
What's new in
SEER-MFG 8.1 w Aero 5.1
GALORATH

Contents

ADDITIVE MANUFACTURING

SEER-MFG has a new Additive Manufacturing work element

MACHINING

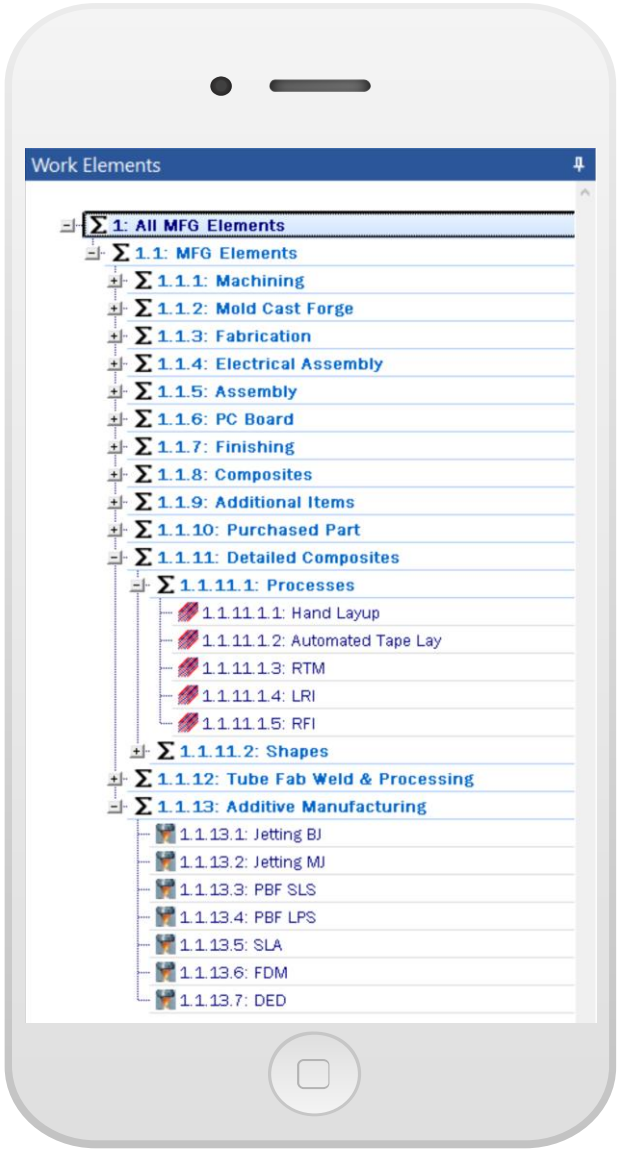
Feeds, Speeds, and RPM limits are now editable within the MFGData.ini file

MOLD CAST FORGE

New Isostatic Pressing operation

RIBBON UI

Previous menus and toolbars are replaced by the ribbon



PRINT/PRINT PREVIEW

A new print engine that offers print preview and an option to output to PDF

64 BIT APPLICATION

SEER-MFG is now a 64-bit application

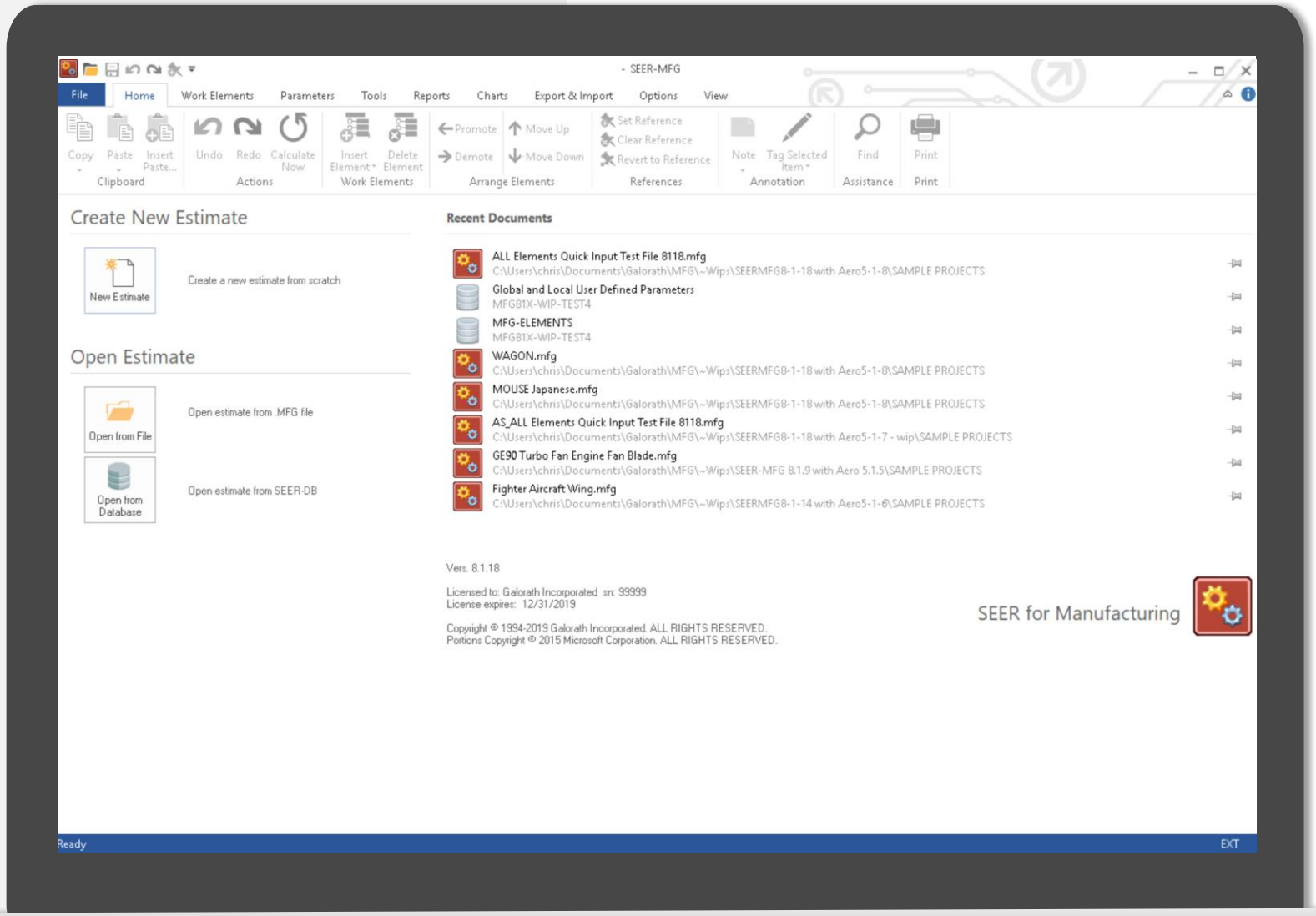
UNICODE SUPPORT

SEER-MFG can now handle many different languages and character sets

Noteworthy updates

Reports, Charts, Paths, NDT Dialog updates. User-Defined Function. Multiline Expression Editor. Autosave. Tag Selected Item Color Pallet. Format Outputs. Custom License Path

SEER-MFG 8.1 Ribbon UI



RIBBON UI

Previous menus and toolbars are replaced by the ribbon

QUICK ACCESS TOOLBAR

Add items for quick access

FULLY CUSTOMIZABLE

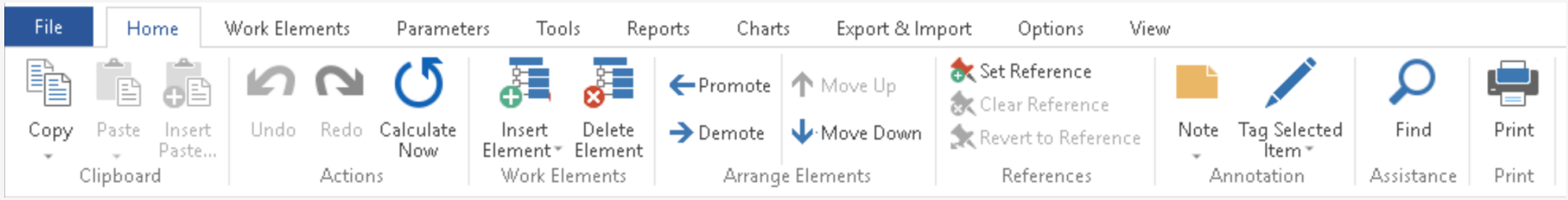
UI Color scheme, and Ribbon Options fully customizable

FILE BACK STAGE PAGE

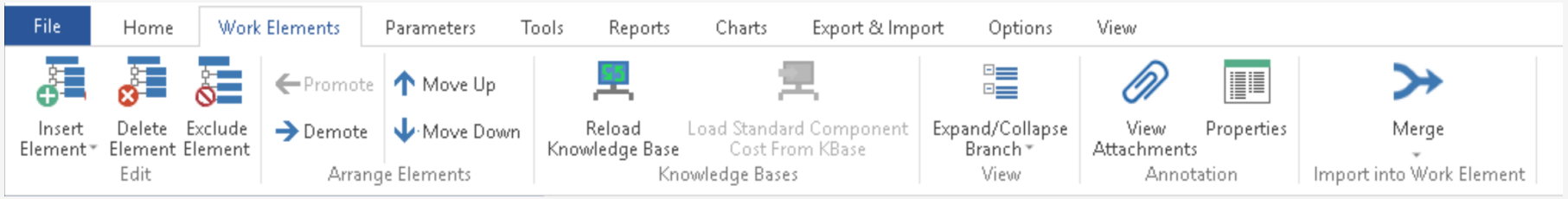
Print Preview, SEER-Suite, Collaboration, and more options on the back stage

