Autodesk® PowerMill®

Reference Help

Electrode Machining Wizard

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Contents

Electrode Machining Wizard

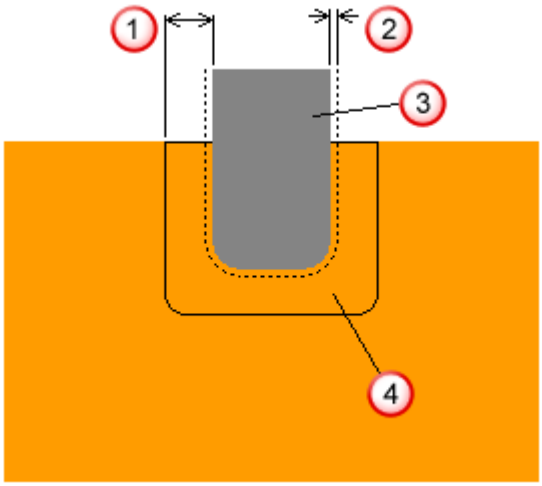
The Electrode Machining Wizard is a PowerMill plugin.

You can use the wizard to extract the information from a .trode file and select the tooling and toolpaths to machine the electrode. You can then reuse the settings to automate future electrode machining projects.

The Electrode Machining Wizard automatically detects the electrodes to machine and applies the correct undersizes to the toolpaths.

Electrodes are machined undersize to make allowance for an appropriate spark gap and orbit on the Electric discharge machine (EDM).

In the EDM industry, the terms *spark gap* and *overburn* are often used interchangeably with undersize.



1. Undersize
2. Spark gap
3. Electrode

4 The material to be removed

To calculate thicknesses, the undersize is subtracted from the machining allowance.

So, Thickness = Machining Allowance - Undersize.

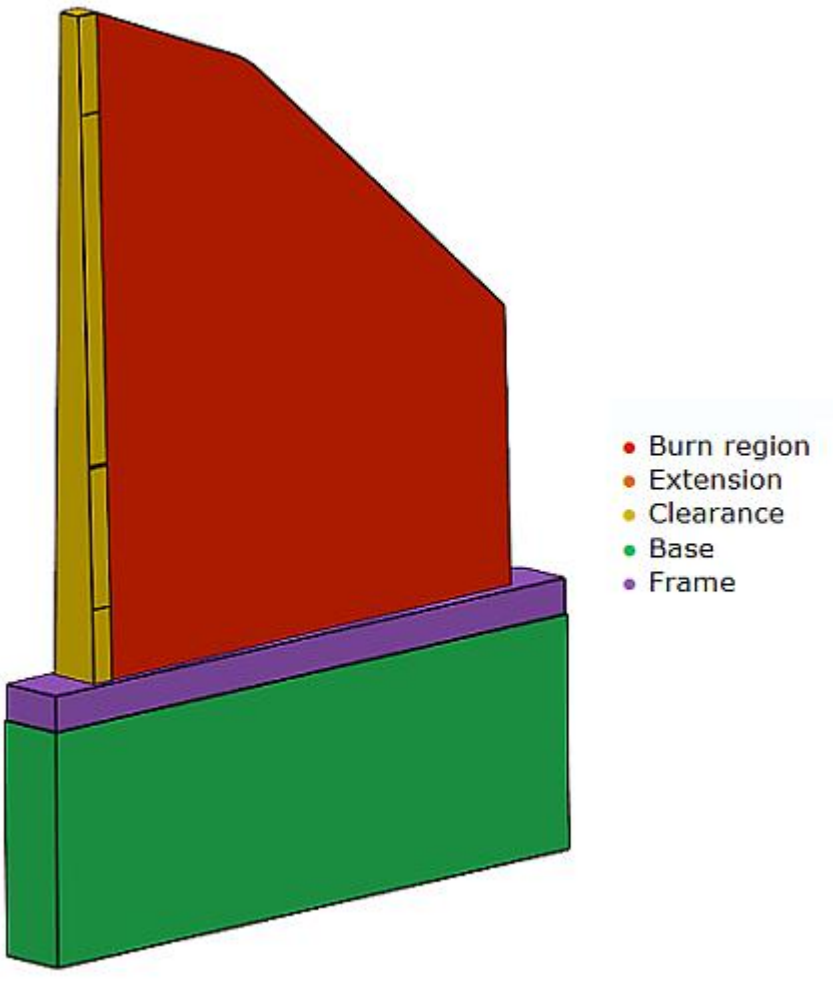
When creating toolpath templates, only include machining allowances in your calculations as the appropriate undersize is applied by the Electrode Machining Wizard and is different for each electrode.

A .trode file exported from PowerShape's Electrode Design Wizard contains the following information:

- The geometry for the electrode.
- The material type and block size.
- The spark gaps/undersizes.

The Electrode Machining Wizard analyses this information and displays the geometry in various colours.

Regions are represented as:



See also

Installing the Electrode Machining Wizard (see page 4)
Installing the Electrode Machining Wizard examples (see page 5)
Using the Electrode Machining Wizard (see page 6)
Configuring the Electrode Machining Wizard (see page 19)
Electrode Machining Wizard options (see page 22)

Installing the Electrode Machining Wizard

The default installation folder is:

C:\Program Files\Autodesk\ElectrodeMachiningWizardxxxxx

Within the installation folder, the **Data** folder contains:

- **Tools** — This folder contains the default machine tools available with the wizard.
- **Strategies** — The folder contains the default strategies available with the wizard.

