operation platform. Often when transitioning from one CAD system to another there is unnecessary data that gets carried over. This complicates the design process by introducing additional work. We can model designs in RhinoCAD, with the assurance of knowing that there will not be a problem in RhinoCAM. Everything is done right the first time!"**

- Anthony Pelosi, CNC Lead at PBE

Cutting Terrain Models with RhinoCAM

A recent Rhino/RhinoCAM project at PBE involved the topographic exhibit design and production of a geographical site recently designated a [World Heritage Site](#) by the World Heritage Convention (an organization of UNESCO). The geospatial data was loaded into Rhino 5.0. The Machining Setup, Stock, 3 Axis toolpaths and all the required g-code were completed using RhinoCAM. Refer to the figures below to learn more about this amazing project!

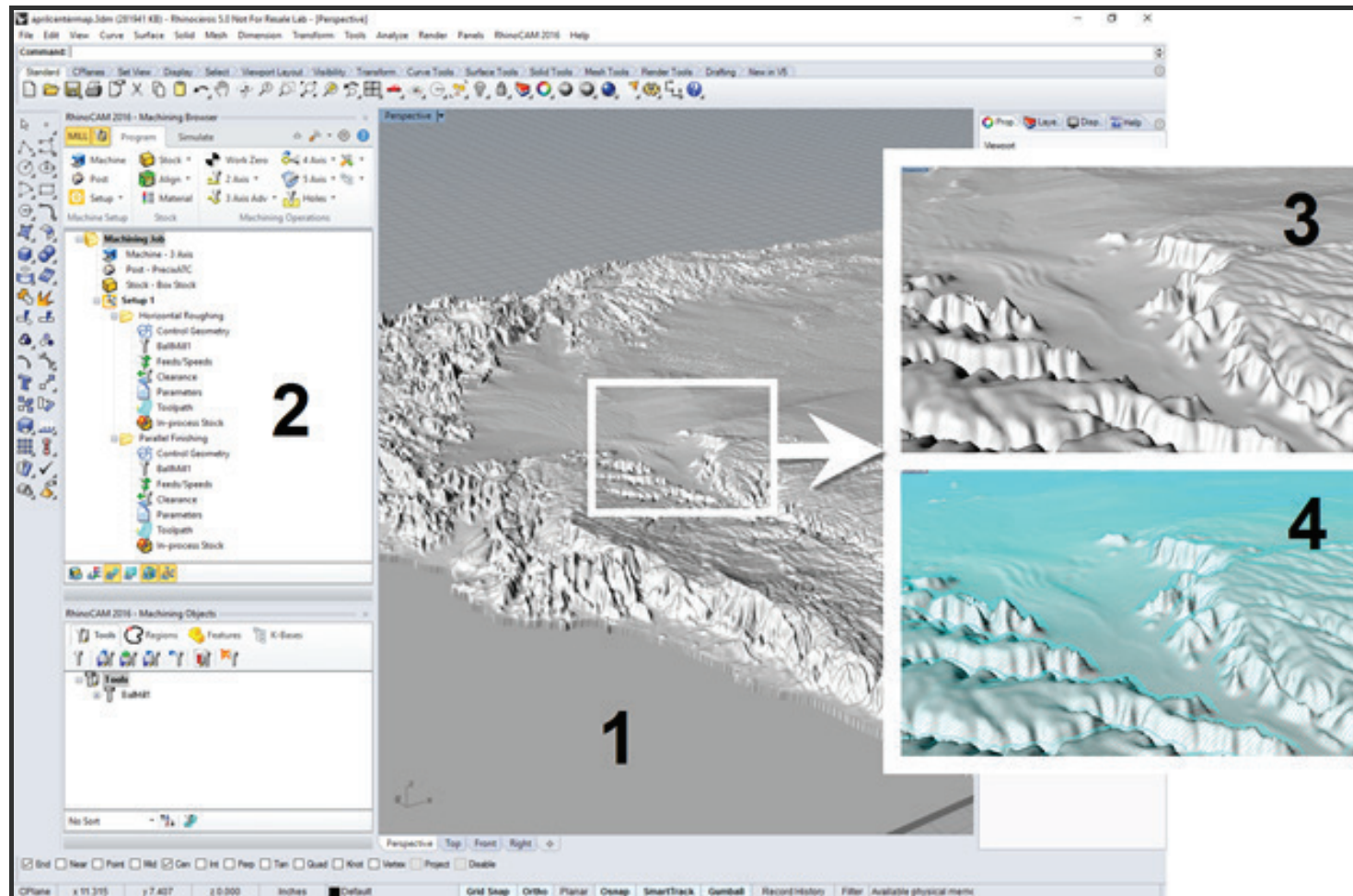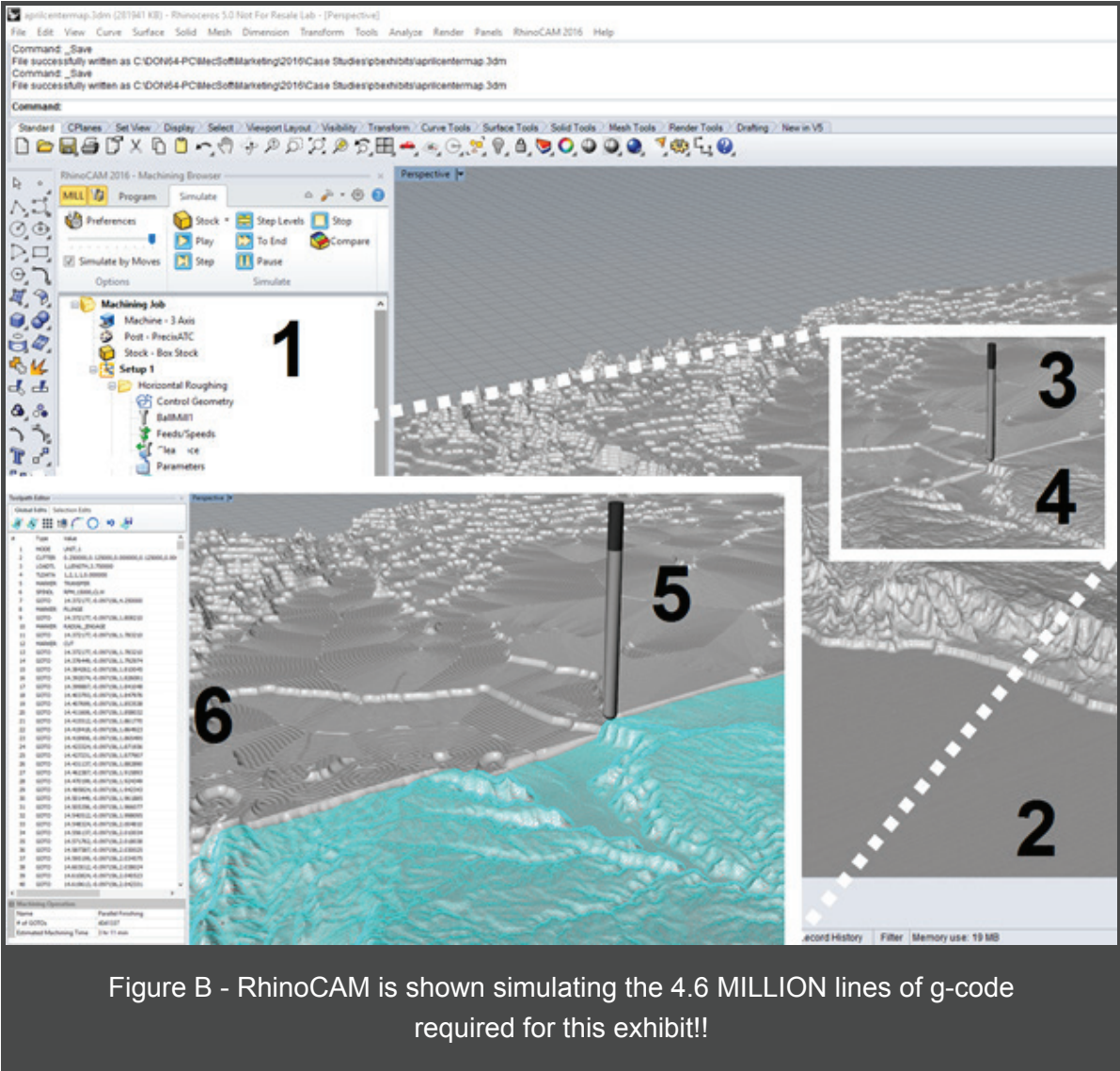Want to see how RhinoCAM can help you? [Click here](#) to download a demo.