Ribbon Options

Home

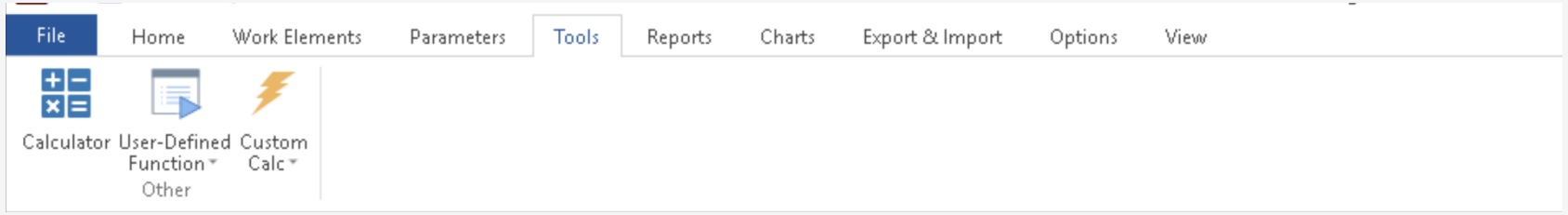


Work Elements



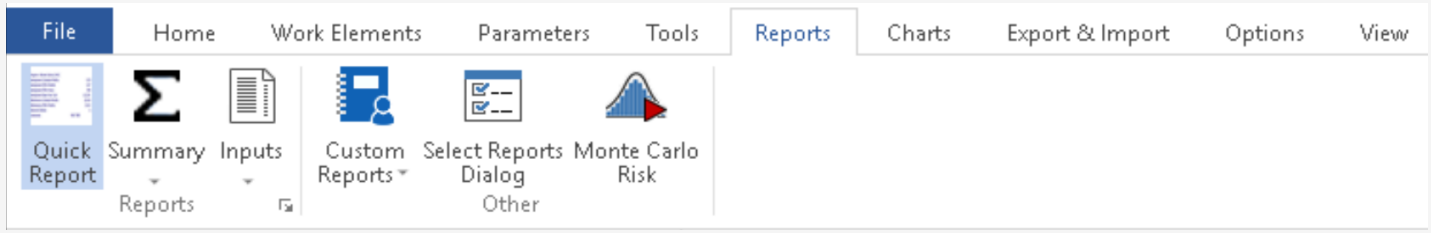
Parameters

Tools

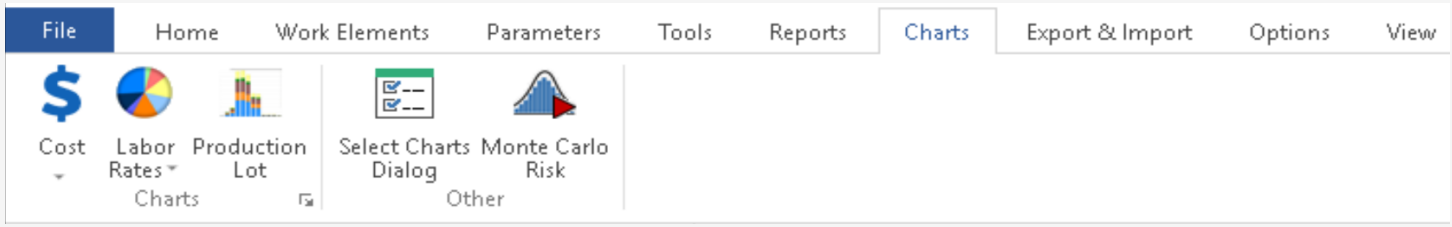


GALORATH

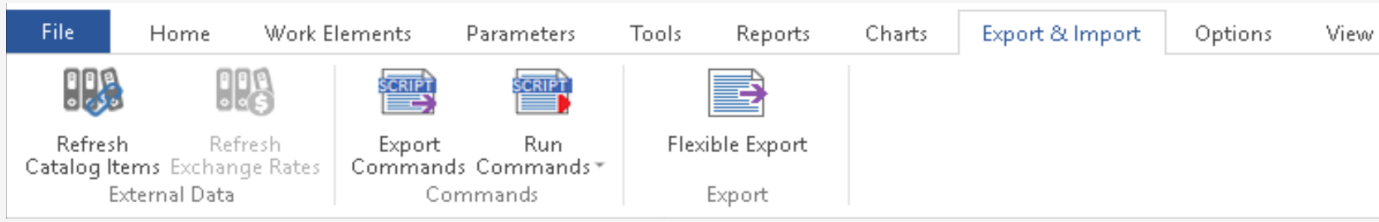
Reports



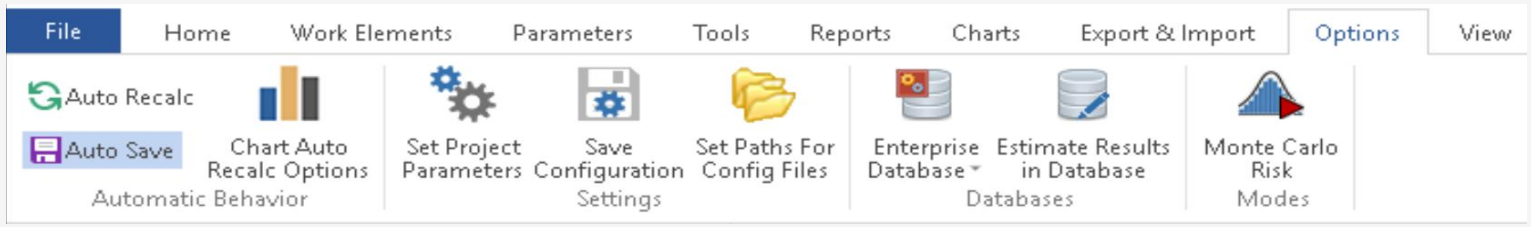
Charts



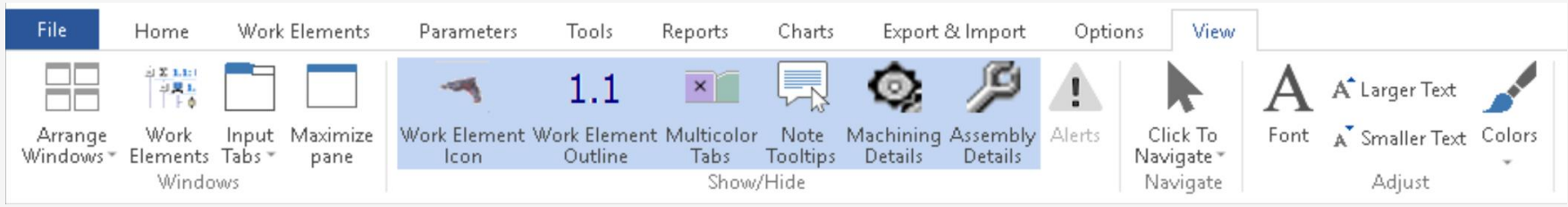
Export & Import



Options



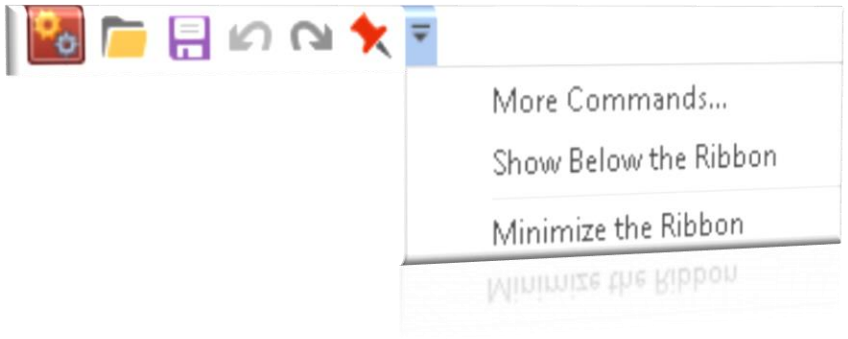
View



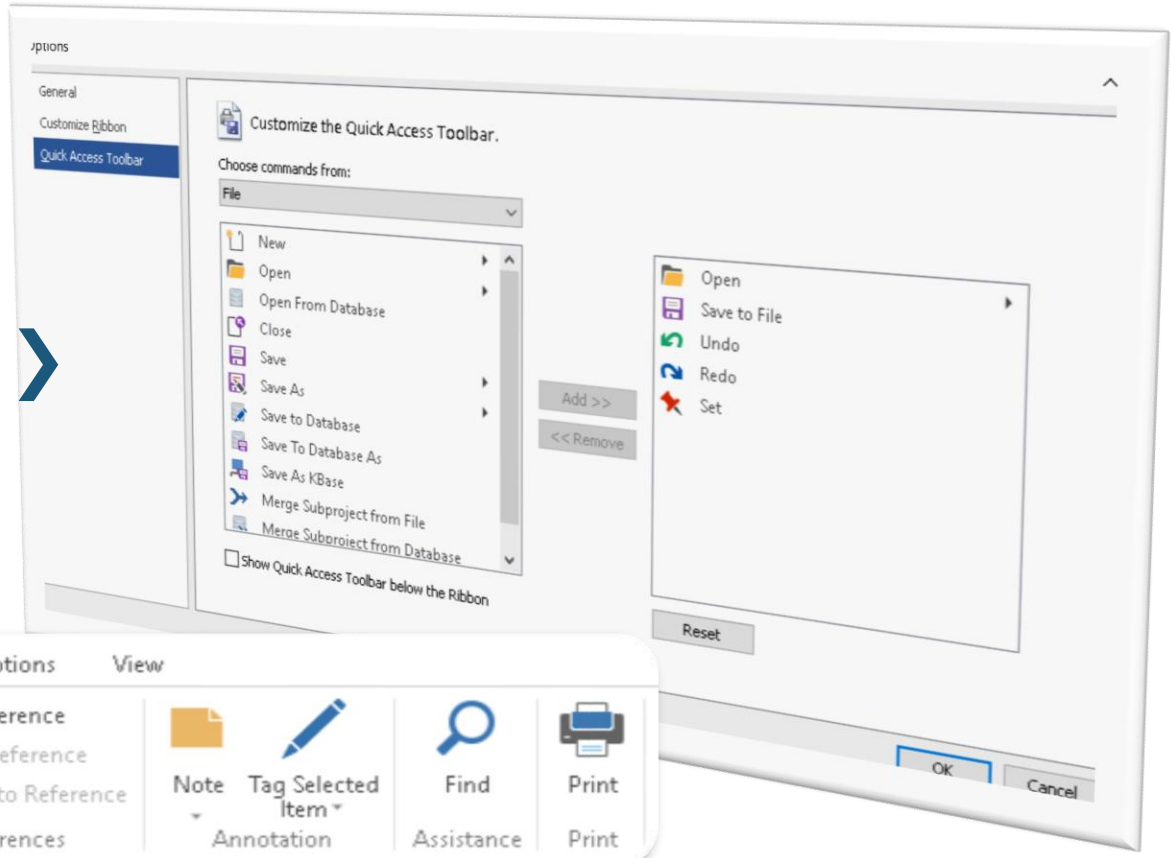
GALORATH

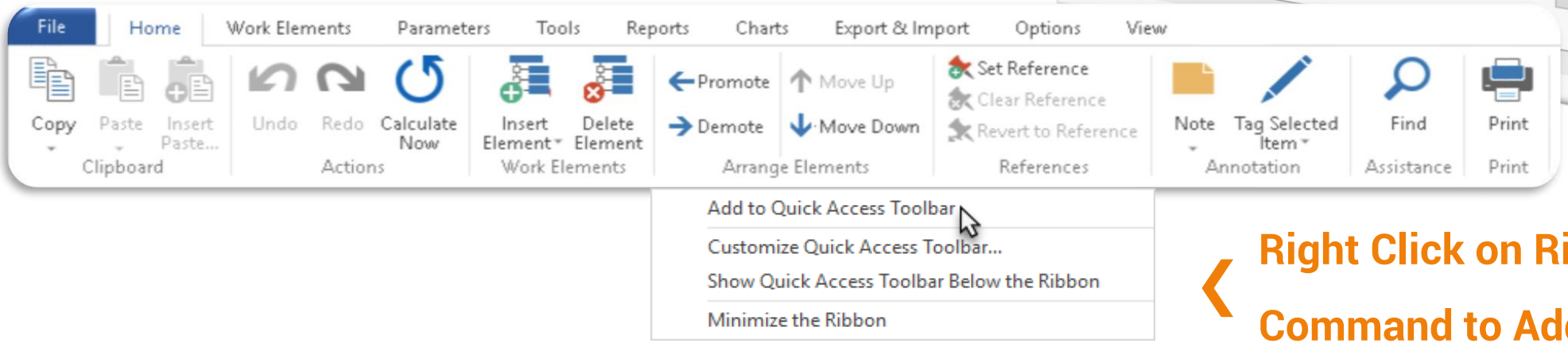
Ribbon Customization

Customize the Ribbon, Quick Access Toolbar, and Add Commands…



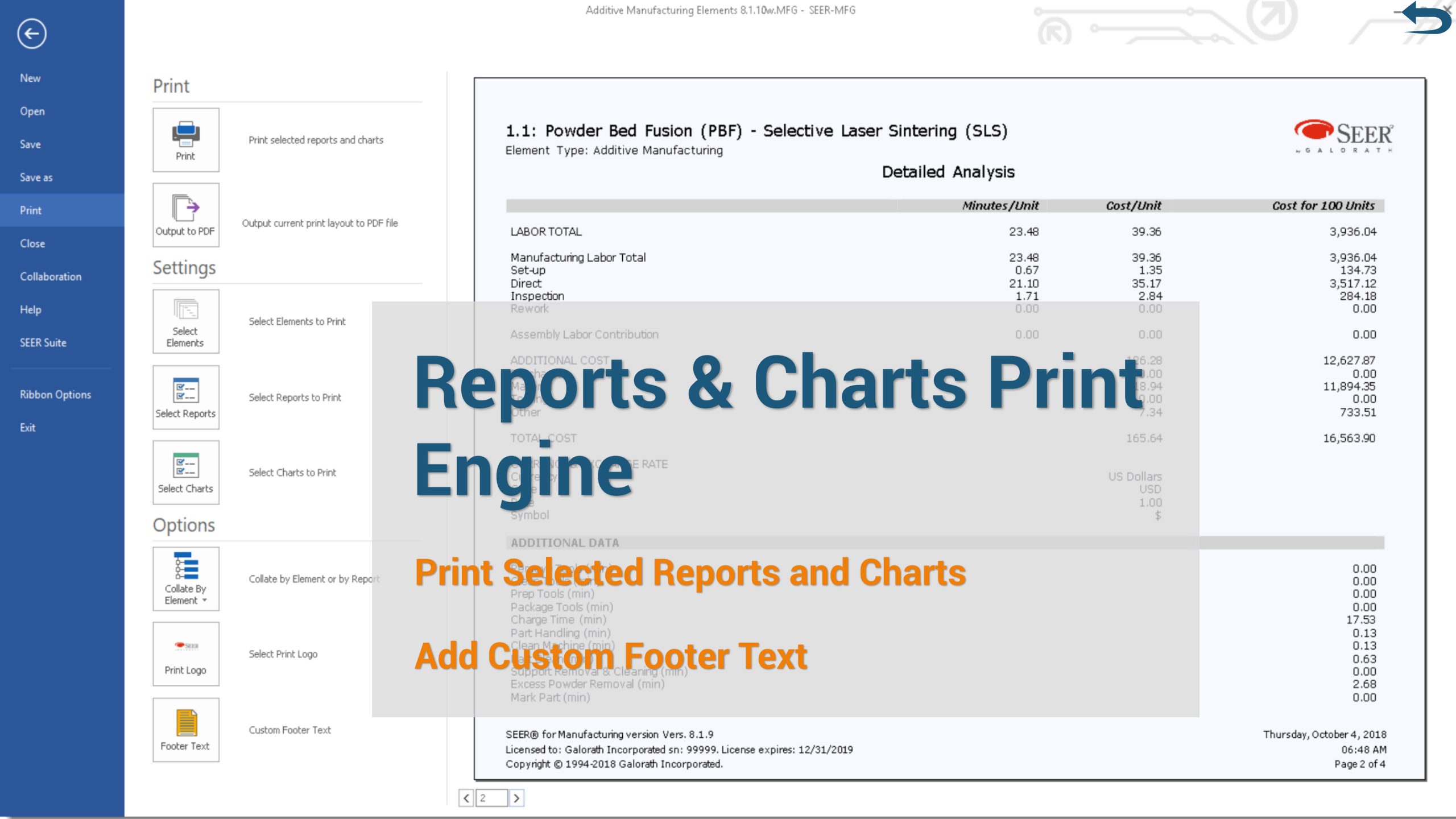
Available Options





Right Click on Ribbon Command to Add

GALORATH

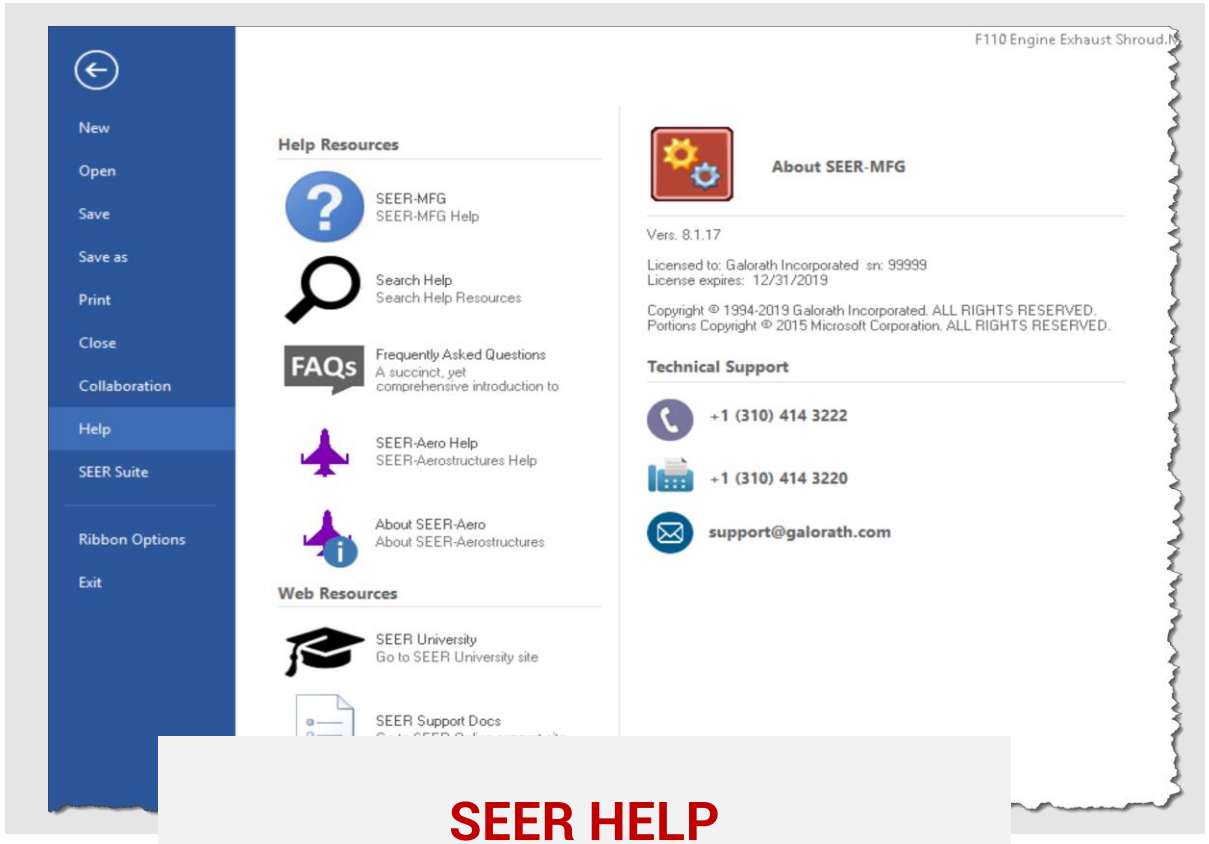


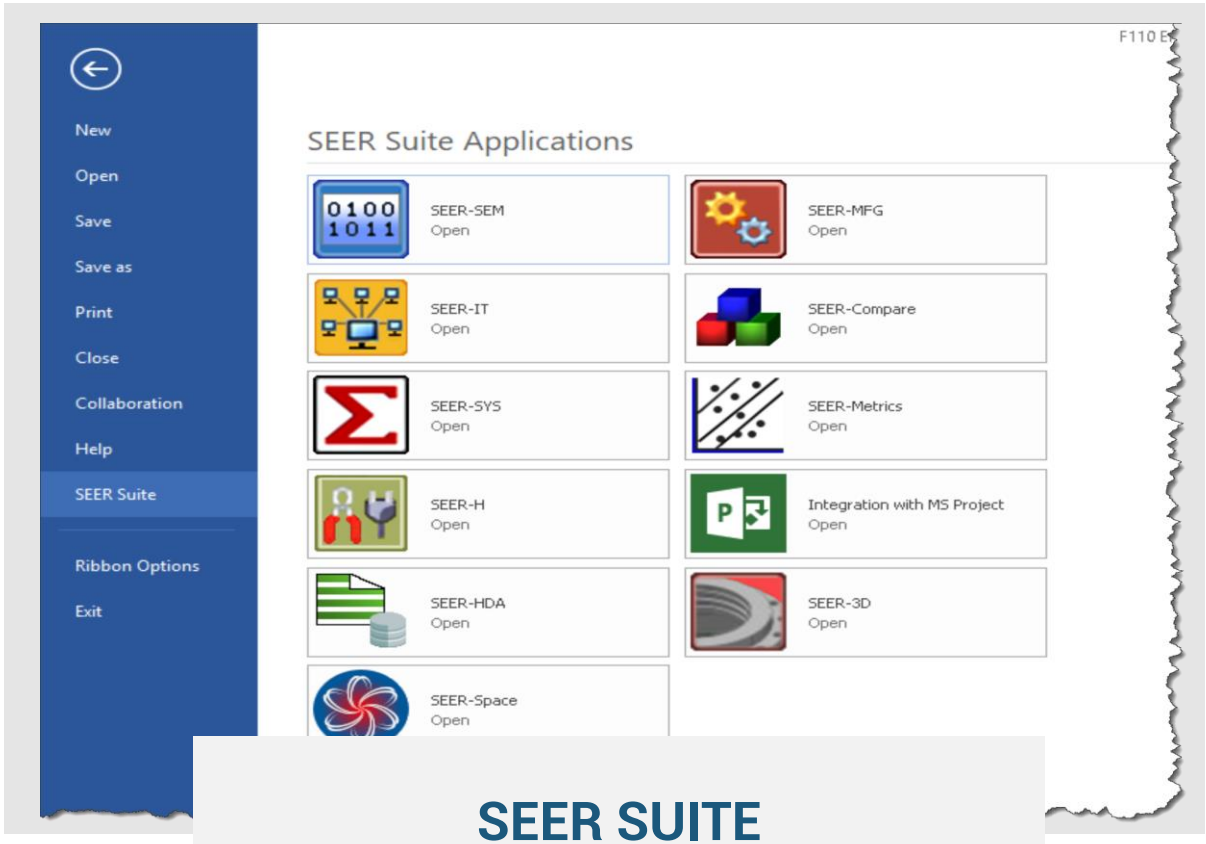
Reports & Charts Print Engine

Print Selected Reports and Charts

Add Custom Footer Text

Back Stage Pages: HELP & SUITE





SEER HELP

Help resources and web resources are available in the Backstage view. Click File and then click Help

SEER SUITE

Buttons to launch SEER Suite Applications are now moved to Backstage view (click File). Click the SEER Application icon to launch as long as the application is installed

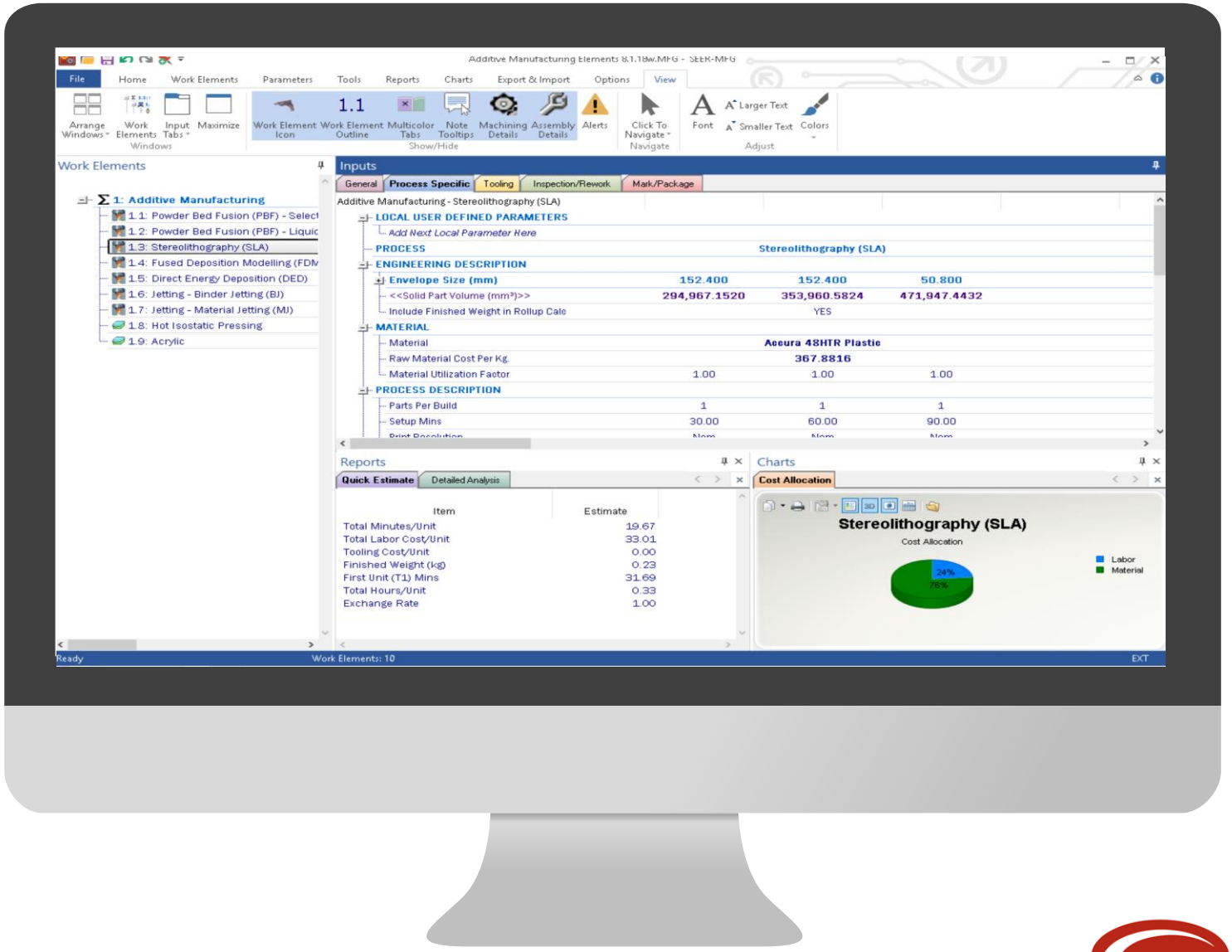
Additive Manufacturing

Additive Manufacturing Work Element

New Work Element for modelling parts made via Additive Manufacturing processes

7 New Processes

- **Powder Bed Fusion (PBF)**
  - **Selective Laser Sintering (SLS)**
  - **Liquid Phase Laser Sintering (LPS)**
- **Jetting**
  - **Binder Jetting (BJ)**
  - **Material Jetting (MJ)**
- **Direct Energy Deposition (DED)**
- **Stereolithography (SLA)**
- **Fused Deposition Modelling (FDM)**

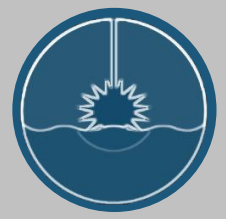


PROCESS SELECTION

When building an Additive Manufacturing cost model, select from these categories of process families:

DED

Direct Energy Deposition is the process of passing either wire or powder material into the path of a laser or beam, fusing it selectively onto the build surface.



SLA