Use the options available under **PowerMill > File tab > Options > Manage Installed Plugins > Electrode Wizard > Options** (see page 22) to change the default data folder.

*If you install Electrode Machining Wizard Examples, the default **Data** folder path changes to the folder available in the Electrode Machining Wizard Examples install folder.*

Installing Electrode Machining Wizard examples

The default folder where Electrode Machining Wizard examples are installed is:

C:\Program Files\Autodesk\ElectrodeMachiningExamplesxxxxx

xxxxx denotes the Electrode Machining Wizard examples version number.

The folders within the Electrode Machining Wizard examples installation folder are:

- **Data** — This folder contains the example **Tools** and **Strategies** under their respective folders.

  See Using the Electrode Machining Wizard (see page 6), Tooling (see page 13), and Step 3 — Machining Strategies (see page 12) for examples of how they are used.
- **Models** — This folder contains sample .trode and .psmodel files of the electrodes.
- **Videos** — This folder contains videos, which demonstrate how to use the Electrode Machining Wizard.

Using the Electrode Machining Wizard

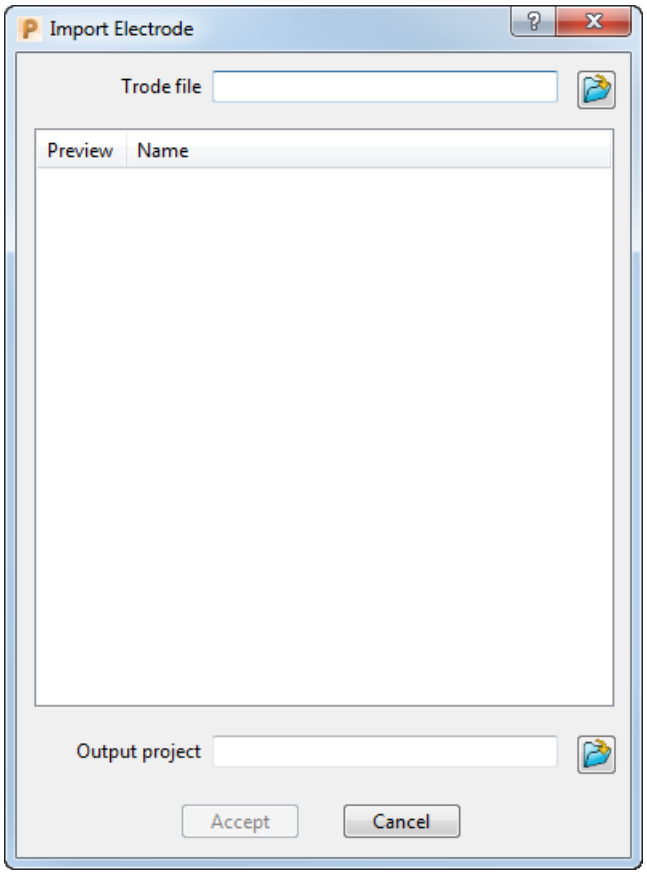
The Electrode Machining Wizard guides you through the process of creating electrodes. It includes several steps that:

- Set up the block (see page 9).
- Analyse and modify (see page 10) the **Minimum radius** and **Draft angle**.
- Select from the previously created machining strategies (see page 12).
- Select the machine tool (see page 13), if necessary.
- Perform final tasks (see page 14).
- Organise and process projects (see page 15) queued to the PowerMill Project Server.

The following steps use the **ForgingConnector** example from Electrode Machining Wizard examples (see page 5), and assumes you have installed the file in the default installation location.

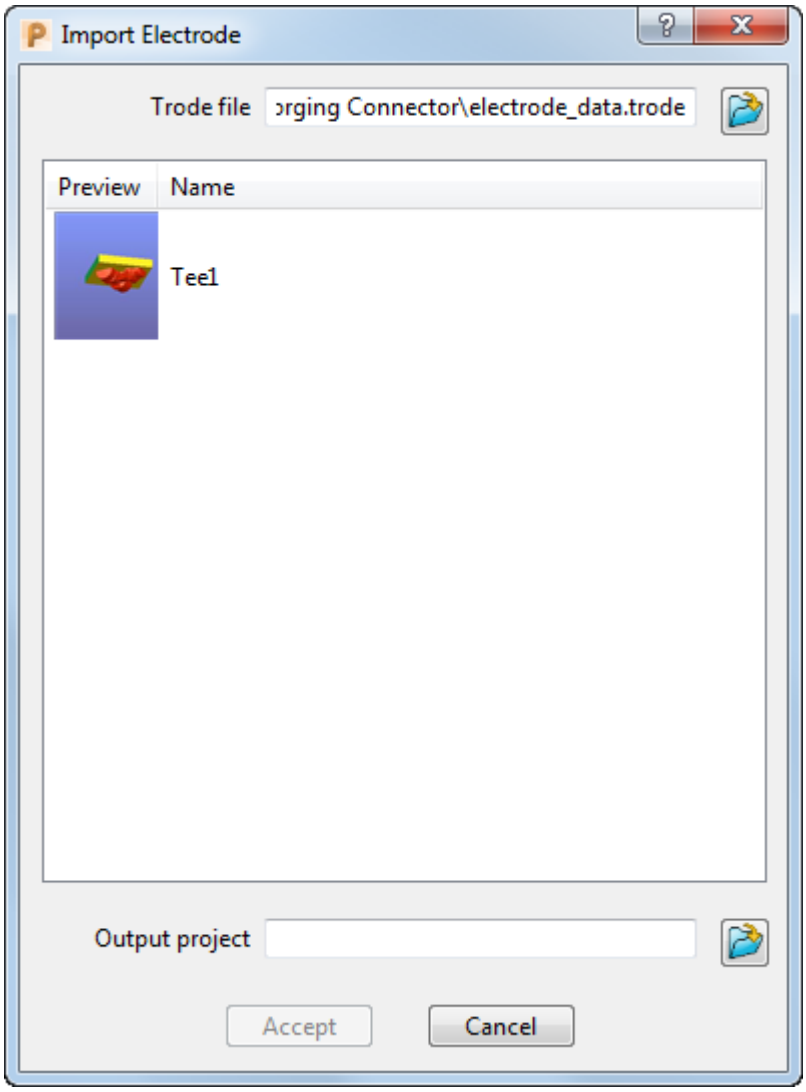
To start the Electrode Machining Wizard, in PowerMill:

1. Click File tab > Import > Import Electrode. This displays the **Import Electrode** dialog.



2. In the **Trode File** area, click  to display the **Select Trode Archive** dialog.
3. Browse to C:\Program Files\Autodesk\ElectrodeMachiningExamples13100\Models\Forging Connector and select the electrode_data.trode file and click **Open**.

The available electrodes are listed in the **Import Electrode** dialog. In this case, **Tee1**.



4 Select the electrode **Tee 1**.

5 In the **Output project** area, click  and enter a new project name and select the folder where you want to store the project.

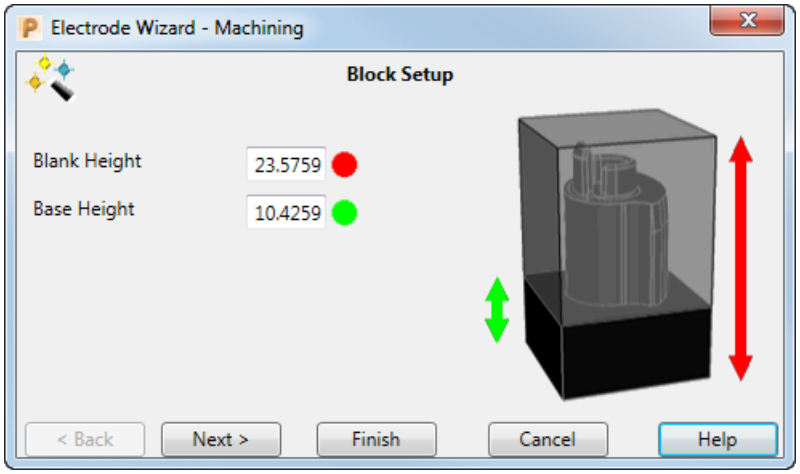
6 Click **Accept**.

This imports the selected electrode into PowerMill with the HTML tab displaying the electrode details.

This starts the Electrode Machining Wizard and takes you to the Block Setup (see page 9) step of the wizard.

Step 1 — Block Setup

Use the **Block Setup** page to define the size of the block that the electrode is to be machined from.



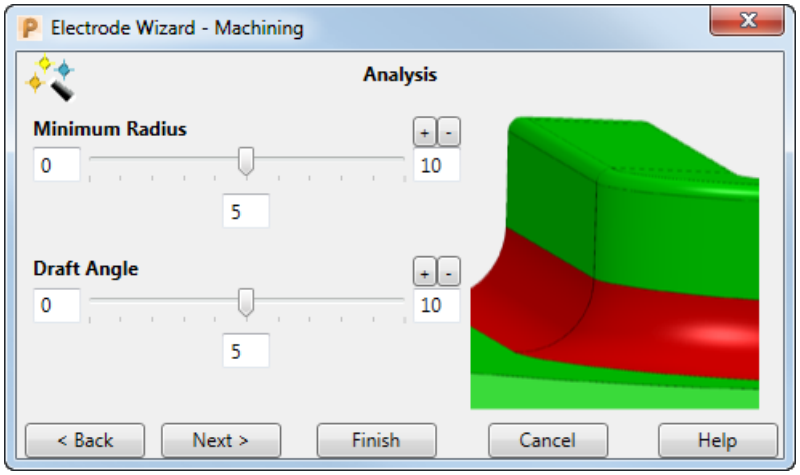
Blank height — The height of the electrode machining material.

Base height — The height of the part base.

When you have made the necessary changes, click **Next** to go to the **Analysis** (see page 10) page of the wizard. Click **Finish** if you want to end the wizard after generating the electrode machining material.

Step 2 — Analysis

Use the **Analysis** page to analyse and modify the **Minimum radius** and **Draft angle**. The colours used to display the model represent the radius and available draft angles.



Use the sliders to increase or decrease the values. To make finer adjustments, click + to increase or click - to decrease the slider factor.

