



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

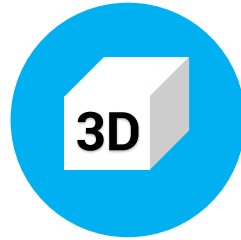
GALORATH



Contents

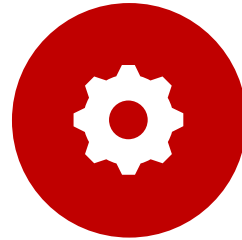
ADDITIVE MANUFACTURING

SEER-MFG has a new Additive Manufacturing work element



MACHINING

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



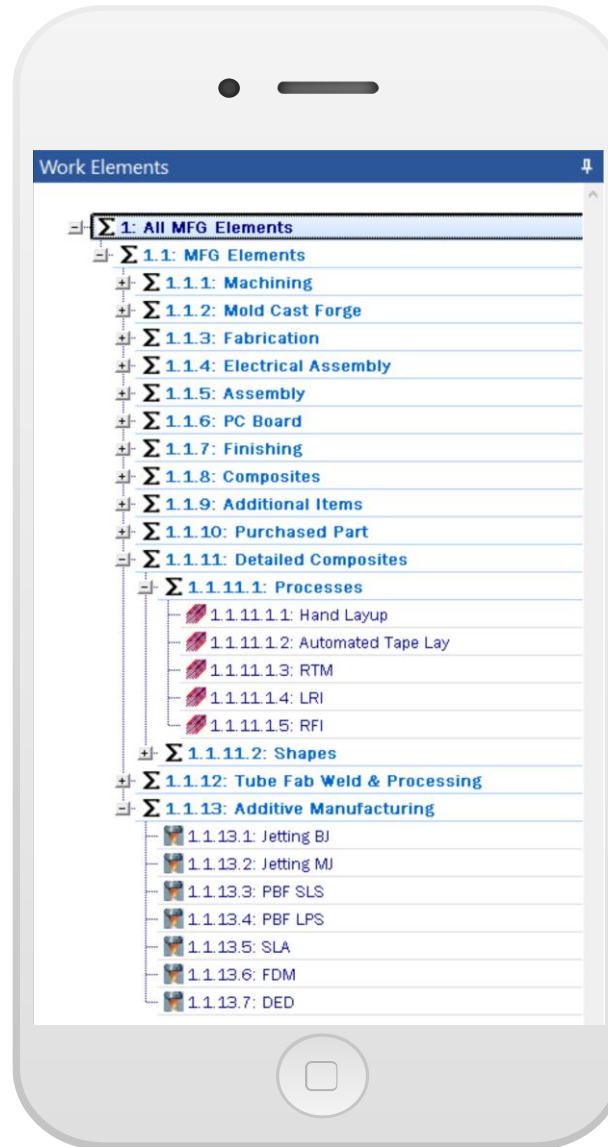
MOLD CAST FORGE

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

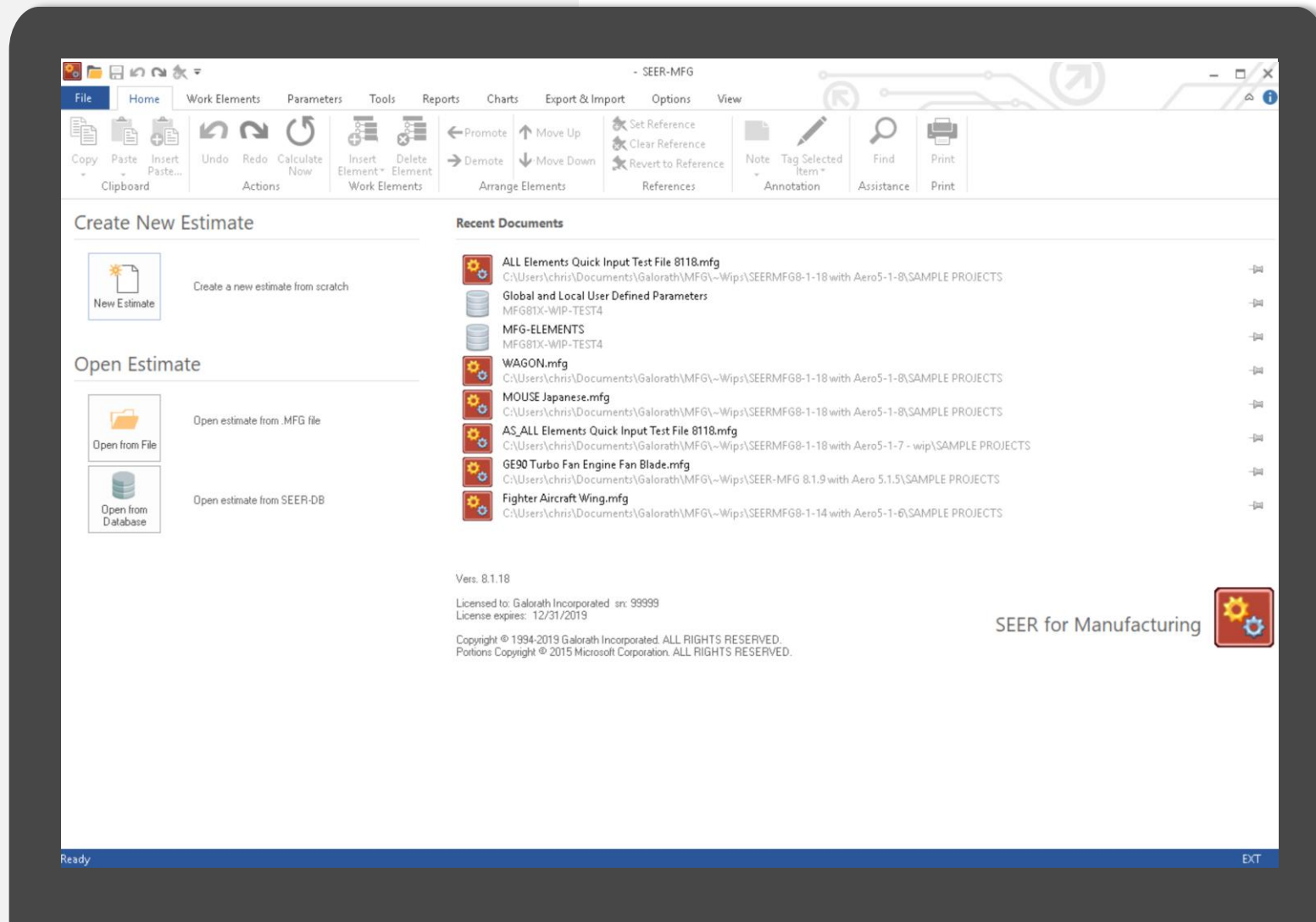
SEER-MFG can now handle many different languages and character sets