Stereolithography or VAT Polymerization is the process of selectively curing a liquid substrate, layer by layer.

JETTING

Jetting utilizes and inkjet printer head system to selectively deposit droplets of material onto a powder bed or directly onto a build surface.

FDM

Fused Deposition Modeling is an extrusion process where a spool of material is drawn through a nozzle and deposited onto a build surface.

PBF

Powder Bed Fusion is selectively fusing thin layers of powder with a laser. This process in MFG accommodates DMLS as well as other standard PBF processes

Including their sub-process categories, SEER-MFG 8.1 accommodates a total of 8 additive manufacturing processes & machine types. These 8 processes are the most commonly utilized in the Aviation, Defense, Space, Medical & Automotive and other advanced manufacturing industries.

JETTING > BINDER JETTING

Binder Jetting utilizes and inkjet printer head system to selectively deposit droplets of an aqueous adhesive onto a powder bed.

JETTING > MATERIAL JETTING

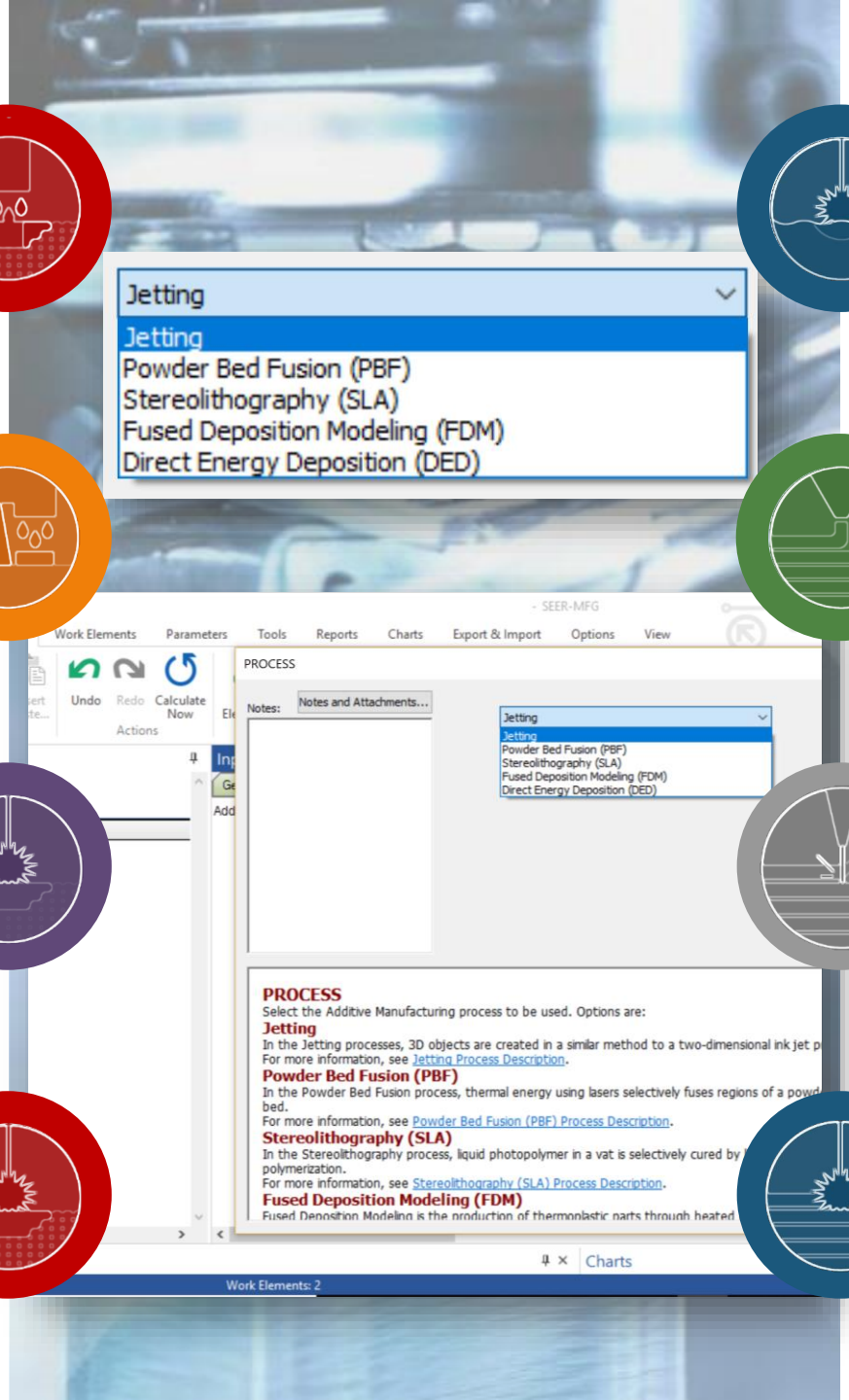
Material Jetting utilizes and inkjet printer head system to selectively deposit droplets of a typically wax like material directly onto a build surface.

PBF > SLS

Selective Laser Sintering is common Powder Bed Fusion process by which a laser fuses thin layers of powder. This process in MFG is set up to accommodate Direct Metal Laser Sintering as well as other standard PBF processes

PBF > LPS

Liquid Phase Laser Sintering allows for a powder bed mixture of multiple materials; melting one element which acts as a binding agent to fuse together the other.



SLA

Stereolithography or VAT Polymerization is the process of selectively curing a liquid substrate with a UV laser, solidifying the material layer by layer.

FDM

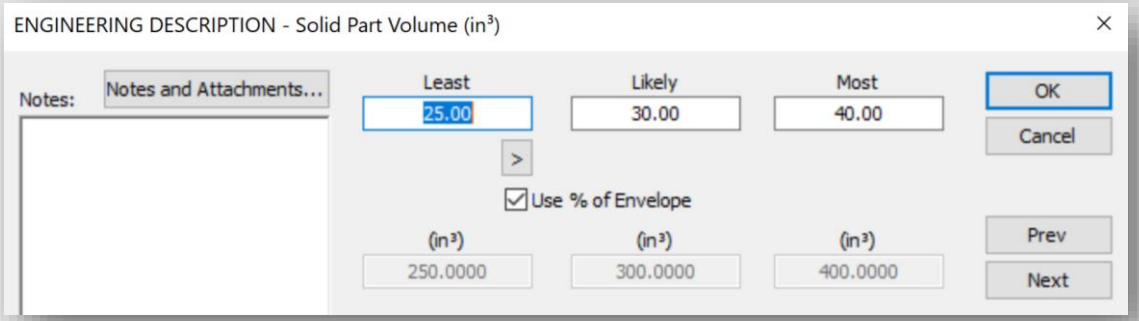
Fused Deposition Modeling is perhaps the most common form of Additive Manufacturing. It is an extrusion process by which a spool of material is drawn through a nozzle and deposited onto a build surface.