After the initial analysis, click **Next** to go to the **Machining Strategies** (see page 12) page. Click **Finish** if you want to end the wizard after analysing the **Minimum Radius** and **Draft Angle**.

See also

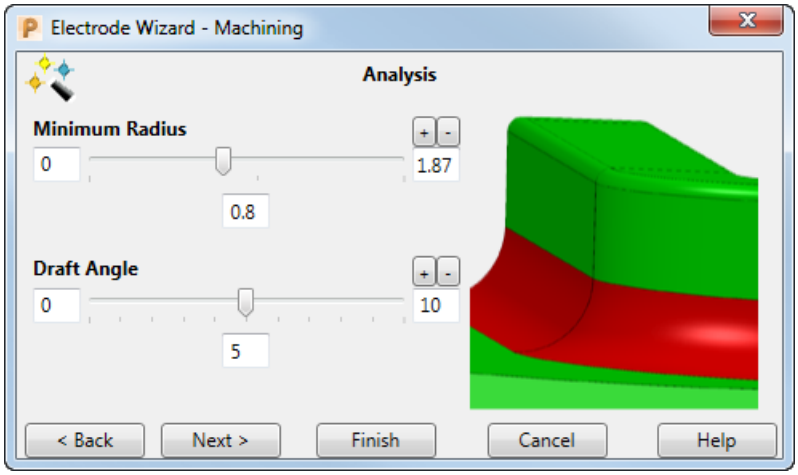
Using PowerMill interactively with the Electrode Machining Wizard (see page 11)

Using PowerMill interactively with the Electrode Machining Wizard

You can use PowerMill at the same time as you are using the wizard.

For example, to find and measure an area on the model with a minimum radius of less than **0.80** mm:

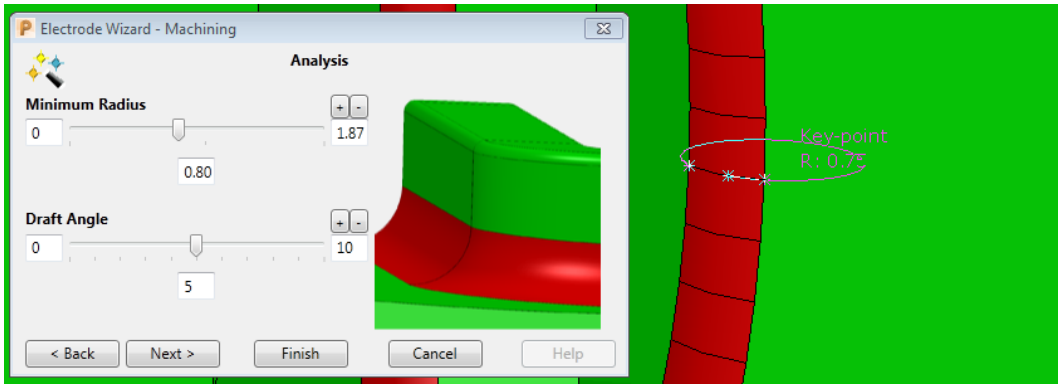
1. Move the **Minimum Radius** slider to display **0.80**. This displays areas on the model which have a minimum radius equal to or below **0.80** mm.



Use + to increase or - to decrease the slider measurement granularity.

2. In PowerMill click Home tab > Utilities panel > Measurer to display the **Measure** dialog.

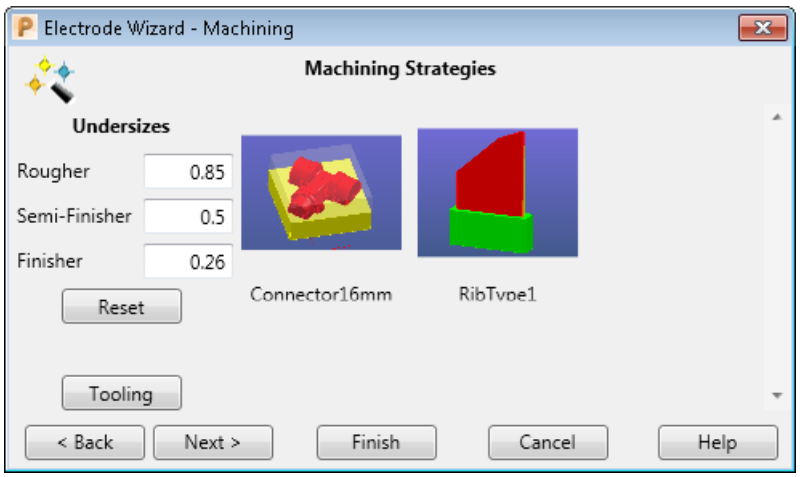
3. On the **Measure** dialog, click to measure a **Radius from Three Points**. In the below example, this shows that the exact radius in this region is **0.75** mm.



Step 3 — Machining Strategies

Use the **Machining Strategies** page to select the strategy used to machine the electrode. You can also modify the undersizes loaded from the .trode file.

In this example, **Connector 16mm** and **RibType1** are previously created **Machining Strategies**. When a previously created strategy is selected, it imports the associated tools and toolpaths into the current PowerMill session.



Use **Rougher**, **Semi-finisher**, and **Finisher** fields to make changes to **Undersizes**.

Click **Reset** to revert all values to their default.