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

The image displays four screenshots of a software ribbon interface, each highlighting a different tab. The ribbon tabs are File, Home, Work Elements, Parameters, Tools, Reports, Charts, Export & Import, Options, and View.

- Home (Red callout):** Shows the Home tab selected. It includes groups for Clipboard (Copy, Paste, Insert Paste...), Actions (Undo, Redo, Calculate Now), Work Elements (Insert Element, Delete Element), Arrange Elements (Promote, Demote, Move Up, Move Down), References (Set Reference, Clear Reference, Revert to Reference), Annotation (Note, Tag Selected Item), Assistance (Find), and Print (Print).
- Work Elements (Orange callout):** Shows the Work Elements tab selected. It includes groups for Work Elements (Insert Element, Delete Element, Exclude Element Edit), Arrange Elements (Promote, Demote, Move Up, Move Down), Knowledge Bases (Reload Knowledge Base, Load Standard Component Cost From KBase), View (Expand/Collapse Branch), Annotation (View Attachments, Properties), and Import into Work Element (Merge).
- Parameters (Blue callout):** Shows the Parameters tab selected. It includes groups for Change Multiple (Change and Copy, Copy/Paste Multiple), Item Actions (Move Up, Move Down, Delete, Modify, Rename), Lock and Unlock (Lock Parameters, Unlock Parameters), Hide and Show (Hide Parameters, Unhide Parameters), Parameter Expressions (Parameter Expression, Edit Assembly Details), Remove Catalog Reference (Remove Catalog Reference, Links), and Highlight Changed Parameters (Highlight Changed Parameters, Annotation).
- Tools (Green callout):** Shows the Tools tab selected. It includes groups for Calculator (Calculator, User-Defined Function, Custom Calc).



Reports

File Home Work Elements Parameters Tools **Reports** Charts Export & Import Options View

Quick Report Summary Reports Inputs Custom Reports Select Reports Dialog Other Monte Carlo Risk

Charts

File Home Work Elements Parameters Tools Reports **Charts** Export & Import Options View

Cost Labor Rates Charts Production Lot Select Charts Dialog Other Monte Carlo Risk

Export & Import

File Home Work Elements Parameters Tools Reports Charts **Export & Import** Options View

Refresh Catalog Items Refresh Exchange Rates External Data Export Commands Run Commands Flexible Export Export

Options

File Home Work Elements Parameters Tools Reports Charts Export & Import **Options** View

Auto Recalc Auto Save Automatic Behavior Chart Auto Recalc Options Set Project Parameters Save Configuration Settings Set Paths For Config Files Enterprise Database Estimate Results in Database Databases Monte Carlo Risk Modes

View

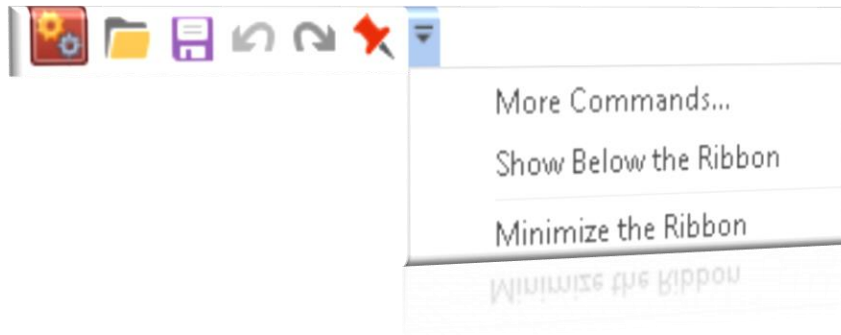
File Home Work Elements Parameters Tools Reports Charts Export & Import Options **View**

Arrange Windows Work Elements Windows Input Tabs Maximize pane Work Element Icon 1.1 Work Element Outline Multicolor Tabs Note Tooltips Show/Hide Machining Details Assembly Details Alerts Click To Navigate Font Larger Text Smaller Text Adjust Colors