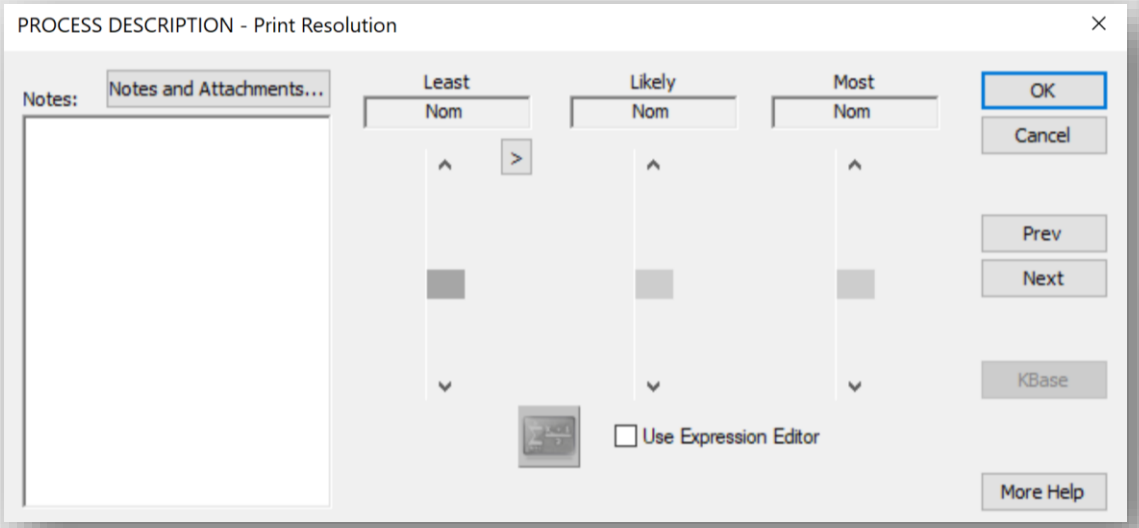
DED (WIRE)

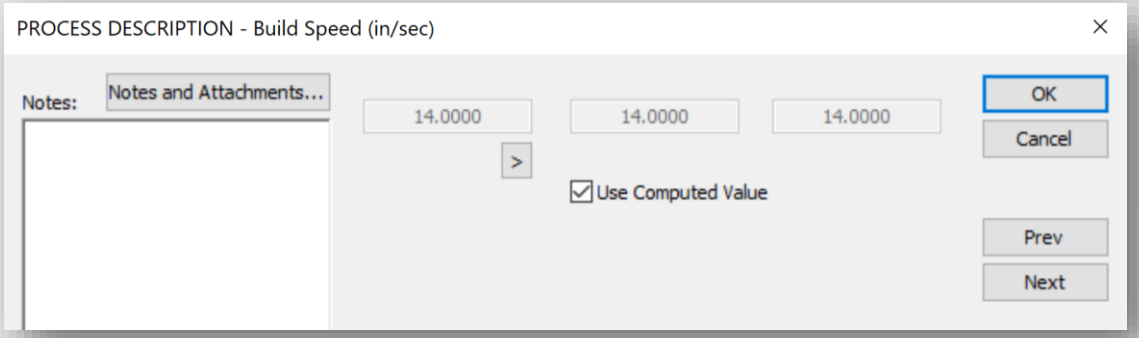
Direct Energy Deposition with wire material is similar to a welding process, where a spool of conductive wire is selectively fed into the path of a laser or beam and deposited directly onto the build surface.

DED (POWDER)

Direct Energy Deposition with powder material uses a nozzle to selectively spray a stream of powder into the path of a laser, fusing the material to a build surface.







PRIMARY INPUTS

Primary AM Cost Model Calculations Drivers

PART VOLUME or the volume of the finished part assuming a 100% density. If the actual part volume is unknown, it is calculated. It does not include the Support Volume. Inputs can be provided as exact volume measurement in in^3 (mm^3) if known, or, if unknown, as a % of the part envelope.

PRINT RESOLUTION is the resolution (accuracy and level of detail) in the X,Y & Z axes. Inputs range from Very Low to Very High. Vlo represents a process optimized for build time minimization; Vhi represents a process optimized for part quality, precision or accuracy.

The following Parameters can be controlled by Print Resolution:

- **Layer Height %** - Increasing Resolution will decrease Layer Height.
- **Infill %** - Increasing Resolution will increase Infill %.
- **Support Infill %** - Increasing Resolution will increase Support Infill %.

BUILD SPEED or Scan Speed, is the velocity with which a nozzle, printer head or energy beam moves and deposits / scans material. It is a machine controlled setting and generally driven by material properties, layer height, energy output and user preferred resolution / surface finish.

If unknown, Build Speed should be input as 50% (half) the OEM's maximum reported speed. If reported speed is unknown, it can be calculated by MFG, based on the other standard inputs.

With Jetting, this is referred to as PRINTER HEAD SPEED

GALORATH

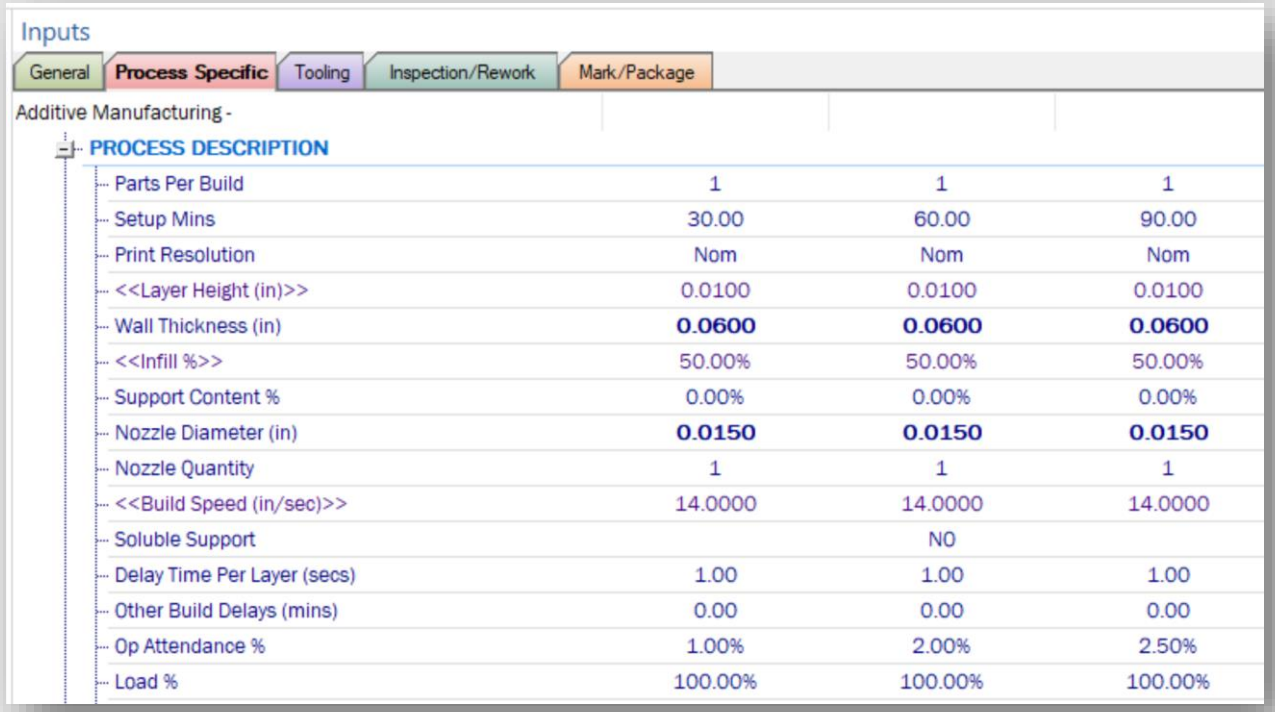
LOAD % determines the % of parts being estimated from the total machine run. All parts in the same run, powder bed or build plate = 100% Load %.

LAYER HEIGHT or thickness, of each layer. Greater height reduces print time, but results in lower resolution & visa versa.

WALL THICKNESS determines the portion of the build that fully dense regardless of the infill %. For builds with varying wall thickness, use an average.

SUPPORT CONTENT % is the material used as support aids in manufacturing, but not part of the final design, input as a % of the total part volume.

INFILL % allows the user to control how dense the parts are on the inside, but not the actual material density properties. Also referred to as *Infill Density.*

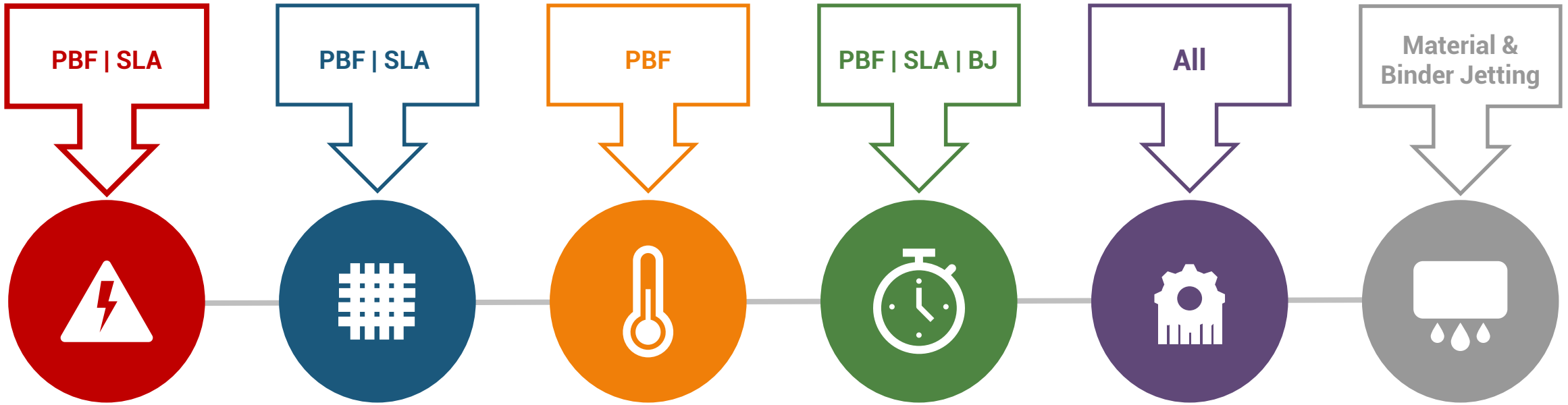


Parts Per Build	1	1	1
Setup Mins	30.00	60.00	90.00
Print Resolution	Nom	Nom	Nom
<<Layer Height (in)>>	0.0100	0.0100	0.0100
Wall Thickness (in)	**0.0600**	**0.0600**	**0.0600**
<<Infill %>>	50.00%	50.00%	50.00%
Support Content %	0.00%	0.00%	0.00%
Nozzle Diameter (in)	**0.0150**	**0.0150**	**0.0150**
Nozzle Quantity	1	1	1
<<Build Speed (in/sec)>>	14.0000	14.0000	14.0000
Soluble Support		NO	
Delay Time Per Layer (secs)	1.00	1.00	1.00
Other Build Delays (mins)	0.00	0.00	0.00
Op Attendance %	1.00%	2.00%	2.50%
Load %	100.00%	100.00%	100.00%

STANDARD INPUTS

These Standard Inputs are common across all Additive Manufacturing cost models, and will be the standard figures driving the final estimate. All Standard Inputs come with either a default value, or a computed value. Some are driven by the Primary Inputs while others are performance typical values based on the process type.

PROCESS SPECIFIC INPUTS



LASERS

Laser Power (W / mW)

Laser Diameter (in)