Click **Tooling** to display the **Tooling** (see page 13) step. The step enables you to load additional tools to the electrode project so a tooling gap within the machining strategy can be filled. (A tooling gap may occur if you are using a machining strategy to machine an electrode that the strategy was not designed for.)

Click **Next** to move to the **Final Tasks** (see page 14) page of the wizard. Click **Finish** if you want to end the wizard at loading the machining strategies step.

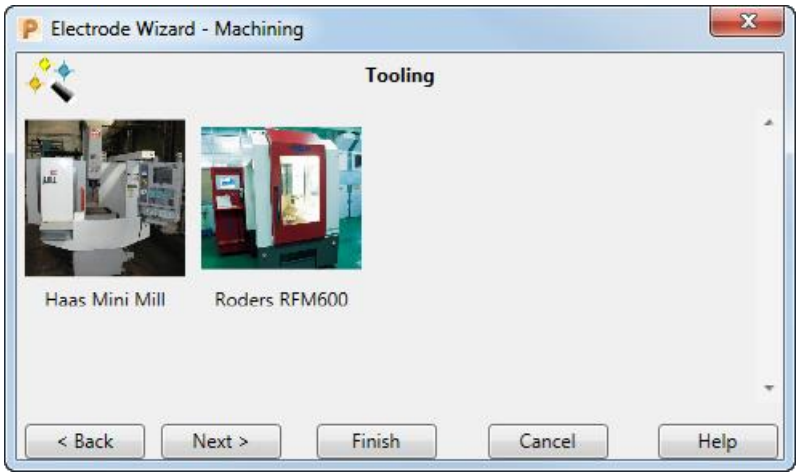
See also

Configuring the Electrode Machining Wizard (see page 19)

Tooling

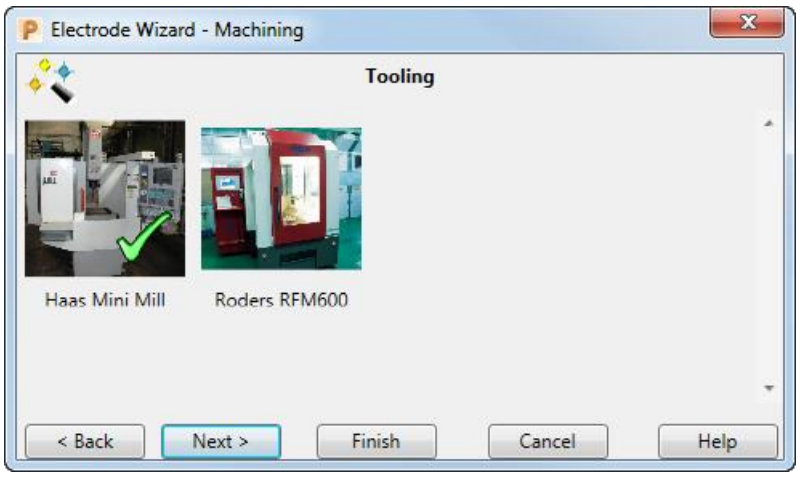
Use the **Tooling** page to load additional tools to the electrode project so a tooling gap within the machining strategy can be filled. (A tooling gap may occur if you are using a machining strategy to machine an electrode that the strategy was not designed for.)

To display the **Tooling** page, click the **Tooling** button on the **Machining Strategies** page.



The displayed machine tools are dependent on your machine tool installations.

Select the machine tool you want. The machine tool is displayed with a ✓.



Selecting a machine tool loads the associated tools into the PowerMill session.

*If you want to just import the tools saved with the toolpath templates, click **Next** without selecting a machine tool.*

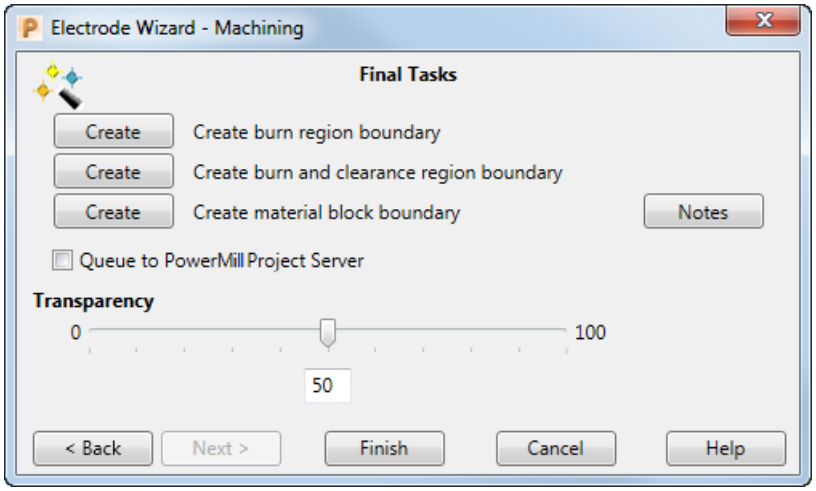
After selecting the machine tool, click **Next** to open the **Machining Strategies** (see page 12) page of the wizard. Click **Finish** if you want to end the wizard after importing the tools into the current PowerMill session.

See also

Configuring the Electrode Machining Wizard (see page 19)

Step 4 — Final Tasks

Use the **Final Tasks** page to create boundaries for the electrode regions, to make or read notes about the machining strategy, and to specify when the project is to be processed.