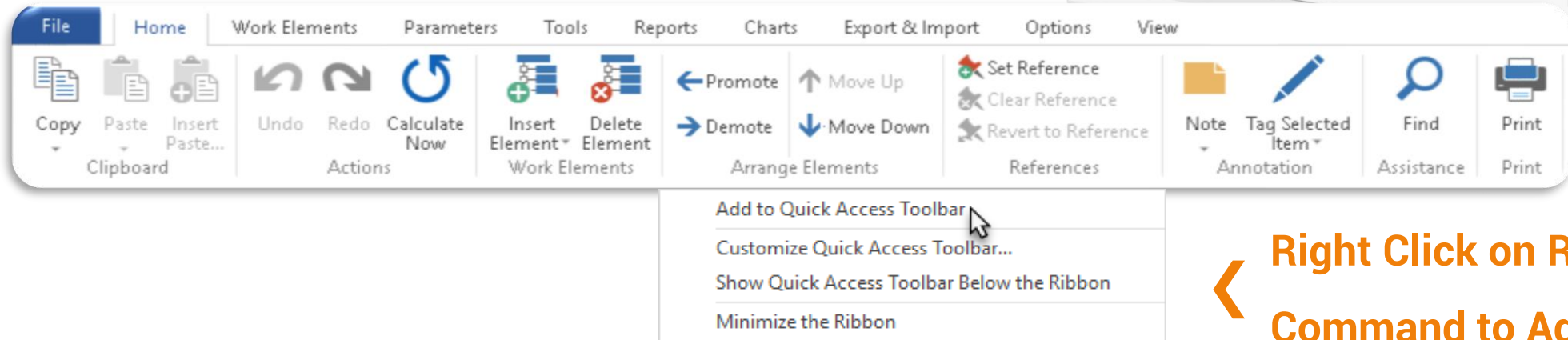
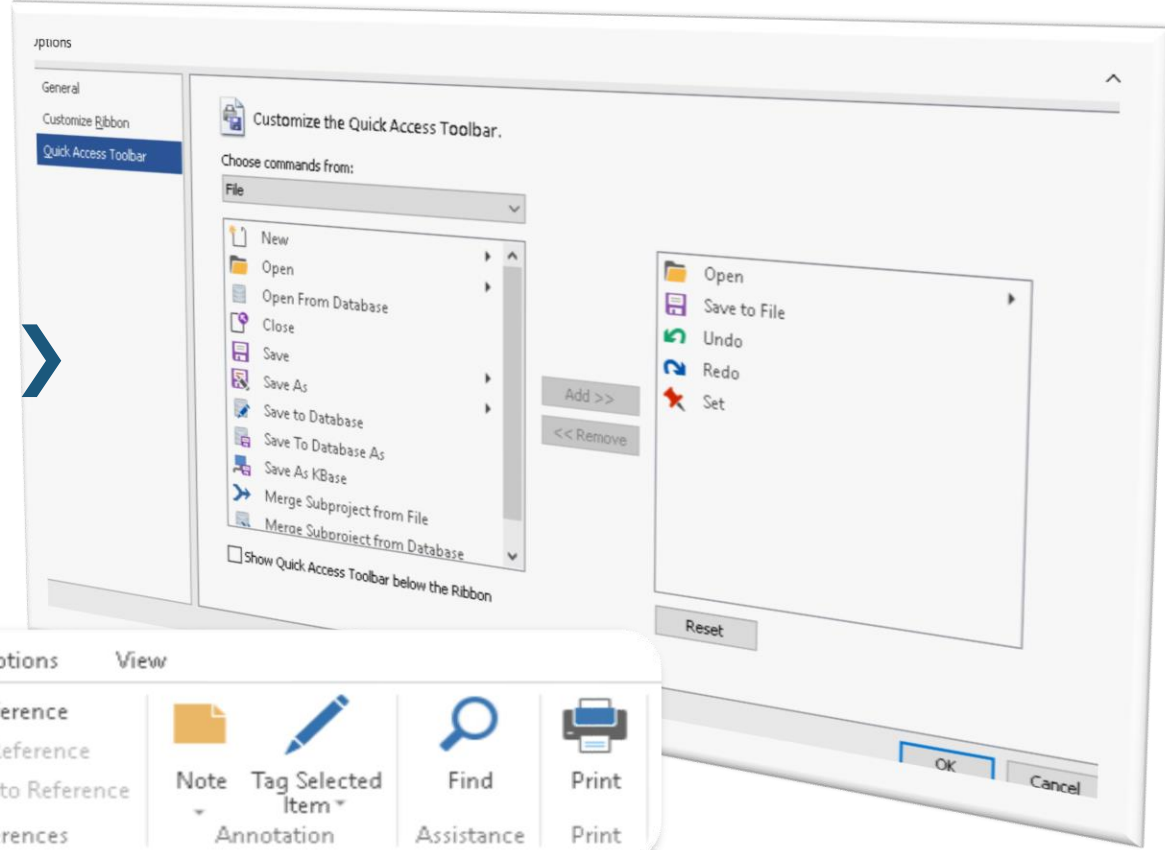


Ribbon Customization

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



Available Options →




Right Click on Ribbon Command to Add






- New
- Open
- Save
- Save as
- Print**
- Close
- Collaboration
- Help
- SEER Suite
- Ribbon Options
- Exit




Print

- 
Print selected reports and charts
- 
Output current print layout to PDF file

Settings

- 
Select Elements to Print
- 
Select Reports to Print
- 
Select Charts to Print

Options

- 
Collate by Element or by Report
- 
Select Print Logo
- 
Custom Footer Text

1.1: Powder Bed Fusion (PBF) - Selective Laser Sintering (SLS)

Element Type: Additive Manufacturing



Detailed Analysis

	Minutes/Unit	Cost/Unit	Cost for 100 Units
LABOR TOTAL	23.48	39.36	3,936.04
Manufacturing Labor Total	23.48	39.36	3,936.04
Set-up	0.67	1.35	134.73
Direct	21.10	35.17	3,517.12
Inspection	1.71	2.84	284.18
Rework	0.00	0.00	0.00
Assembly Labor Contribution	0.00	0.00	0.00
ADDITIONAL COST		126.28	12,627.87
Material		0.00	0.00
Machine		18.94	1,894.35
Other		7.34	733.51
TOTAL COST		165.64	16,563.90
CURRENCY AND UNIT RATE			
Currency		US Dollars	
Unit		USD	
Rate		1.00	
Symbol		\$	