Laser Quantity

HATCHING

Hatch Style

Hatch Overlap %

TEMP CONTROL

Powder Bed Pre-Heat Temp

Powder Bed Heat up Rate

Part cool Down Rate -

RECOAT RATE

Recoat Rate / Layer

Time Delay / Layer

Other Build Delays

SUPPORTS

Support Infill %

Support Removal & Cleaning

PRINTER HEADS

Printer Head Quantity

Printer Head Length

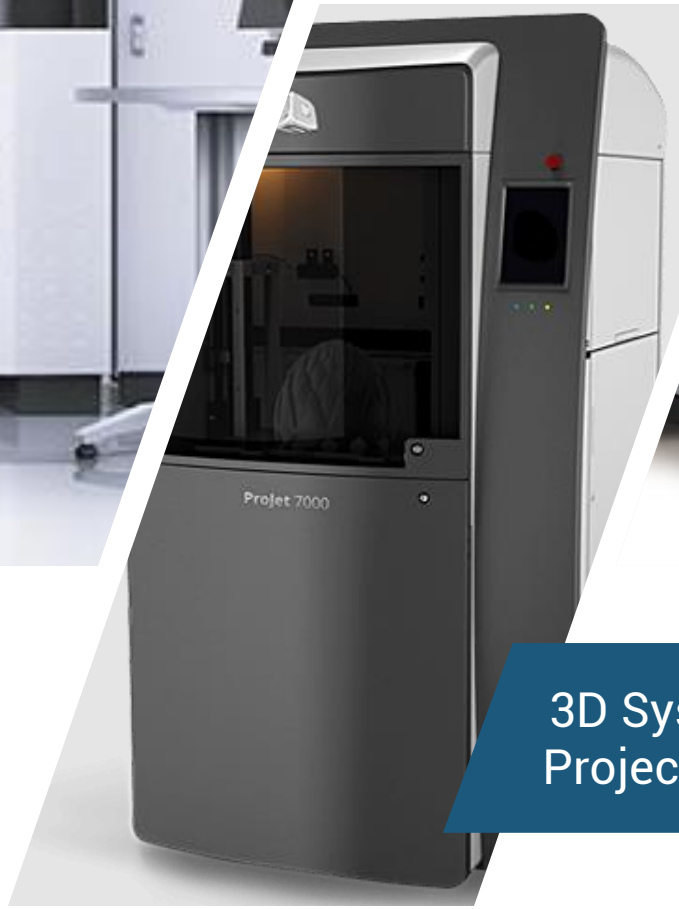
X & Y Axis Sweeps per Layer

GALORATH

KNOWLEDGE BASES

EOS M400

Concept Laser M2



3D Systems Project 7000

ExOne S-Max Furan

Stratasys F900

and more …

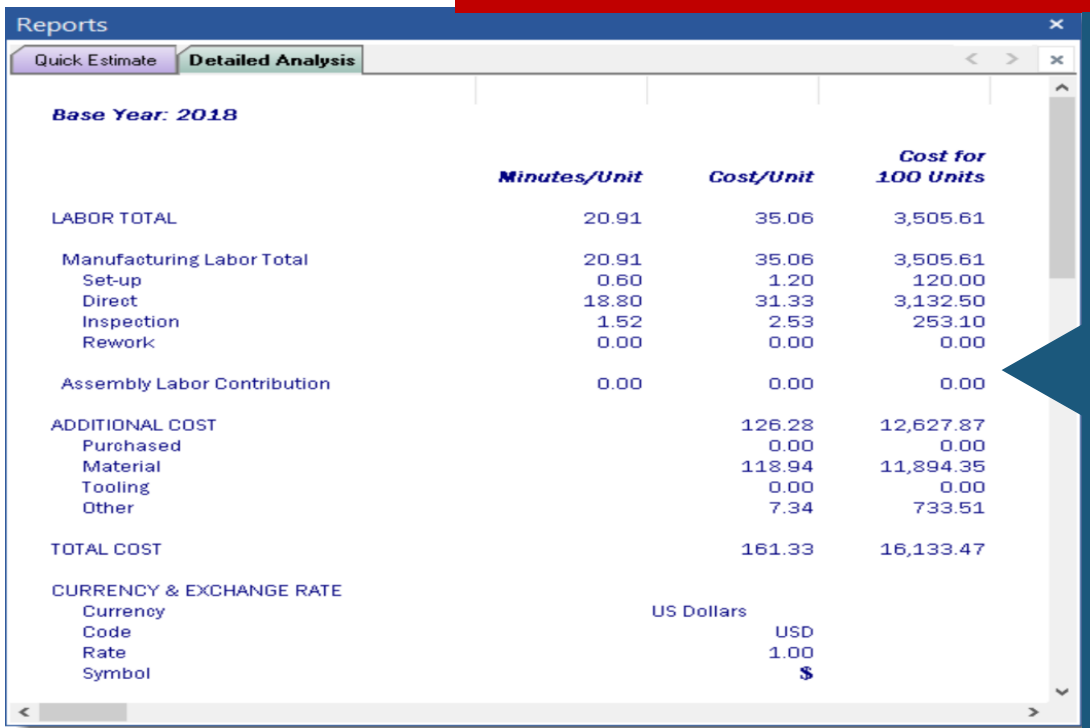
All Kbases are pre-set with machine specific inputs & OEM recommended settings

GALORATH

AM: Outputs

Additional Data

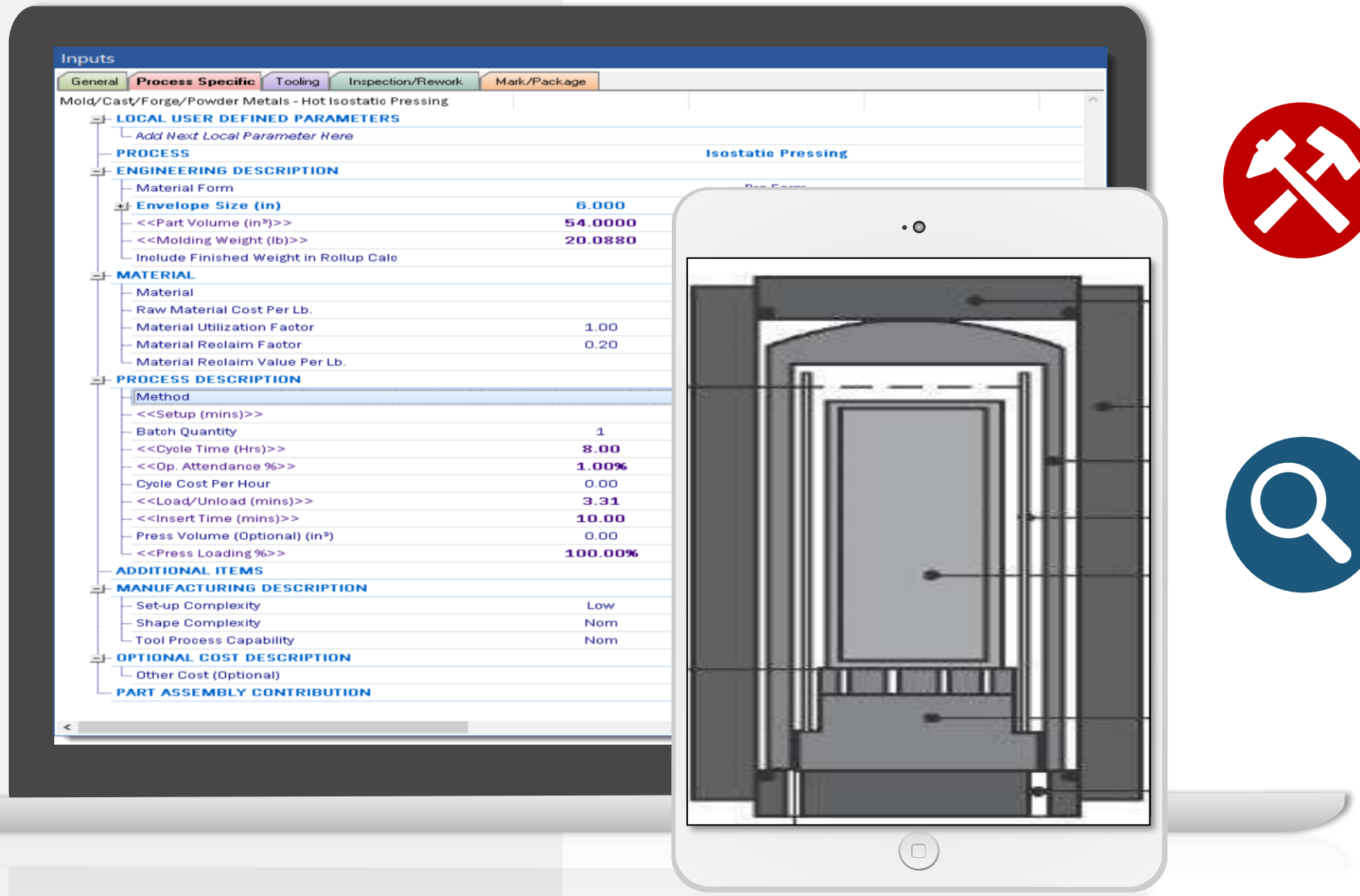
Outputs change depending on process type, detailed metrics and computed values, all of which can be copied, pasted, and exported for use in other applications



Detailed Analysis Report

Shows Labor, Setup, Direct, Inspection, Rework, Material, Tooling, and other Costs

Mold Cast Forge: Isostatic Pressing



Process

A process that applies equal pressure in all directions on a pre-formed part, or powder compact to achieve maximum uniformity of density

Options

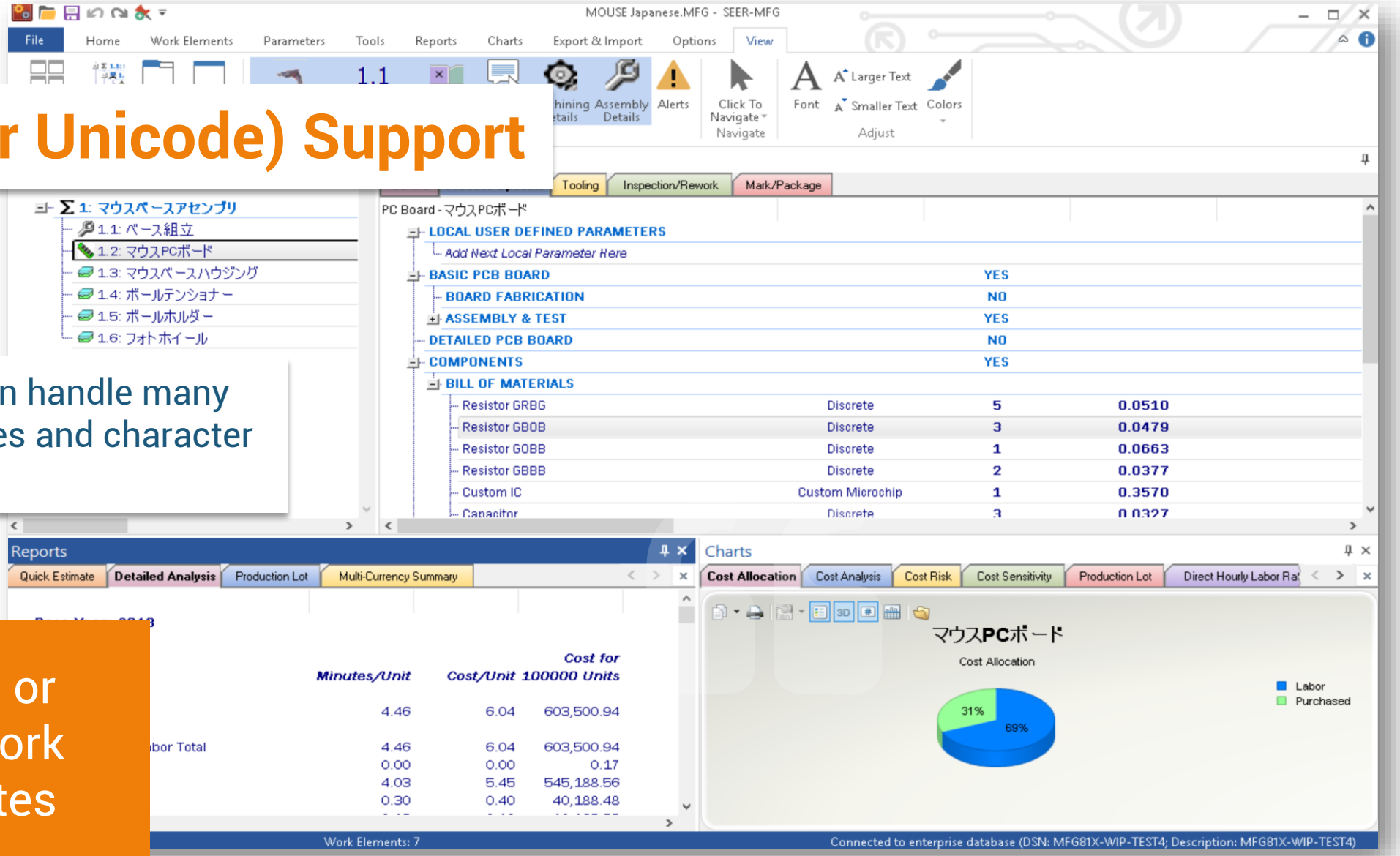
Isostatic pressing is performed “Cold”, “Hot”, or “Warm”

GALORATH

Multilingual (or Unicode) Support

SEER-MFG 8.1 can handle many different languages and character sets

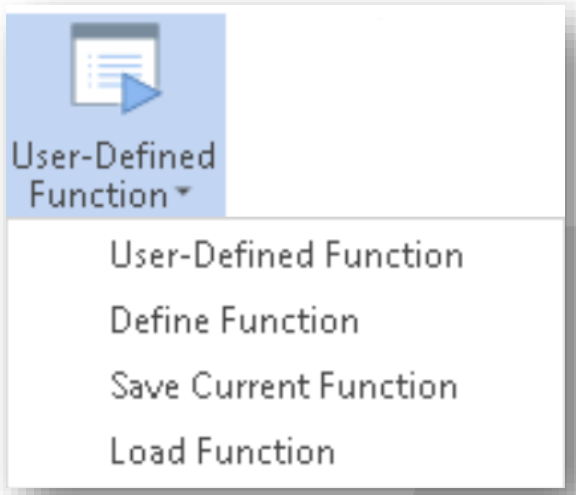
Use any font type or text to describe work elements, and notes

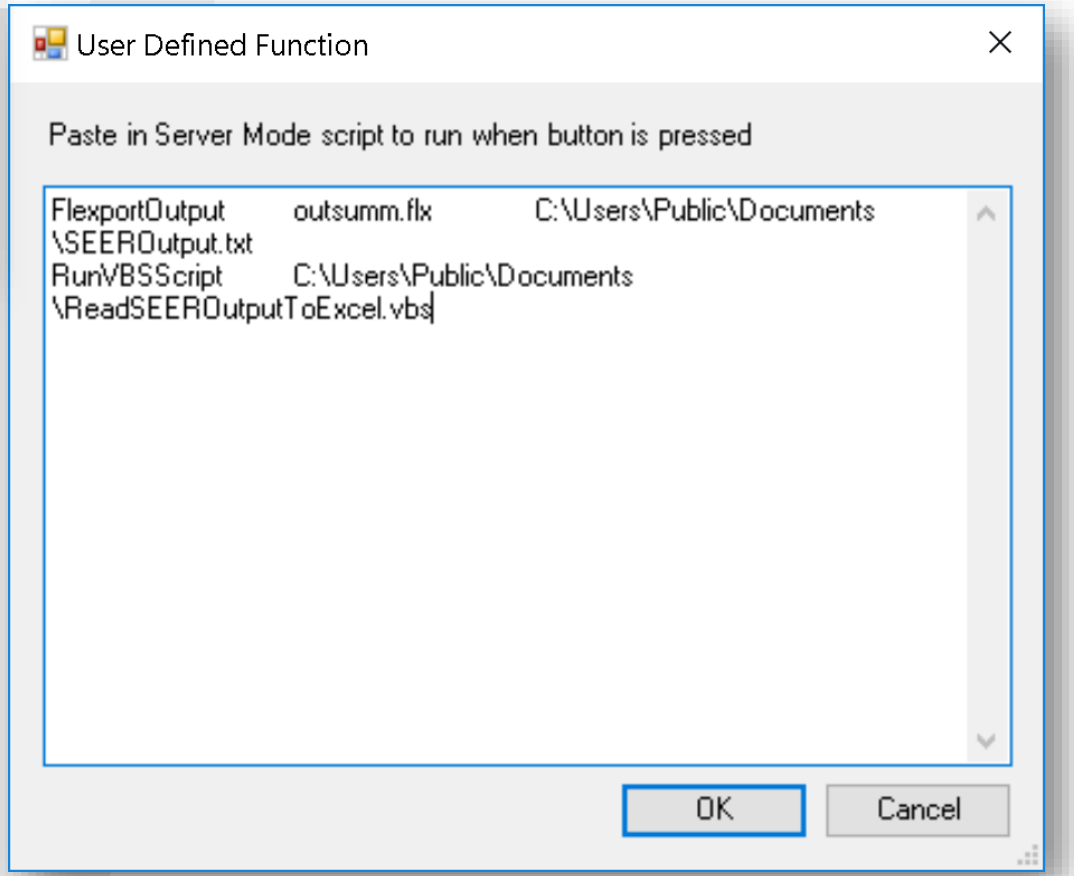


User Defined Function

Run servermode scripts from within SEER

Click the User-Defined Function button, or menu option, to run a defined script.