Create burn region boundary — Click to create a boundary around the burn region (displayed in red).

Create burn and clearance region boundary — Click to create a boundary around the burn and clearance regions (displayed in red and green respectively).

Create material block boundary — Click to create a boundary around the block region (displayed in green).

Transparency — Move the slider to adjust the transparency of the electrode.

Notes — Click to open WordPad. The function provides an easy method to record information about the strategy setup for future use. The file is saved in the relevant machining strategy folder and can be viewed and updated by clicking **Notes**.

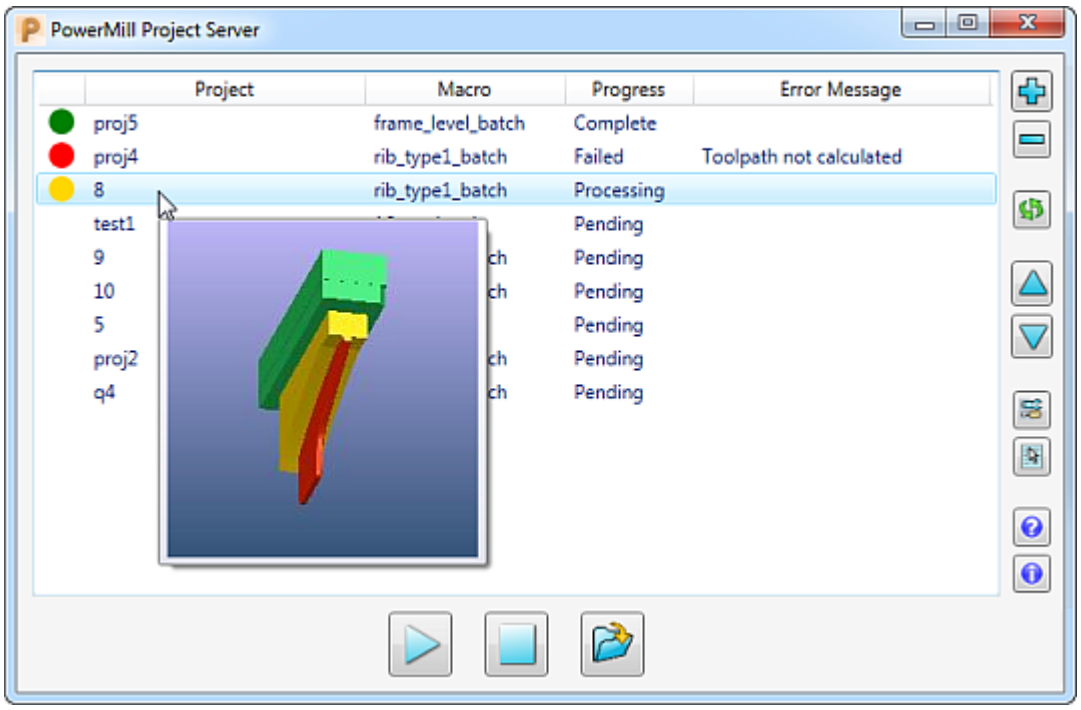
Queue to PowerMill Project Server — Select and then click **Finish** to add the project to the PowerMill Project Server. This enables you to calculate the project, and any other queued projects, using a second session of PowerMill so you can continue to work in PowerMill uninterrupted. Using the server also enables you to process the projects at a more convenient time, such as during the evening, when CPU performance is not such a concern.

Finish — Click to calculate the project. To calculate the project at a later time, select the **Queue to PowerMill Project Server** option.

PowerMill Project Server

Use the PowerMill Project Server to organise and process queued projects.

To display the server, select the **Queue to PowerMill Project Server** option on the **Final Tasks** (see page 14) page of the wizard and click **Finish**, or double-click the server's desktop icon.



The server has these main features:

- As well as adding projects to the server using the wizard, you can also add projects directly to the server from your PC or network.
- Projects are listed in the order they are queued to the server but you can reorder the projects.
- The server enables you to assign or change a project's macro (machining strategy).

- To process the projects, the server uses its own PowerMill session so you can continue to work in your current PowerMill session without interruption.
- The project server shows the status of a project:
  - — Project currently being processed.
  - — Project successfully processed.
  - — Project unsuccessfully processed.
- If a project fails to be processed, the cause of the failure is displayed in the **Error** column and the server continues to process the next project. If you want to correct the error immediately, you can stop the server and open the project in PowerMill. You can then refresh the project and reprocess it.
- When you stop the processing of projects, the server maintains its position so, when restarted, processing continues from where it was stopped. The queue and the server position are also maintained across sessions.
- For a project to be processed successfully, the toolpaths must be free of collisions and gouges, and the project must be processed fully. If necessary, you can load a custom validation macro with different and/or extra criteria to check the projects against. For more information about validation macros, see Options (see page 18).

The server features the following options:

 **Add** — Click to add a project or a folder of projects to the queue. The server ignores any duplicates.

 **Remove** — Click to remove selected projects from the queue.

 **Refresh** — Click to update the project after making changes to it in PowerMill.

 **Move up** — Click to move the selected project up in the queue.

 **Move down** — Click to move the selected project down in the queue.

 **Options** — Click to display the **PowerMill Project Server Options** (see page 18) dialog.

 **Set macro** — Click to display the macro file that is assigned to the selected project. This enables you to change or specify the macro (machining strategy) for a project.