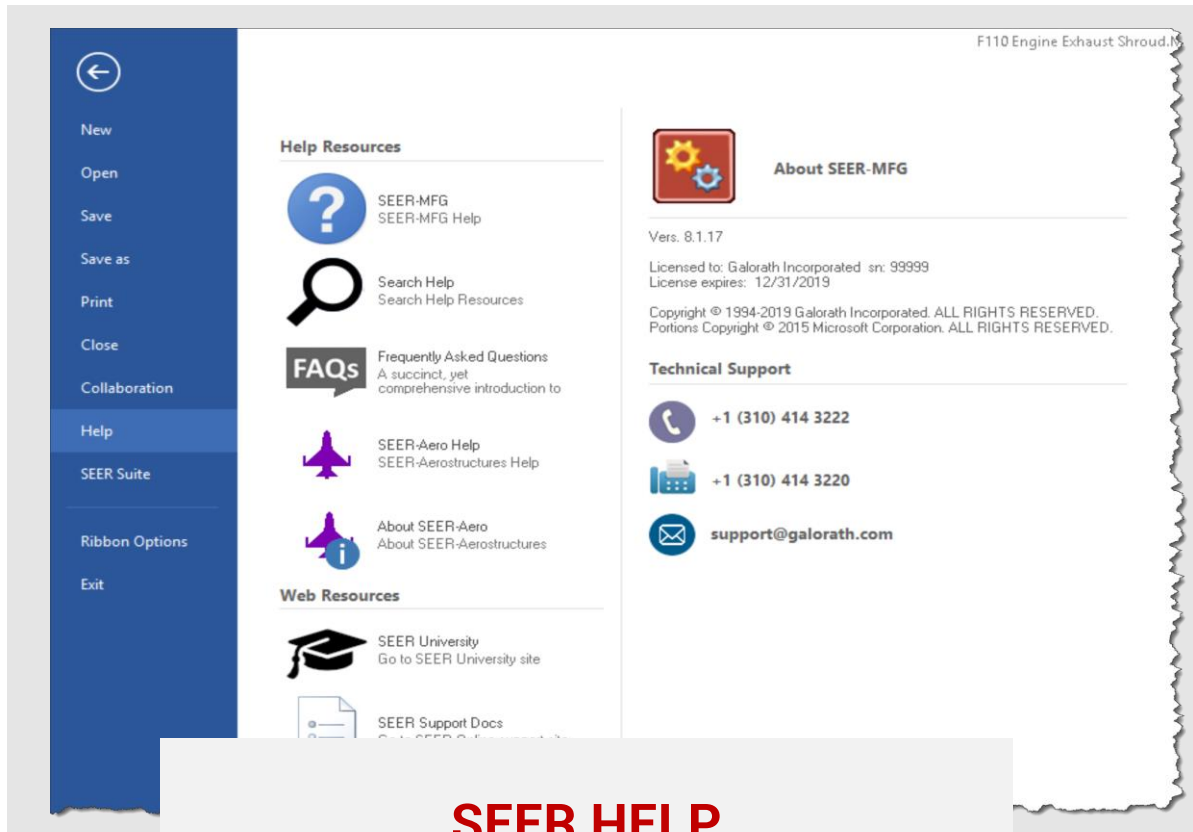
Reports & Charts Print Engine

Print Selected Reports and Charts

Add Custom Footer Text

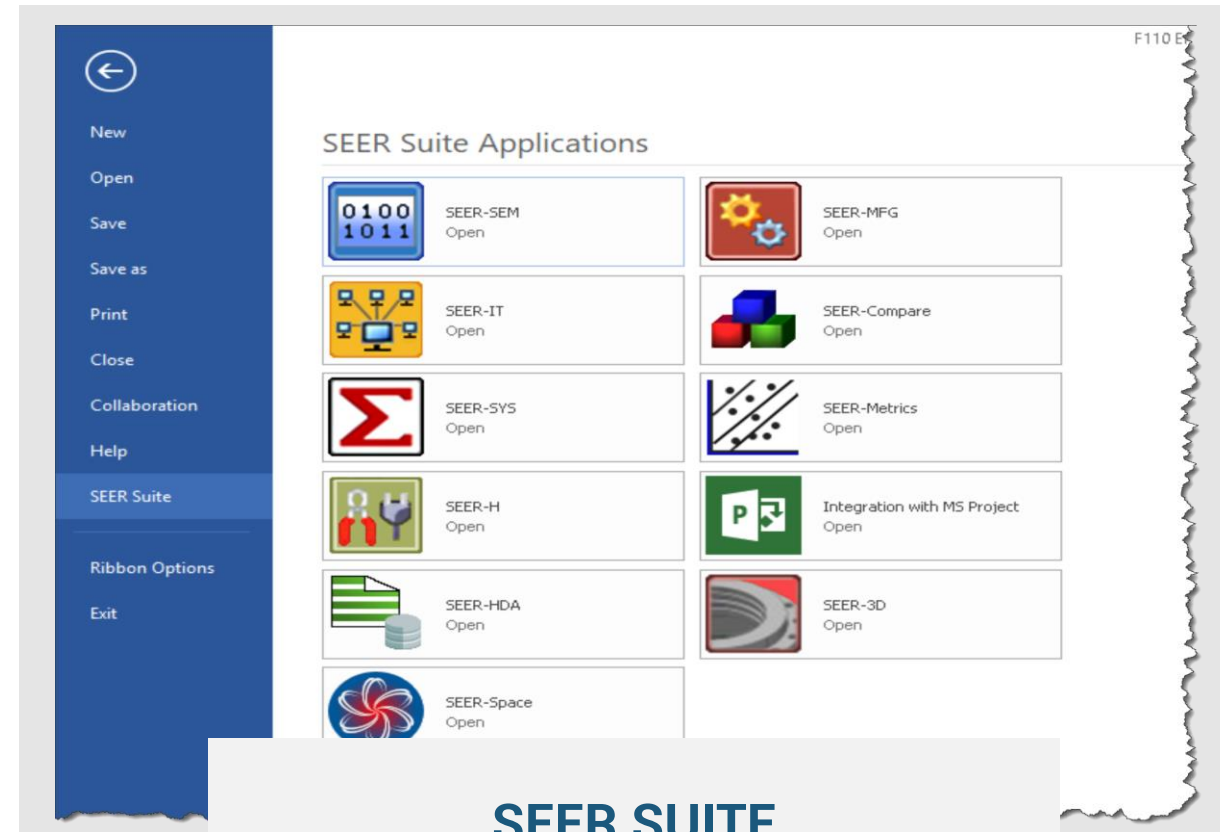
ADDITIONAL DATA	
Prep Tools (min)	0.00
Package Tools (min)	0.00
Charge Time (min)	17.53
Part Handling (min)	0.13
Clean Machine (min)	0.13
Support Removal & Cleaning (min)	0.63
Excess Powder Removal (min)	2.68
Mark Part (min)	0.00