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Figure A - This PBE project shows RhinoCAM being used to generate 3 Axis toolpaths on a high resolution
3-dimensional surface elevation terrain model of a geographic world heritage site.
The scale model is 88" long by 34" with an overall height of 4".

Refer to Figure A above:

1. The high-resolution surface elevation terrain model is displayed in Rhino 5.0.

2. The RhinoCAM Machining Browser is shown on the left with the Machining Job defined comprised of a 3 Axis Setup, a 3 Axis Horizontal Roughing and a 3 Axis Parallel Finishing operation.

3. A close-up area of the terrain model (inset upper-right) shows clear details including river basins, mountain ranges and estuary runoff!

4. The same section (insert lower-right) is shown with the 3 Axis Parallel Finishing toolpath superimposed on the surface terrain model.

Figure B - RhinoCAM is shown simulating the 4.6 MILLION lines of g-code required for this exhibit!!

Refer to Figure B above:

1. The RhinoCAM Machining Browser is shown on the left with the Simulation tab selected.

2. The 88"x34"x4" stock model is shown with cut material being simulated.

3. The 3 Axis Horizontal Roughing operation contains 650,000 lines of g-code and is shown previously simulated on the far side of the stock model using a ¼" ball mill, an offset cut pattern, a step over of 40% (of the tool diameter), a step down of 50% and a stock offset of 0.025" left on the part.

4. On the front side, we see the 3 Axis Parallel Finishing operation in the process of being simulated.

5. A close up of the toolpath cut material simulation shows the river basin and estuary runoff shown in Figure A(3) above being simulated.

6. The 3 Axis Parallel Finishing operation contains 4 MILLION lines of g-code shown in the RhinoCAM Toolpath Editor. The operation uses the same ¼" ball mill with a stock allowance set to zero (finish cutting on the surface of the high-resolution terrain model) at a 12% step over.