Define & Paste Scripts to Run from SEER

GALORATH

Reports > Operation Details Report

Outputs Available in Flex Ex

Reports

Quick Estimate | Detailed Analysis | Operation Details

Base Year: 2018

	Set-up Minutes	Direct Minutes	Inspection Minutes	Rework Minutes	Total Minutes	% Of Total Time
Finish & Heat Treat Operations:						
Blasting - Abrasive Blasting	1.8637	5.8277	0.3734	0.1493	8.2141	7.44%
Solvent Clean - Solvent Cleaning	0.2452	32.0854	1.5548	0.6219	34.5074	31.26%
Painting - Air Gun Spraying	0.5915	62.8081	3.0492	1.2197	67.6685	61.30%
Mark Part Operations:						
- Hand Write ID/Tag	0.0219	0.8549	0.0000	0.0000	0.8768	87.48%
- Rubber Stamp	0.0219	0.1036	0.0000	0.0000	0.1255	12.52%

Flexible Export Operation Details

Output to Excel or other Applications

File | Home | Insert | Draw | Page Layout | Formulas | Data | Review | View | Developer | TEAM

Cut | Copy | Format Painter | Paste | Calibri | 11 | Wrap Text | General | Merge & Center | Clipboard | Font | Alignment

M118

	A	B	C	D	E
99	Finish & Heat Treat - Description: Finishing				
100	Finish & Heat Treat Operations	Set-up Minutes	Direct Minutes	Inspection Minutes	Rework Mi
101	Blasting - Abrasive Blasting	1.8637	5.8277	0.3734	0
102	Solvent Clean - Solvent Cleaning	0.2452	32.0854	1.5548	0
103	Painting - Air Gun Spraying	0.5915	62.8081	3.0492	1
104	Mark Part Operations	Set-up Minutes	Direct Minutes	Inspection Minutes	Rework Mi
105	- Hand Write ID/Tag	0.0219	0.8549	0	
106	- Rubber Stamp	0.0219	0.1036	0	

Flexible Export

Load/Save Template | Options | Template

Available Outputs and Inputs

- TIME PER UNIT
- TOTAL COSTS
- COST PER UNIT
- TOOLING COSTS
- OTHER
- PRODUCTION LOT COSTS
- MULTI-CURRENCY SUMMARY
- OPERATION DETAILS
  - Set-up Minutes
  - Direct Minutes
  - Inspection Minutes
  - Rework Minutes
  - Total Minutes
  - % Of Total Time
- ADDITIONAL DATA - DETAILED C
- ADDITIONAL DATA - ELECTRICAL
- ADDITIONAL DATA - TUBE, FAB, V
- ADDITIONAL DATA - PCB BOARD
- ADDITIONAL DATA - ADDITIVE MA

Selected Choices

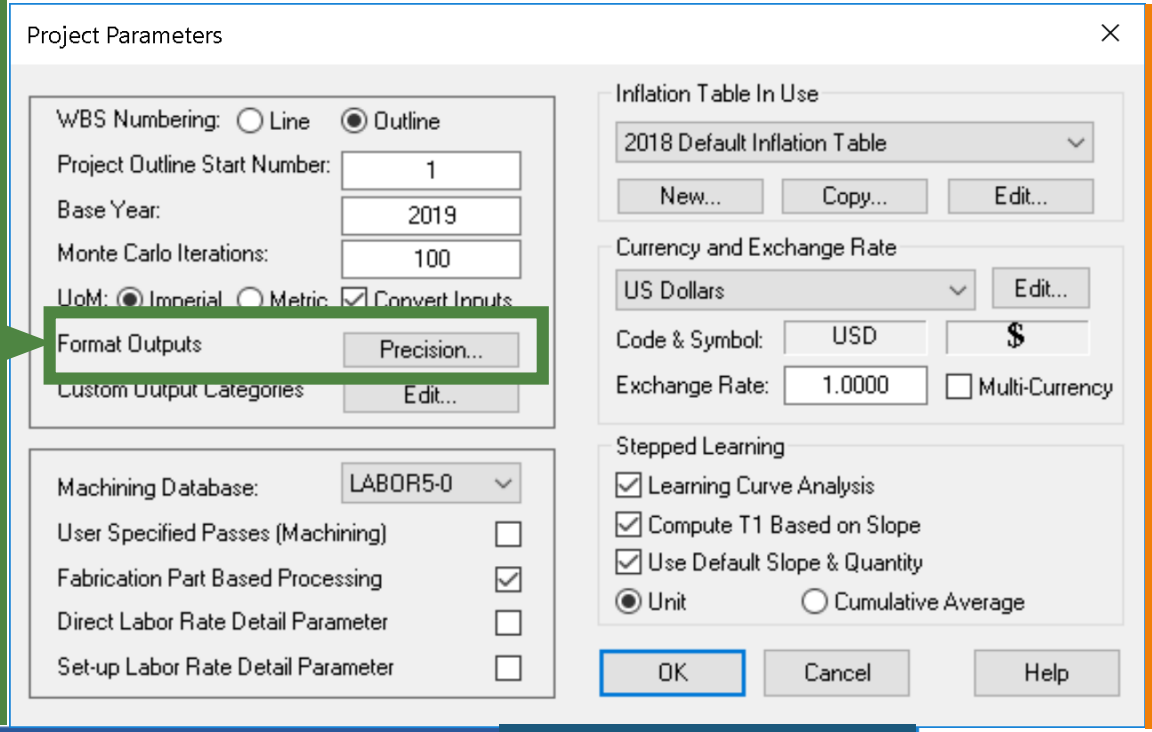
OPERATION DETAILS
Set-up Minutes
Direct Minutes
Inspection Minutes
Rework Minutes
Total Minutes
% Of Total Time

Move Up | Move Down | Remove | Remove All

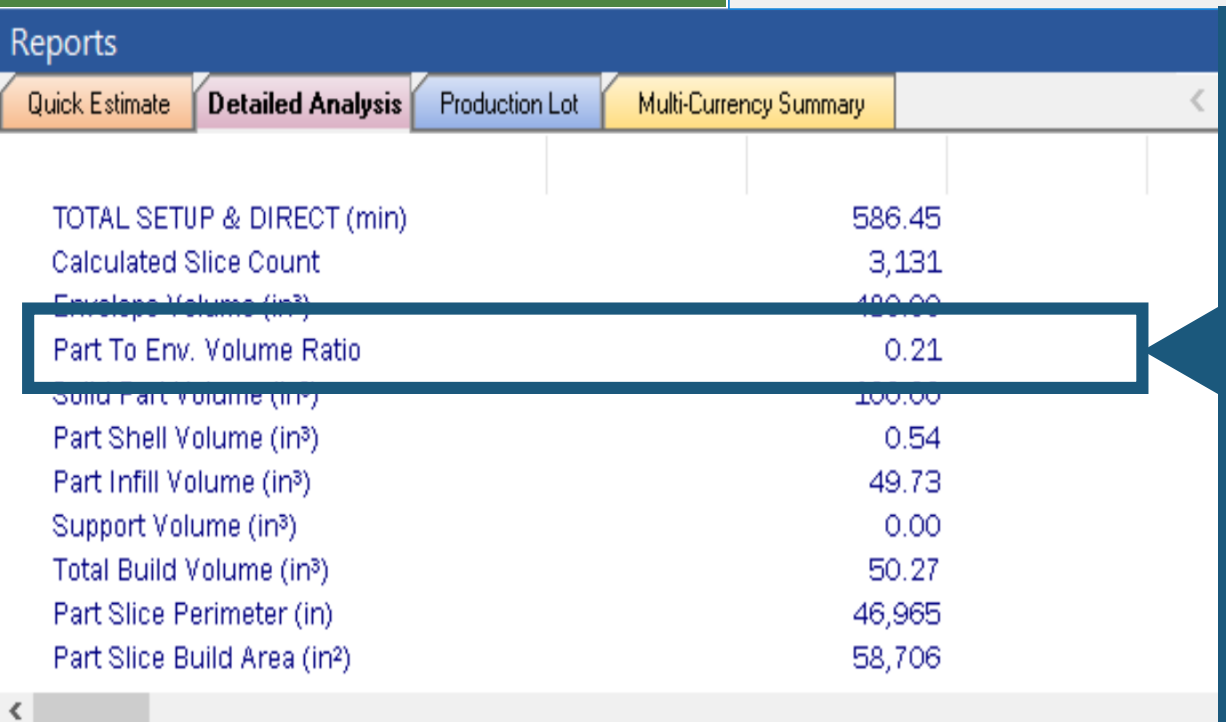
Current Template:

Export | Save Template | Close | Help

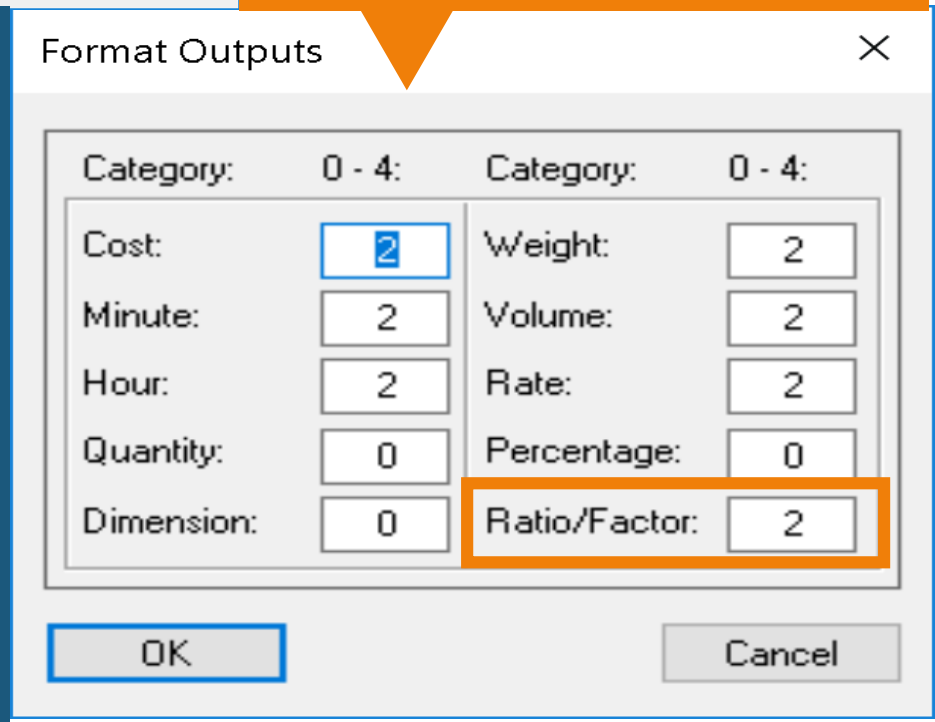
Options > Set Project Parameters > Format Ouputs > Precision