 **Display help** — Click to display help.

 **About** — Click to display version information.

 **Start** — Click to start calculating projects.

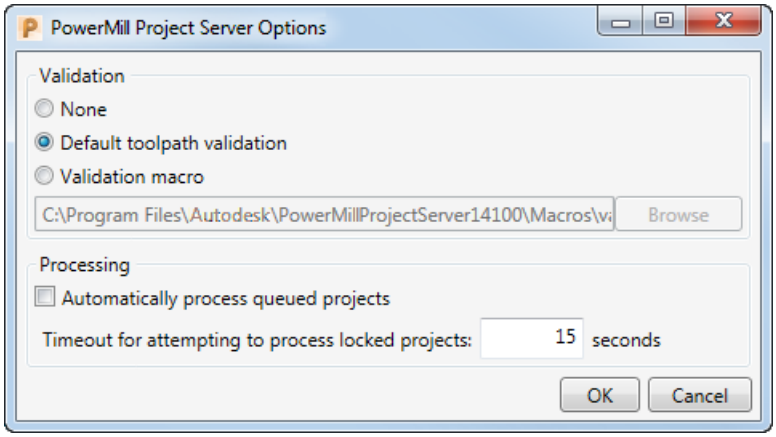
 **Stop** — Click to stop calculating projects. The server maintains its position and restarts in the same place. The queue and the server position are maintained across sessions.

 **Open** — Click to open the selected project in PowerMill. This is useful if you need to fix an error that caused the processing of project to fail.

PowerMill Project Server Options dialog

Use the **PowerMill Project Server Options** dialog to customise the server.

To display the dialog, click **Options** on the **PowerMill Project Server** dialog.



The validation options enable you to set the criteria used to assess whether a project is considered safe to be machined and, therefore, if the project is processed successfully or not.

- **None** — Select this option if you do not want to check projects.
- **Default toolpath validation** — Select this option to use the server's default validation criteria, which checks that toolpaths are free from collisions and gouges and the project has been processed fully.
- **Validation macro** — Select this option to use your own validation macro.
- **Automatically process queued projects** — Select this option to automatically process projects that are queued to the server.
- **Timeout for attempting to process locked projects** — Specify how long the server waits before trying to process the project again. This enables you to close the project in PowerMill because if the project is open then it cannot be processed.

Configuring the Electrode Machining Wizard

The tools and strategies available on the **Tooling** and **Machining Strategies** steps of the Electrode Machining Wizard are available in their respective folders under the **Data** folder as specified in **File tab > Options > Manage Installed Plugins > Electrode Wizard > Options** (see page 22).

To create machine tools, see Creating machine tools for the Electrode Machining Wizard (see page 20).

To create machining strategies, see Creating machining strategies for the Electrode Machining Wizard (see page 20).

Creating machine tools for the Electrode Machining Wizard

To define the tools available at the **Tooling** (see page 13) stage of the wizard:

1. In an empty PowerMill project, create the tools available in your machine tool carousel.
2. Click File tab > Save As > Template objects to create a PowerMill template (.ptf) file and name it appropriately.
3. Create an image of your machine tool in a .png format file and name it appropriately.

   You can also use a .jpg format image file as the machine tool image.
4. Create a folder in the name of your machine tool under the **Tools** folder defined in the Electrode Machining Wizard Options (see page 22) dialog.
5. Copy both the .ptf and .png files to the machine tool folder.

You can view these machine tools in the **Tooling** (see page 13) step of the wizard.

Creating machining strategies for the Electrode Machining Wizard

The main points to remember while creating machining strategies for Electrode Machining Wizard are:

- Remove any undersizes. Toolpaths must only have the machining allowances applied to them.
- You must save any surfaces, which must be selected before the toolpath is calculated, on the toolpath component thickness set 7.
- Toolpaths cannot be calculated if the spark gaps of the electrode plus the machining tolerance is greater than the tool radius. However, for toolpaths using end mills and slot drills, toolpaths are calculated but require visual verification.
- If you need a boundary for your toolpath, create an empty boundary and save the required parameters to a macro. Then, run the xxx_batch.mac to automatically apply these parameters.

You can give the macro any name you want, but the file name has to end with _batch.mac. For example, if you want to name your macro Fred, then the complete file name must be Fred_batch.mac.

1. Create a PowerMill toolpath for the electrode you want to machine.
2. Right-click the toolpath and select **Save as template**.
3. In the **Template Parameter Saving** dialog, enter the toolpath name and select the folder where you want to save the template.

You can control the order in which the toolpath templates are imported by adding a numeric value at the beginning of the template name. For example, 01_firsttoolpath.ptf, 02_secondtoolpath.ptf.

1. Click **Save**. This saves a PowerMill template file (.ptf) with the toolpath details.
2. Create an image of your electrode in a .png format file and name it appropriately. Save the image in the same folder as the PowerMill template.

You can also use a .jpg format file.

3. Copy the xxx_batch.mac file from the install directory and copy it into the same folder as the template.

   The macro checks the model for surfaces to be selected. These are surfaces which are defined at the component thickness set 7.