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)

The screenshot displays the 'Additive Manufacturing Elements' software interface. The main window shows the configuration for a 'Stereolithography (SLA)' work element. The 'Inputs' tab is active, showing 'LOCAL USER DEFINED PARAMETERS' and 'ENGINEERING DESCRIPTION'.

Stereolithography (SLA)			
ENGINEERING DESCRIPTION			
Envelope Size (mm)	152.400	152.400	50.800
-<<Solid Part Volume (mm³)>>	294,967.1520	353,960.5824	471,947.4432
-Include Finished Weight in Rollup Calc		YES	
MATERIAL			
Material	Accura 48HTR Plastic		
-Raw Material Cost Per Kg.	367.8816		
Material Utilization Factor	1.00	1.00	1.00
PROCESS DESCRIPTION			
Parts Per Build	1	1	1
-Setup Mins	30.00	60.00	90.00
Print Resolution	None	None	None

The 'Reports' section shows a 'Quick Estimate' table:

Item	Estimate
Total Minutes/Unit	19.67
Total Labor Cost/Unit	33.01
Tooling Cost/Unit	0.00
Finished Weight (kg)	0.23
First Unit (T1) Mins	31.69
Total Hours/Unit	0.33
Exchange Rate	1.00

The 'Charts' section displays a 'Cost Allocation' pie chart for 'Stereolithography (SLA)'. The chart shows 24% for Labor and 76% for Material.



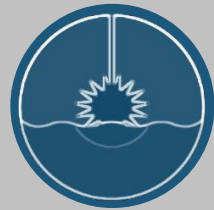
PROCESS SELECTION

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.



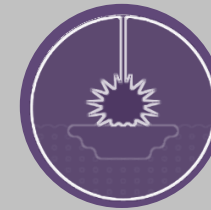
JETTING

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

JETTING > MATERIAL JETTING

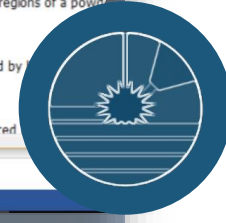
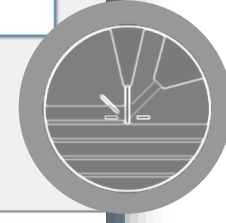
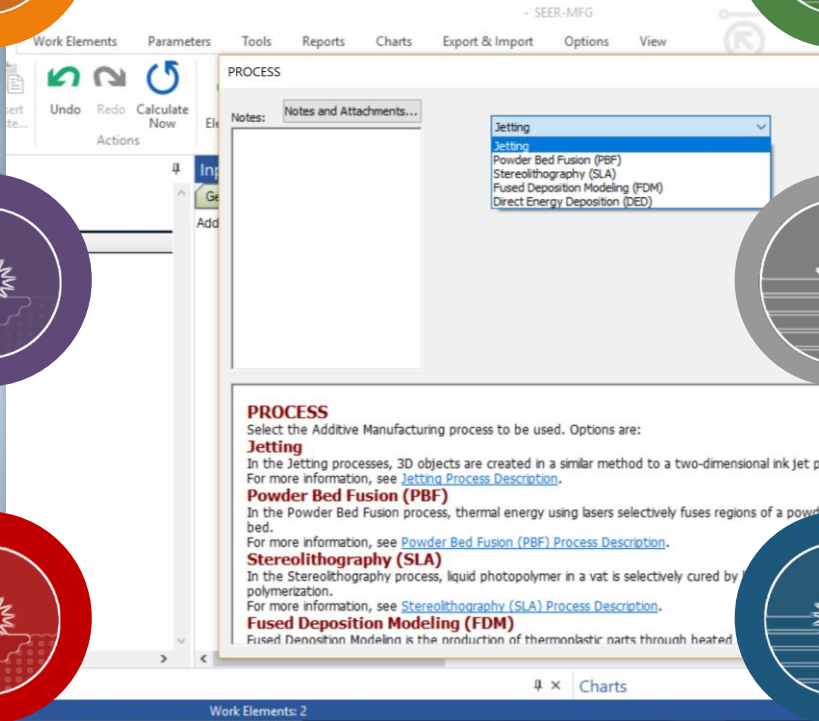
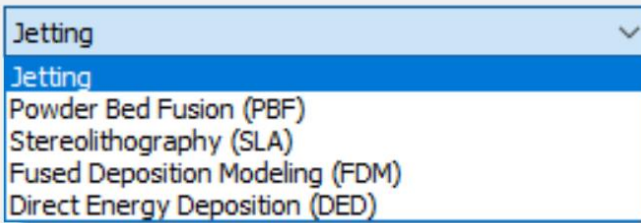
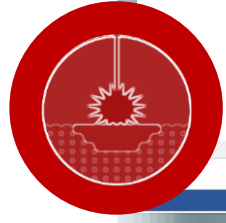
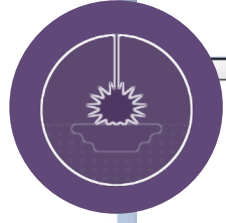
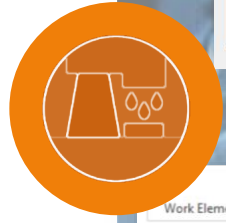
Material Jetting utilizes an inkjet printer head system to selectively deposit droplets of a typically wax-like material directly onto a build surface.