Precision… Format Outputs Dialog Ratio/Factor Added

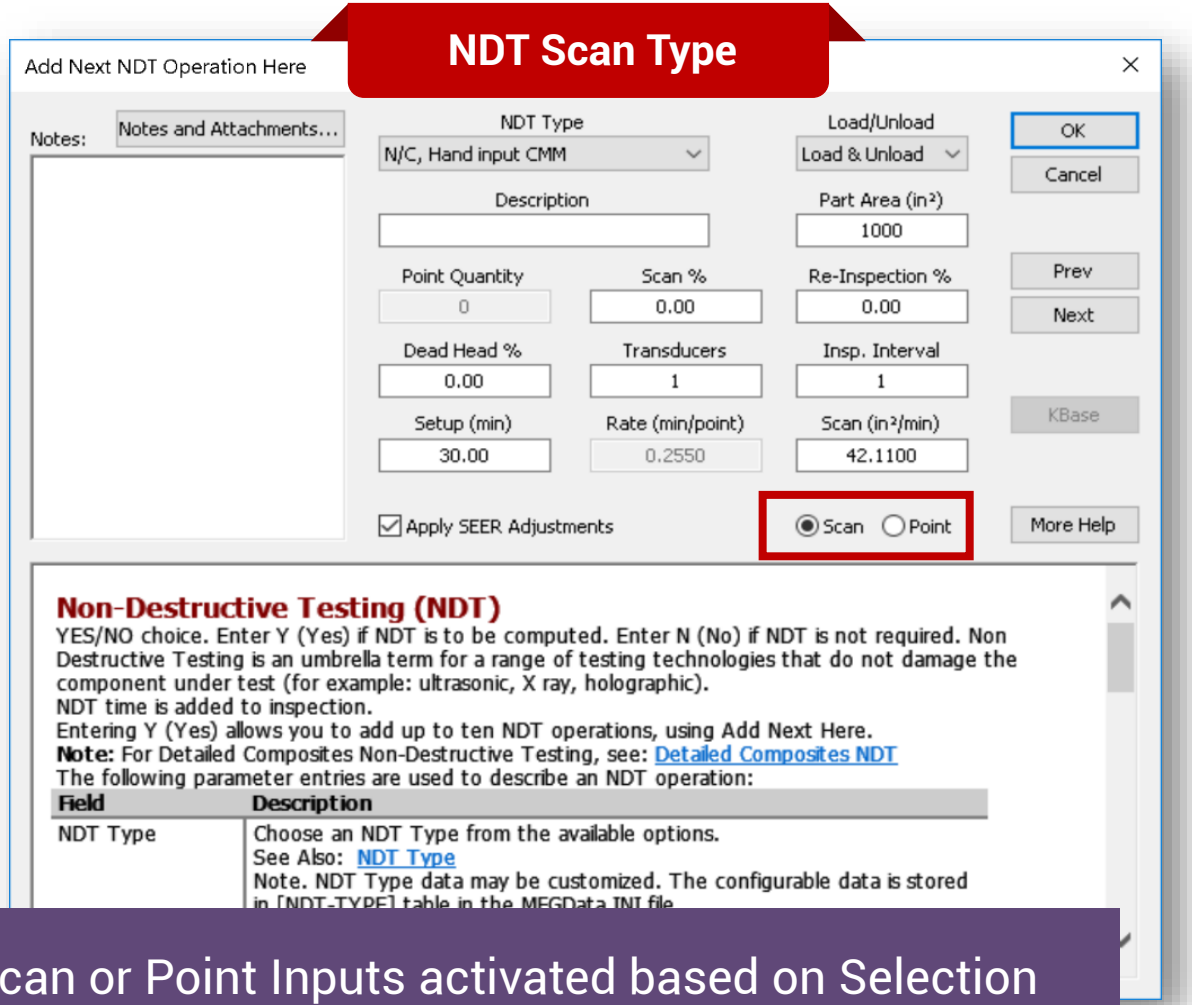


Decimal Precision Updated on Reports

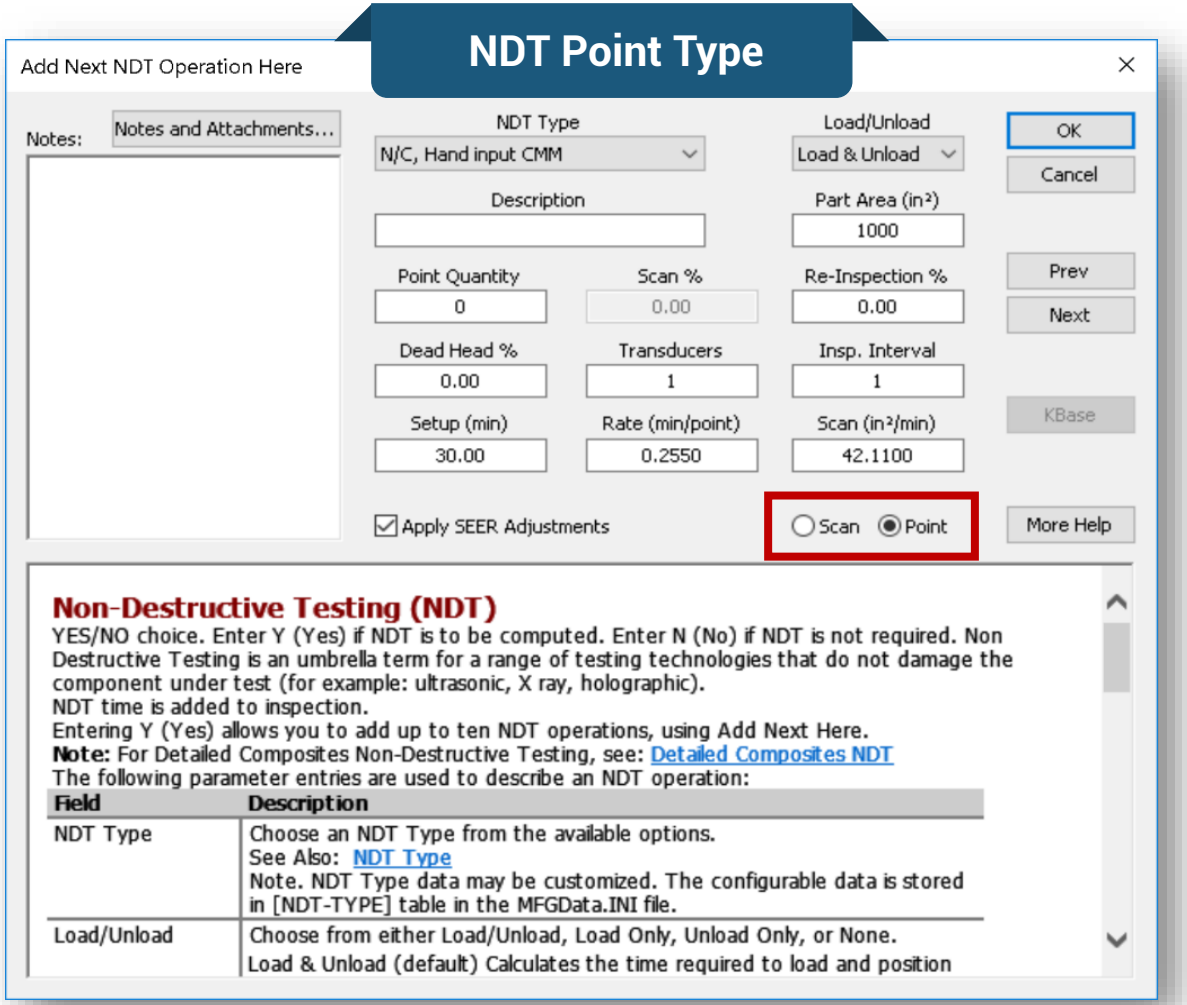


NDT Dialog Updates

NDT Scan Type



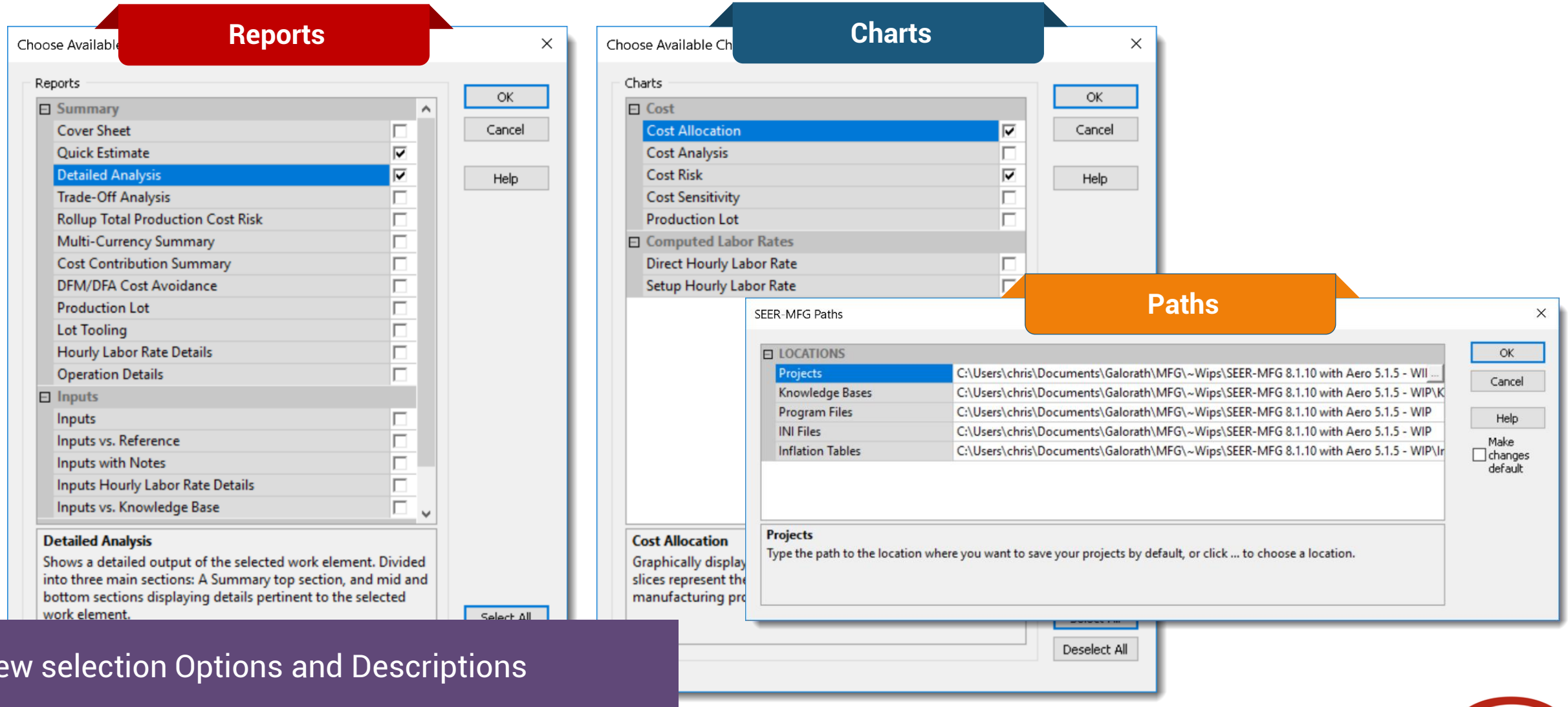
NDT Point Type



Scan or Point Inputs activated based on Selection

GALORATH

Reports, Charts, and Paths Dialog Updates



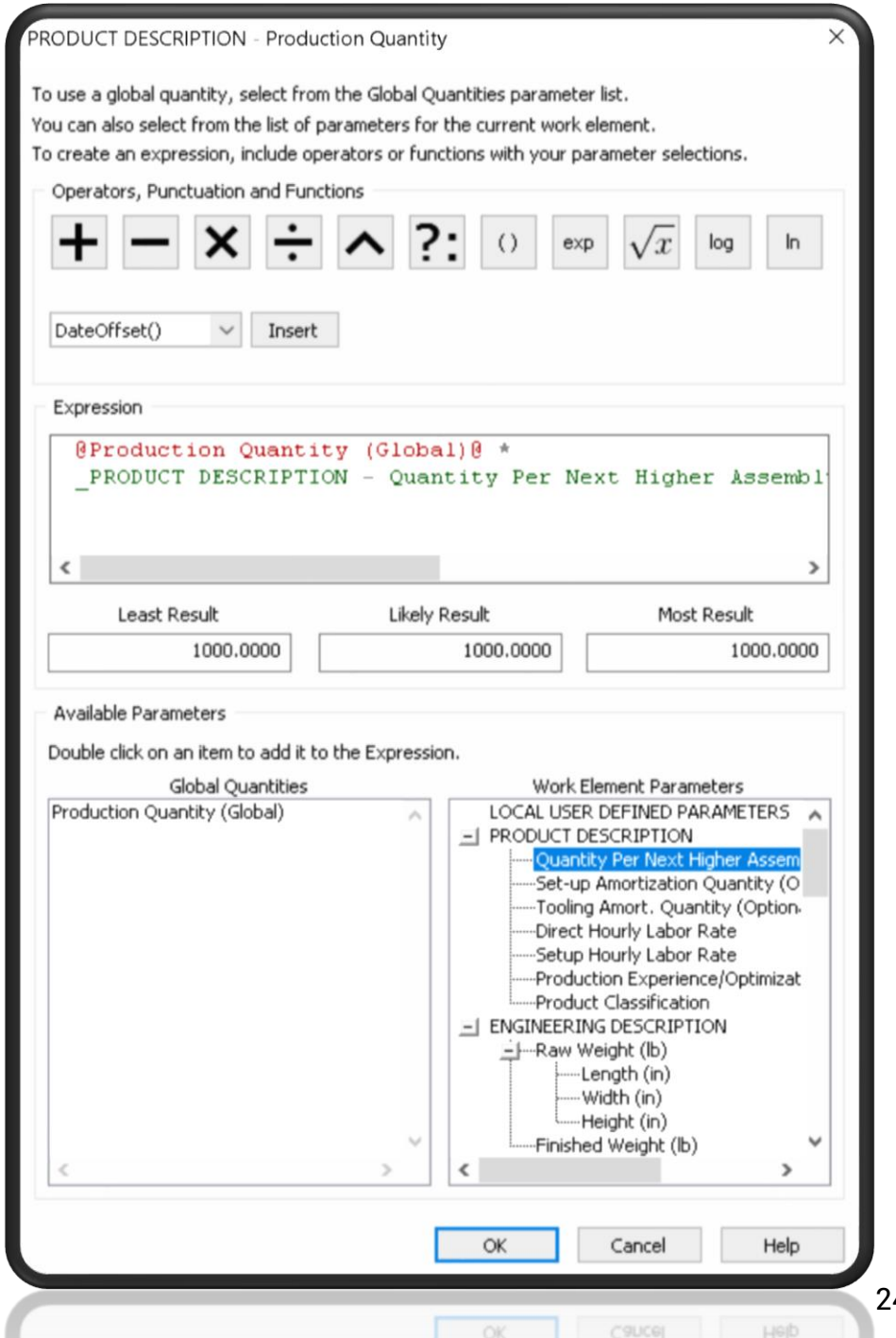
New selection Options and Descriptions

GALORATH

Expression Editor

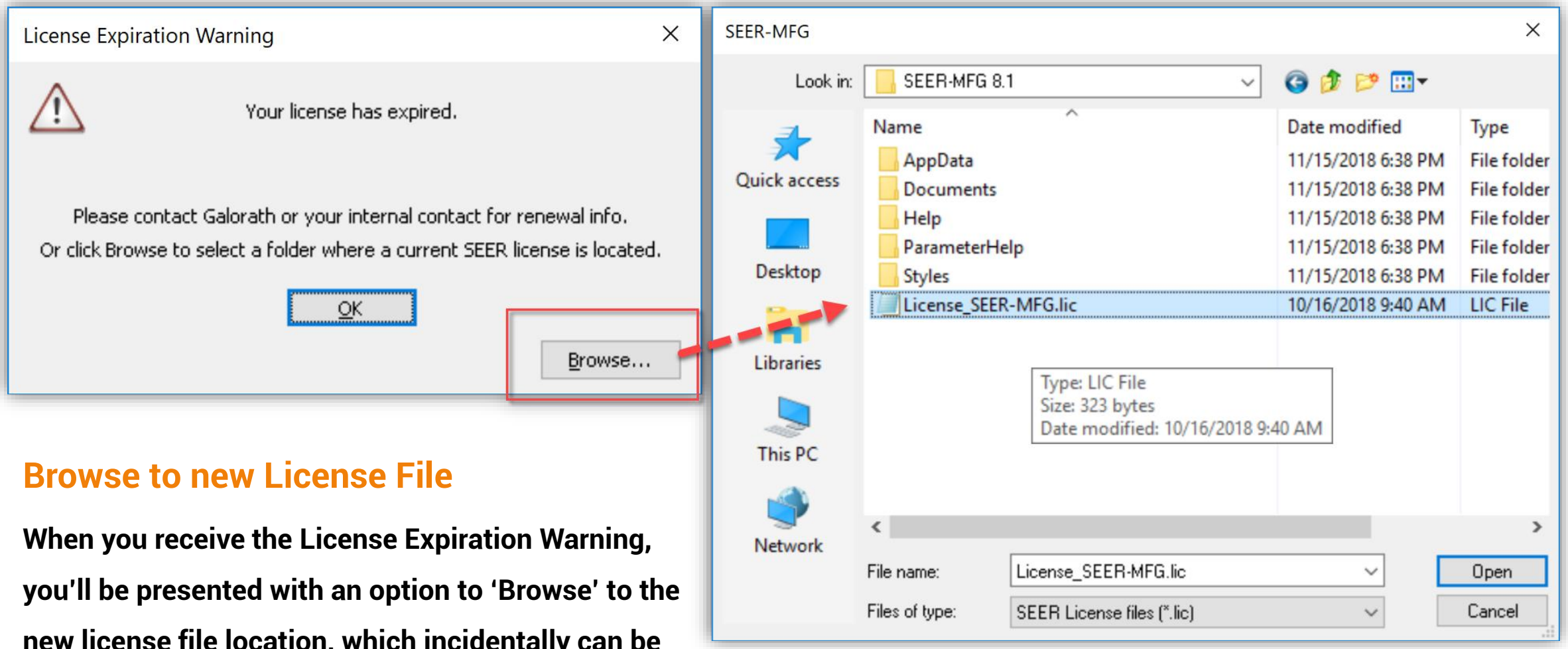
Multiline Expression Editor

The expression editor Expression entry field has been expanded to allow for line breaks within the expressions.