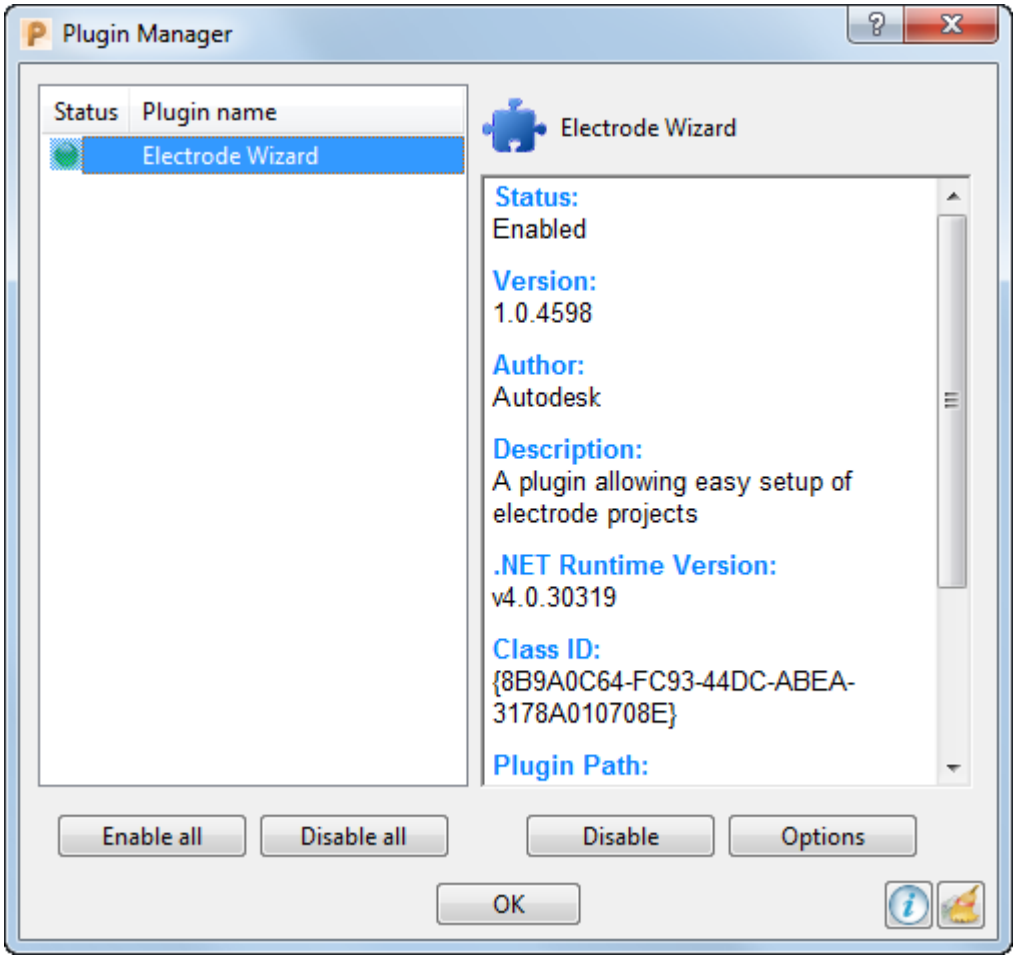
   When you prepare the electrode to be machined, using the **Component Thickness** dialog, place the surfaces you need to select in component thickness set 7. If there are no surfaces to select, then the levels are ignored and the macro machines the whole model.

The xxx_batch.mac file contains commands in the PowerMill macro programming language; therefore, you can add additional commands to customise the macro for each individual electrode. Refer to the PowerMill Macro guide for more details.

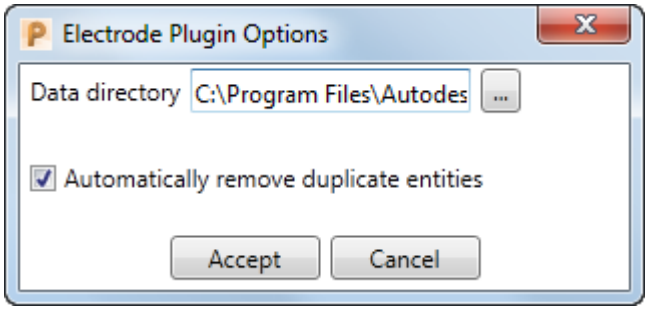
For more details on adding surfaces to a particular component thickness set, see the 'Assigning thickness values' topic in the PowerMill help file.

Changing the Electrode Machining Wizard options

1. In PowerMill, click File tab > Options > Manage Installed Plugins to display the **Plugin Manager**.
2. Select **Electrode Wizard**.



3 Click **Options** to display the **Electrode Plugin Options** dialog.



- **Data directory** — Specifies where the data (the tools and strategies) are stored. By default, this is the plugin installation directory:

  C:\Program Files\Autodesk\ElectrodeMachiningWizardxxxxx\Data

  where xxxxx is the Electrode Machining Wizard version number.

- **Automatically remove duplicate entries** — When this check box is selected, duplicate tooling is removed from imported strategies. Deselect the check box to retain duplicate tooling.

4 When you have made the changes, click **Accept** on the **Electrode Plugin Options** dialog to apply them.

5 On the **Plugin Manager**, click **OK** to close it.

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