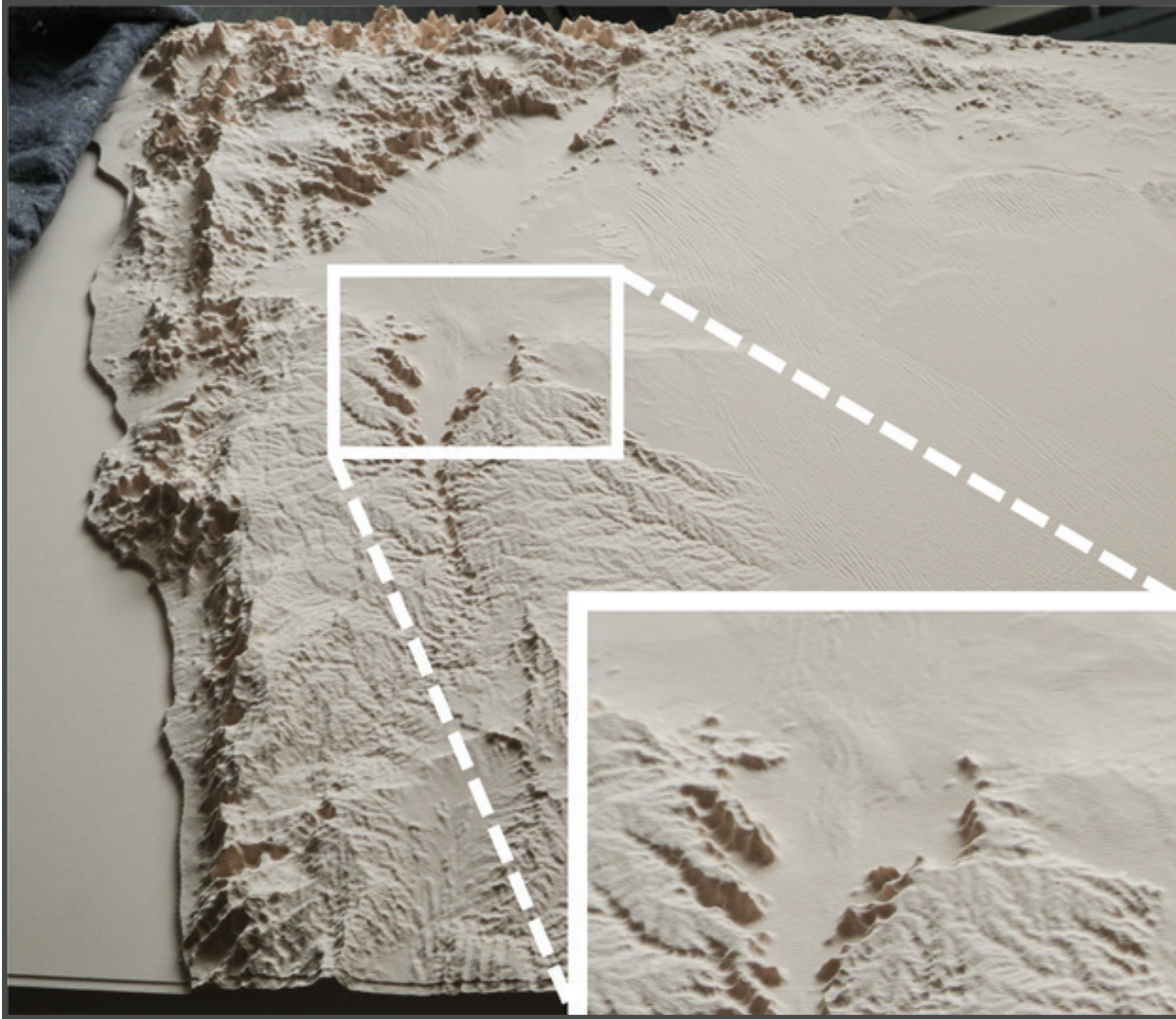Figure C - Here we see the Machining Operations Information dialog for the RhinoCAM toolpaths shown in Figure B above. The 3 Axis Horizontal Roughing is estimated to take 23 hours of machine time cutting at 550 inches/minute while the 3 Axis Parallel Finishing is estimated to take about 3 hours at the same cut feed rate.

(Figure D) The completed surface elevation terrain model cut from RenShape High Density Modeling Board is displayed as it was taken off the CNC machine. The river basin and estuary runoff shown in Figures A and B are shown inset lower right. In this project, PBE clearly demonstrates the power of RhinoCAM!

ART to PART at PBE with RhinoCAM

PBE also uses the RhinoCAM-ART module (also referred to as RhinoART) to convert artwork into geometry suitable for machining. With RhinoART, PBE designers can model artistic shapes from color or black/white raster bitmap images. They can then machine those shapes using RhinoCAM's MILL module.