GALORATH

Define Path to SEER-MFG License

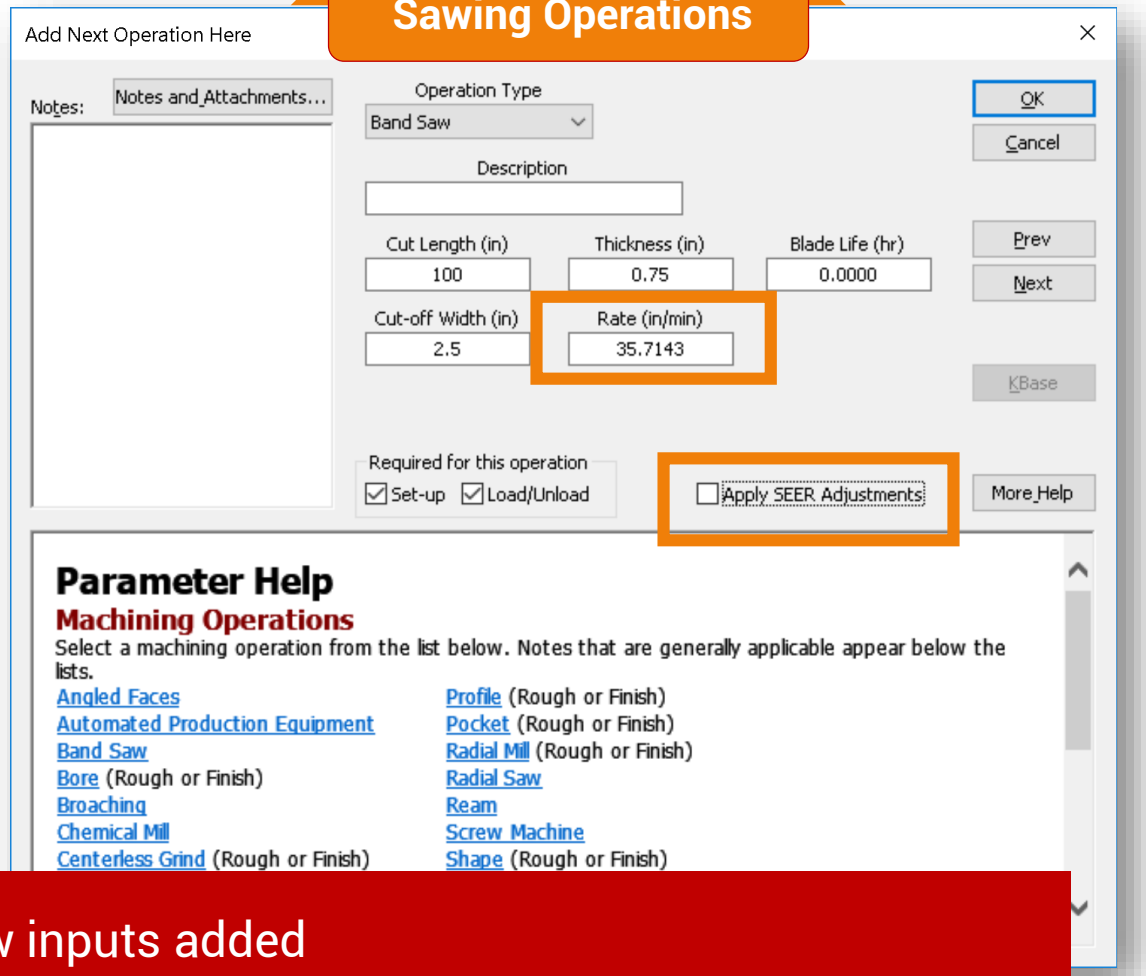


Browse to new License File

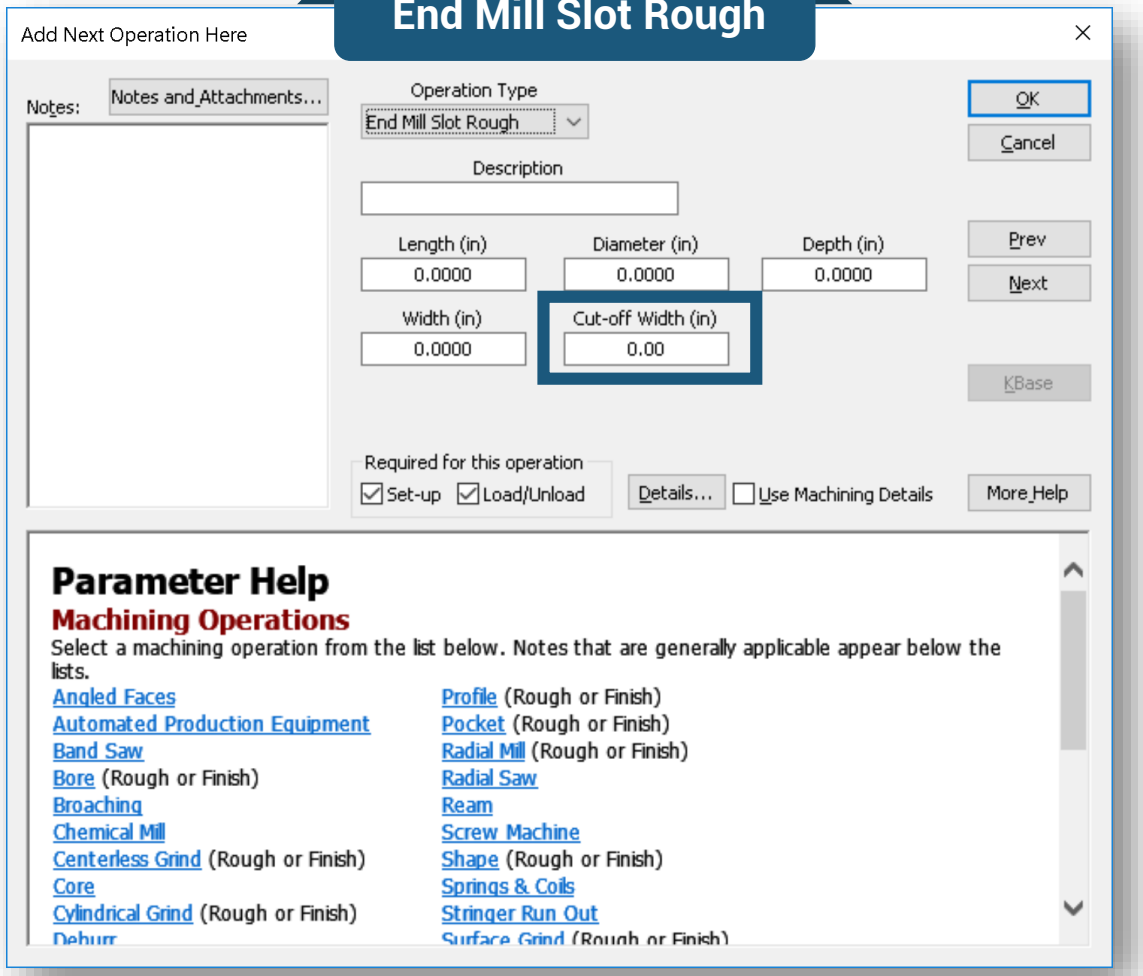
When you receive the License Expiration Warning, you'll be presented with an option to 'Browse' to the new license file location, which incidentally can be stored locally or on a network connected server.

Machining Op Updates

Sawing Operations



End Mill Slot Rough

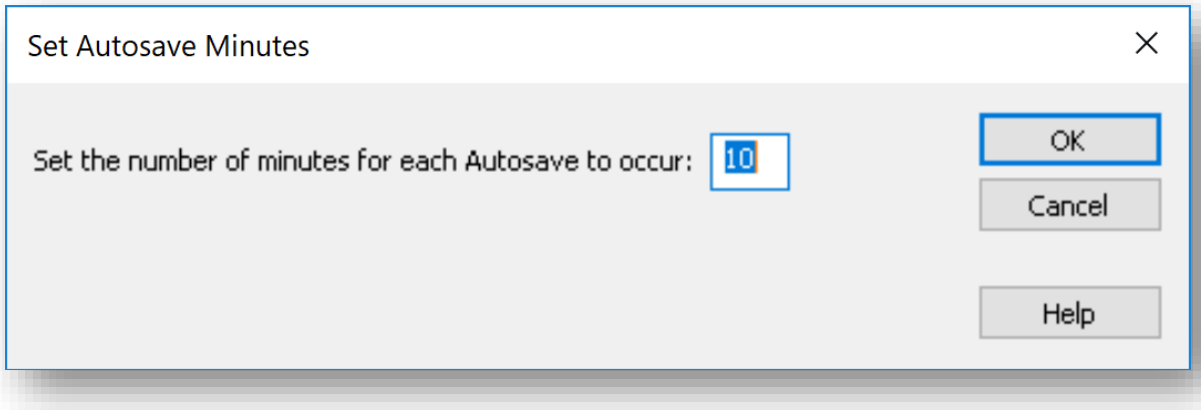


New inputs added

GALORATH

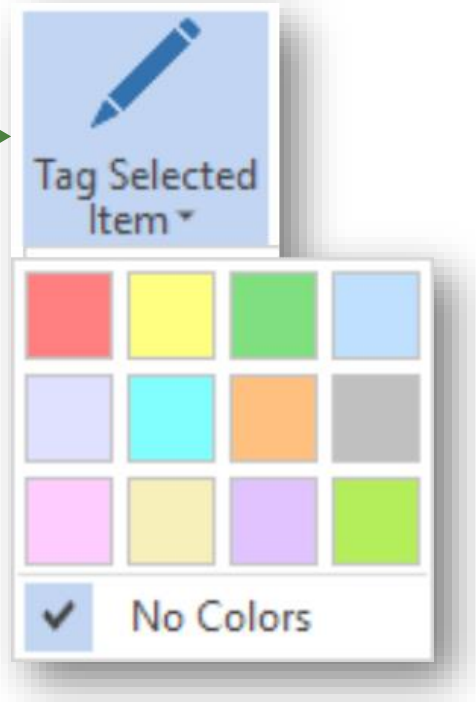
Other Updates

Auto Save. When you turn autosave on, you can set the number of minutes between each autosave.



Auto Save : Option Ribbon tab

Color Pallet



The Tag Selected Item color pallet has been expanded from 8 to 12 colors.

INI File Updates

Settings.ini

- Updated [ODBC] DataSourceName to MFGParts81
- Added VABuffers variable, used to adjust how much memory to allocate for MFG elements
- Changed Base Year to 2019

MFGData.ini

- Updated [TOOL-ELEMENT-MAPPING] table – added columns c14 to support Additive Manufacturing
- Added [AM-PROCESS-DATA] table
- Added [AM-PRINT-RESOLUTION] table
- Added [AM-BUILD-SPEED] table
- Added [INFILL-PERCENT] tables
- Added [AM-BUILD-RATE] tables
- Added FEED & SPEED tables for machining operations
- Added RPM CAP column to Machining Operations table

Material.ini

- Added Material data tables for all Additive Manufacturing Processes

Maintenance Updates & Useful Info

MFG Element Updates

- Machining
  - Added a Saw Rate and Apply SEER Adjustments option to Sawing operation.
  - End Mill Slot Finish Passes update.
  - Added Feed and Speed tables to MFGData.ini, previously defaults were hard coded.
  - Added RPM cap tables to MFGData.ini, previously defaults were hard coded.

MFG Element Updates

- Machining Cont…
  - Added Depth of Cut table to MFGData.ini, previously defaults were hard coded.
  - Fixed issue with incorrect default diameter for Turn operations.
- Mold Cast Forge
  - Added a new Isostatic Pressing operation
- Additional Items
  - Fixed parameter view after Delete of additional operations.

Program Updates

- Fixed parameter view after Delete of additional operations.
- Added Auto Save Option.
- Added new License path.
- Added a new Ribbon UI.
- Updated Select Available Reports Dialog.
- Updated Select Available Charts Dialog.
- Updated SEER-MFG Paths Dialog.
- Updated NDT Dialog to display active parameters for either Point or Scan choices.

Maintenance Updates & Useful Info

Expression Editor

- Fixed issue with 'phantom' custom parameters being displayed after entering a new element below existing element with custom parameters.
- Fixed issue of renaming parameters in one element impacting expressions in other elements.
- Expressions can now use the Part Volume parameter in the mold cast forge work element.
- Added Multi Line expression editor.

Aero Element Updates

- Filament Winding Diameter and Width remain in sync when one or the other input value is changed.
- Aero Cure Autoclave Loading parameter is no longer grayed out when a user Operator Attendance parameter is entered.
- The Max Ply Perimeter calculation has been corrected for the Aero Composites and Aero Cure work elements.

Aero Element Updates

- Aero Cure RTM/VARTM Resin type parameters now correctly loaded into parameter view.
- Sheet Metal Hand Hammer no longer impacted by Mechanization input.

Maintenance Updates & Useful Info

Misc Updates

- Added the operation details report to flexible export – you can now export operation details for all elements within a project.
- Fixed reverse risk chart in Mold Cast Forge.
- Fixed Detailed PCB Fabrication user entered test minutes from adjusting when dialog opens.
- SEER-MFG 8.1 is updated to 64 bit, and no longer supports 32bit windows.
- SEER-MFG 8.1 is updated with Unicode Support.

Misc Updates

- Added RunVBSScript servermode command.
- Added MergeSubProject command.
- Added GetProcessID command.
- Updated the MFGTools - INI File Manager Spreadsheet to support metric/imperial conversions for PCB tables, Additive Manufacturing
- Fixed MFGParts.xls file macro to auto generate UUID.
- Fixed issues with copy and paste of elements with collapsed parameters and notes.

Misc Updates

- Fixed Copy and Paste to Multiple Elements for Machining Raw Dimensions, Fabrication Blank Dimensions, Mold Cast Forge and Additive Manufacturing Envelope Size.
- Fixed FDM material costs not reported.
- Removed print preview option from chart options menu.
- Added Multi Currency Parameters to Additive Manufacturing element.

Maintenance Updates & Useful Info

Misc Updates

- Harness Branches and Detailed Harness Branches parameters now correctly reorder least likely most values after paste.
- Fixed beta release issue related to turning on Basic and or Detailed Harness options in Electrical Assembly work element.

Misc Updates

- Machine Tool Model Max Tool Speed is now computed for Turn and Bore operations.

Misc Updates

- Unified Ribbon Layout and Options for SEER product suite.

We look forward to being part of your success

Galorath Incorporated
info@galorath.com
GALORATH.COM