PBF > SLS

Selective Laser Sintering is a 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

ENGINEERING DESCRIPTION - Solid Part Volume (in³)

Notes:

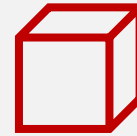
Least: Likely: Most:

Use % of Envelope

(in³) (in³) (in³)

250.0000 300.0000 400.0000

OK Cancel Prev Next



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 in³ (mm³) if known, or, if unknown, as a % of the part envelope.

PROCESS DESCRIPTION - Print Resolution

Notes:

Least: Likely: Most:

Use Expression Editor

OK Cancel Prev Next KBase More Help



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 %.

PROCESS DESCRIPTION - Build Speed (in/sec)

Notes:

Use Computed Value

OK Cancel Prev Next



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



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*.

Inputs

General	Process Specific	Tooling	Inspection/Rework	Mark/Package
Additive Manufacturing -				
PROCESS DESCRIPTION				
Parts Per Build	1	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%	

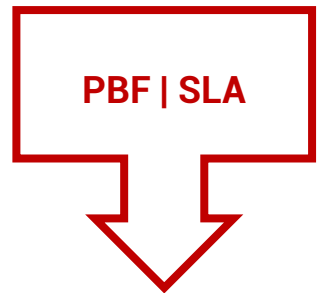


STANDARD INPUTS

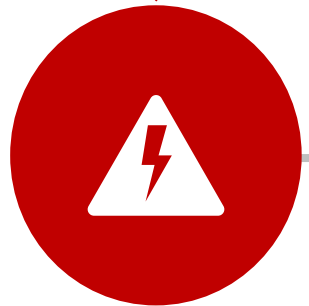
These **Standard Inputs** are common across all Additive Manufacturing cost models, and will be the standard figures driving the final estimate. All Standard Inputs come with either a default value, or a computed value. Some are driven by the Primary Inputs while others are performance typical values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