> *What I like about RhinoART is that it doesn't need a detailed bitmap image. Even a medium quality JPEG image can provide incredible results. I've been able to create 3D geometry from 2D photos with an incredible amount of detail. - Anthony Pelosi, PBE*
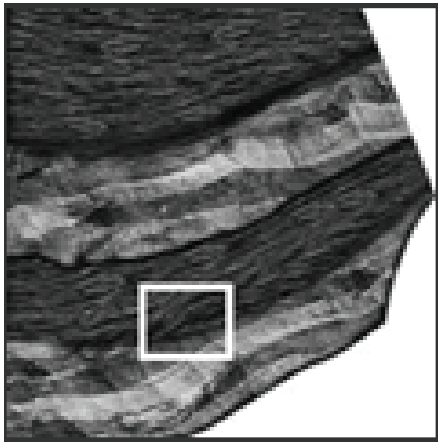

In this example, PBE uses RhinoCAM-ART to create a 3-dimensional Relief model in Rhino 5.0 from a 2-dimensional bitmap file. The image file shows the distribution of salt/share substrate deposits. The goal was to create a wall-mounted exhibit depicting the salt/shale deposits in relief that could be machined using RhinoCAM. Refer to the figures below to learn more about this project.
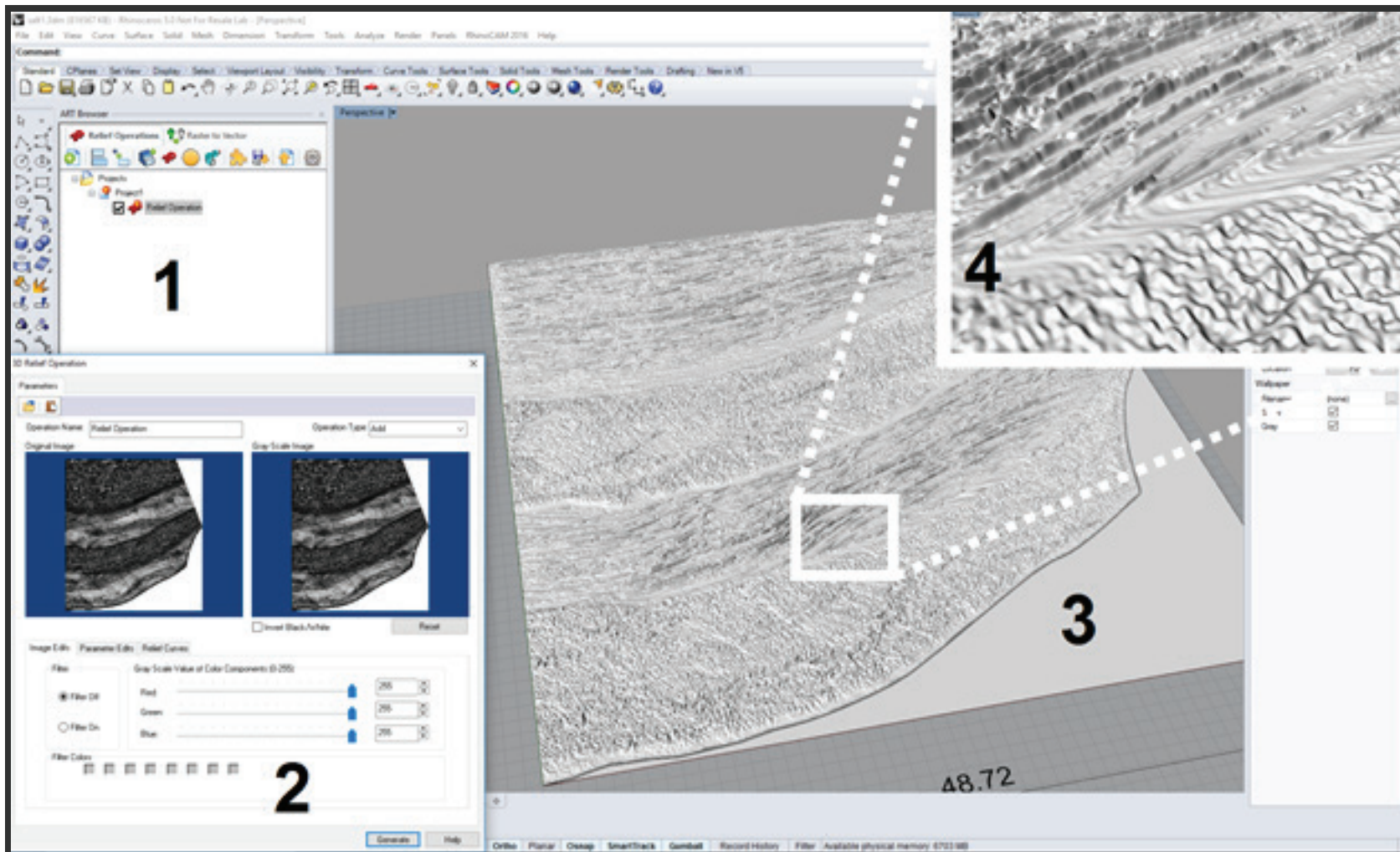
(Figure E) This PBE project shows RhinoCAM-ART being used to create a 3-dimensional Relief model in Rhino 5.0 from a 2-dimensional bitmap image file. The bitmap image is shown in the dialog in the image above and is also shown separately below with the magnified area highlighted.

Want to see how RhinoCAM can help you? Click here to download a demo.

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Refer to Figure E above:

1. The RhinoCAM-ART Browser is shown with the 3D Relief operation displayed.

2. The 3D Relief operation dialog is displayed. This dialog is used to manipulate the original bitmap image prior to creating the 3D model. The different tabs allow you to apply color filters, add relief curves and adjust other parameters such as size, relief height and a smoothing factor.

3. Once generated, the 3D relief model is displayed on the screen.

4. If you zoom in you can clearly see the varying degrees of relief height applied to each pixel color of the original bitmap image. The bitmap image of the salt/share substrate deposits is shown to the right with the magnified area from the image above shown highlighted area.
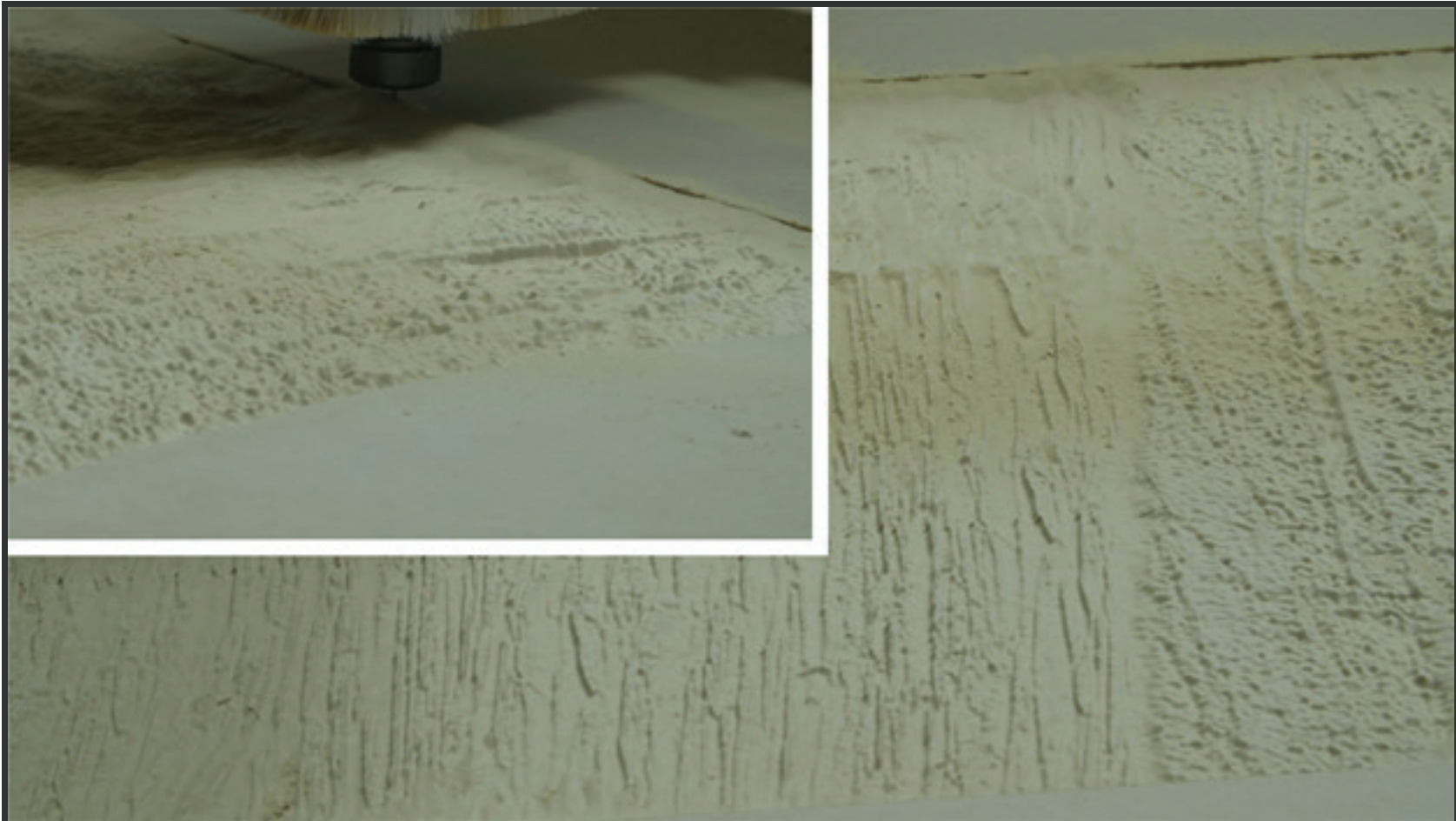
(Figure F) This image shows the 3D Relief model of the salt/share substrate deposits created from a bitmap image in RhinoCAM-ART being machined out of Plum Creek MDF from toolpaths generated in RhinoCAM-MILL. The actual panel measures 48.72" x 53.9". A 3 axis Parallel Finishing operation is being cut using a ⅛" diameter ball nose cutter at a 10% step-over. Both ART and MILL are separate components of the RhinoCAM plugin for Rhino 5.0. All ART and MILL data created in RhinoCAM are stored with the Rhino 5.0 part file and can be regenerated if the geometry changed in Rhino.