PROCESS SPECIFIC INPUTS

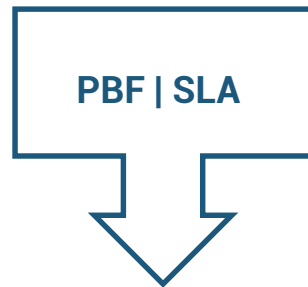


PBF | SLA

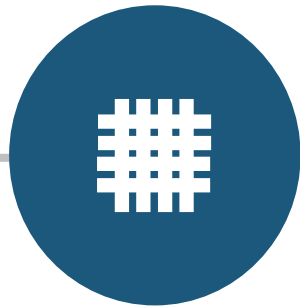


LASERS

Laser Power (W / mW)
Laser Diameter (in)
Laser Quantity

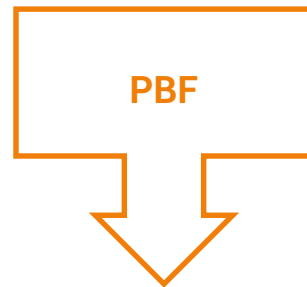


PBF | SLA

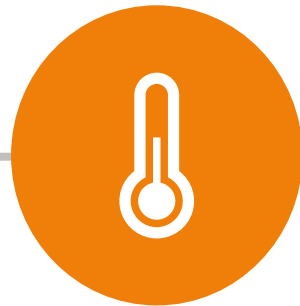


HATCHING

Hatch Style
Hatch Overlap %

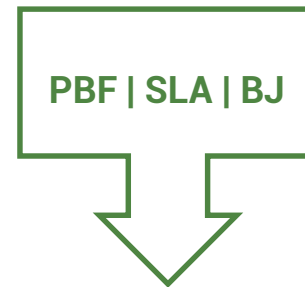


PBF



TEMP CONTROL

Powder Bed Pre-Heat
Temp
Powder Bed Heat up
Rate
Part cool Down Rate -

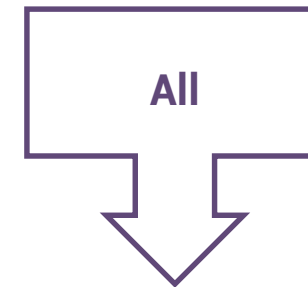


PBF | SLA | BJ



RECOAT RATE

Recoat Rate / Layer
Time Delay / Layer
Other Build Delays

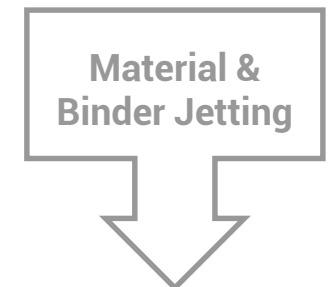


All



SUPPORTS

Support Infill %
Support Removal &
Cleaning



Material &
Binder Jetting



PRINTER HEADS

Printer Head Quantity
Printer Head Length
X & Y Axis Sweeps per
Layer

KNOWLEDGE BASES




EOS M400



Concept
Laser M2



Stratasys
F900



3D Systems
Project 7000



ExOne S-Max
Furan

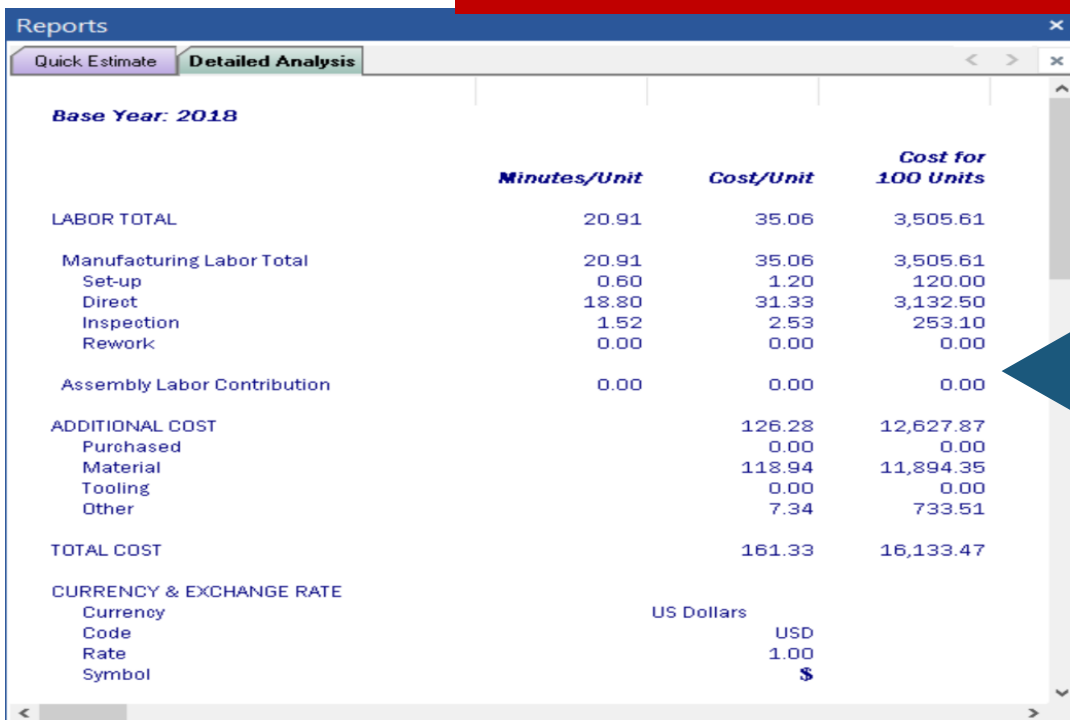
and more ...

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

AM: Outputs

Additional Data

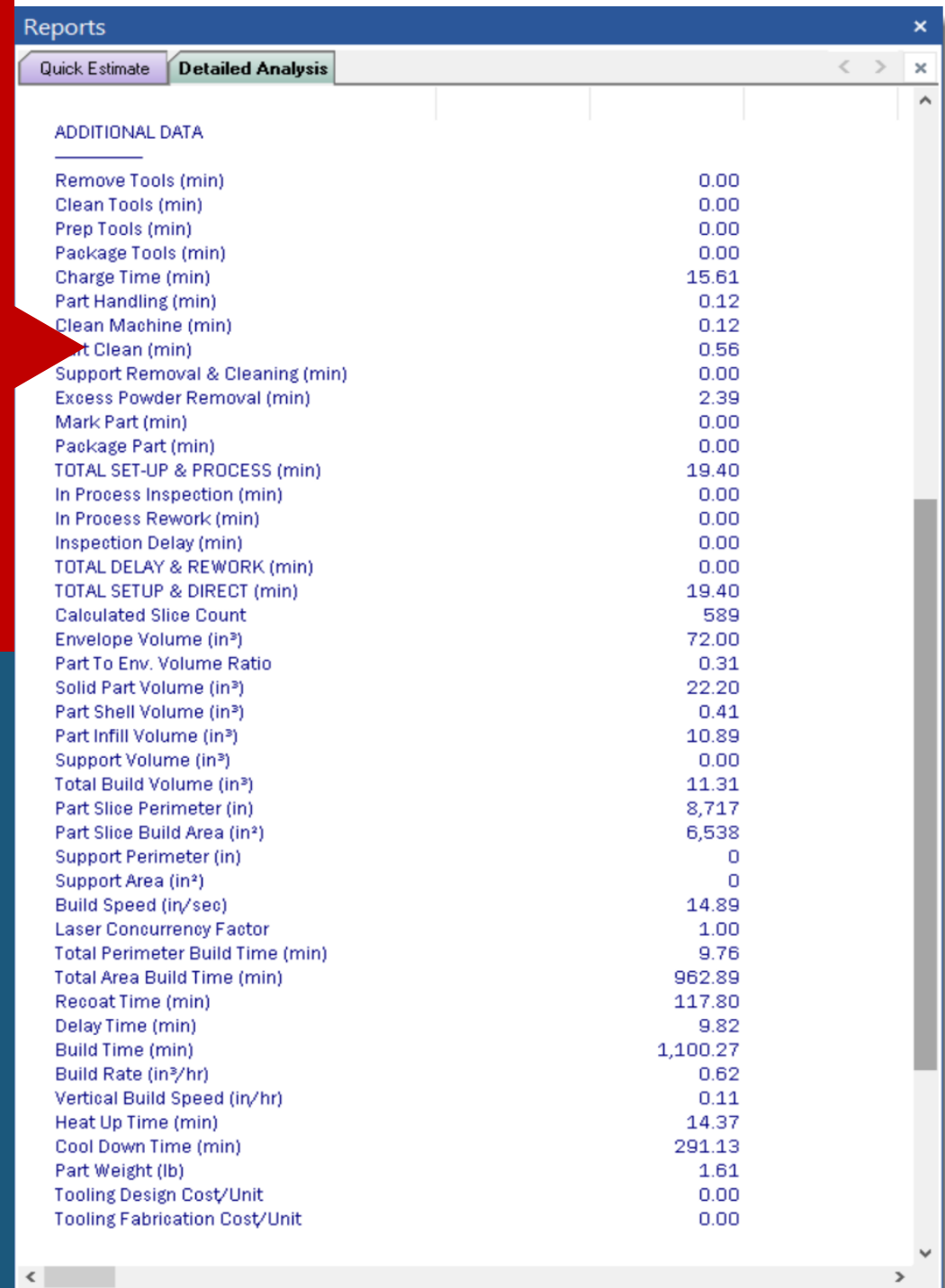
Outputs change depending on process type, detailed metrics and computed values, all of which can be copied, pasted, and exported for use in other applications