More about PBE

PBE features a multifaceted group of designers, engineers, fabricators, programmers, and content specialists providing the following services: Project Management, Content Research & Development, Gallery Curation, Video & Audio Production, Scriptwriting, Exhibit Design, Feasibility & Flow Studies, Graphic Design, Interface & Interactive Design, Custom Programming, 3D Visualization & Animation, Lighting & Electronics, Fabrication & Sculpting, and Installation. You can see more of the work done by Paul Bernhard Exhibit, Design & Consulting by visiting their website.

More about RhinoCAM

RhinoCAM is available in 4 different configurations (Standard, Expert, Professional and Premium). The part shown here was programmed using the Professional configuration. Here are some additional details about each of the available configurations. Click here for the complete features list.

● **RhinoCAM Express**: This is a general-purpose program tailored for hobbyists, makers and students. Ideal for getting started with CAM programming. Includes 2 & 3 axis machining methods.

● **RhinoCAM Standard**: This is a general-purpose machining program targeted at the general machinist. This product is ideal for the rapid-prototyping, hobby and educational markets where ease of use is a paramount requirement. Includes 2-1/2 Axis, 3 Axis and Drilling machining methods.

● **RhinoCAM Expert**: Includes the Standard configuration plus 4 Axis machining strategies, advanced cut material simulation and tool holder collision detection.

● **RhinoCAM Professional**: Includes the Standard and Expert configuration plus advanced 3 Axis machining strategies, 5 Axis indexed machining, machine tool simulation, graphical toolpath editing and a host of other features.
Setup 4: Pocketing & Deep Drill 7.

● **RhinoCAM Premium**: Includes the Standard, Expert and Professional configurations plus 5 Axis simultaneous machining strategies.

To read more about RhinoCAM and view our full line of CAD/CAM products which include screen images, resources, and additional features, visit our Products page. You can also demo our products to take them for a test drive.