	<i>Minutes/Unit</i>	<i>Cost/Unit</i>	<i>Cost for 100 Units</i>
Base Year: 2018			
LABOR TOTAL	20.91	35.06	3,505.61
Manufacturing Labor Total	20.91	35.06	3,505.61
Set-up	0.60	1.20	120.00
Direct	18.80	31.33	3,132.50
Inspection	1.52	2.53	253.10
Rework	0.00	0.00	0.00
Assembly Labor Contribution	0.00	0.00	0.00
ADDITIONAL COST		126.28	12,627.87
Purchased		0.00	0.00
Material		118.94	11,894.35
Tooling		0.00	0.00
Other		7.34	733.51
TOTAL COST		161.33	16,133.47
CURRENCY & EXCHANGE RATE			
Currency	US Dollars		
Code	USD		
Rate	1.00		
Symbol	\$		

Detailed Analysis Report

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



ADDITIONAL DATA	
Remove Tools (min)	0.00
Clean Tools (min)	0.00
Prep Tools (min)	0.00
Package Tools (min)	0.00
Charge Time (min)	15.61
Part Handling (min)	0.12
Clean Machine (min)	0.12
Part Clean (min)	0.56
Support Removal & Cleaning (min)	0.00
Excess Powder Removal (min)	2.39
Mark Part (min)	0.00
Package Part (min)	0.00
TOTAL SET-UP & PROCESS (min)	19.40
In Process Inspection (min)	0.00
In Process Rework (min)	0.00
Inspection Delay (min)	0.00
TOTAL DELAY & REWORK (min)	0.00
TOTAL SETUP & DIRECT (min)	19.40
Calculated Slice Count	589
Envelope Volume (in ³)	72.00
Part To Env. Volume Ratio	0.31
Solid Part Volume (in ³)	22.20
Part Shell Volume (in ³)	0.41
Part Infill Volume (in ³)	10.89
Support Volume (in ³)	0.00
Total Build Volume (in ³)	11.31
Part Slice Perimeter (in)	8,717
Part Slice Build Area (in ²)	6,538
Support Perimeter (in)	0
Support Area (in ²)	0
Build Speed (in/sec)	14.89
Laser Concurrency Factor	1.00
Total Perimeter Build Time (min)	9.76
Total Area Build Time (min)	962.89
Recoat Time (min)	117.80
Delay Time (min)	9.82
Build Time (min)	1,100.27
Build Rate (in ³ /hr)	0.62
Vertical Build Speed (in/hr)	0.11
Heat Up Time (min)	14.37
Cool Down Time (min)	291.13
Part Weight (lb)	1.61
Tooling Design Cost/Unit	0.00
Tooling Fabrication Cost/Unit	0.00



Mold Cast Forge: Isostatic Pressing

Inputs

General Process Specific Tooling Inspection/Rework Mark/Package

Mold/Cast/Forge/Powder Metals - Hot Isostatic Pressing

LOCAL USER DEFINED PARAMETERS

Add Next Local Parameter Here

PROCESS Isostatic Pressing

ENGINEERING DESCRIPTION

Material Form	
Envelope Size (in)	6.000
<<Part Volume (in ³)>>	54.0000
<<Molding Weight (lb)>>	20.0880
Include Finished Weight in Rollup Calc	

MATERIAL

Material	
Raw Material Cost Per Lb.	
Material Utilization Factor	1.00
Material Reclaim Factor	0.20
Material Reclaim Value Per Lb.	

PROCESS DESCRIPTION

Method	
<<Setup (mins)>>	
Batch Quantity	1
<<Cycle Time (Hrs)>>	8.00
<<Op. Attendance %>>	1.00%
Cycle Cost Per Hour	0.00
<<Load/Unload (mins)>>	3.31
<<Insert Time (mins)>>	10.00
Press Volume (Optional) (in ³)	0.00
<<Press Loading %>>	100.00%

ADDITIONAL ITEMS

MANUFACTURING DESCRIPTION

Set-up Complexity	Low
Shape Complexity	Nom
Tool Process Capability	Nom

OPTIONAL COST DESCRIPTION

Other Cost (Optional)	
-----------------------	--

PART ASSEMBLY CONTRIBUTION

The diagram shows a cross-section of an isostatic pressing chamber. It consists of an outer container filled with a fluid (likely water or oil) that transmits pressure uniformly to a central mold. The mold contains the material to be pressed. Arrows indicate the uniform pressure being applied from all directions.



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"





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

The screenshot displays the SEER-MFG 8.1 software interface. The top menu bar includes File, Home, Work Elements, Parameters, Tools, Reports, Charts, Export & Import, Options, and View. The main window is titled 'MOUSE Japanese.MFG - SEER-MFG'. The interface is in Japanese, showing a tree view of work elements for 'マウスPCボード' (Mouse PC Board) and a table of 'LOCAL USER DEFINED PARAMETERS'. The 'Reports' window shows a 'Multi-Currency Summary' table with columns for Minutes/Unit, Cost/Unit, and units. The 'Charts' window shows a 'Cost Allocation' pie chart for 'マウスPCボード' with Labor at 69% and Purchased at 31%.

Parameter Name	Value
LOCAL USER DEFINED PARAMETERS	
Add Next Local Parameter Here	
BASIC PCB BOARD	YES
BOARD FABRICATION	NO
ASSEMBLY & TEST	YES
DETAILED PCB BOARD	NO
COMPONENTS	YES
BILL OF MATERIALS	
Resistor GRBG	Discrete 5 0.0510
Resistor GB0B	Discrete 3 0.0479
Resistor GOBB	Discrete 1 0.0663
Resistor GBBB	Discrete 2 0.0377
Custom IC	Custom Microchip 1 0.3570
Capacitor	Discrete 3 0.0327

	Minutes/Unit	Cost/Unit	10000 Units
	4.46	6.04	603,500.94
Labor Total	4.46	6.04	603,500.94
	0.00	0.00	0.17
	4.03	5.45	545,188.56
	0.30	0.40	40,188.48

Category	Percentage
Labor	69%
Purchased	31%



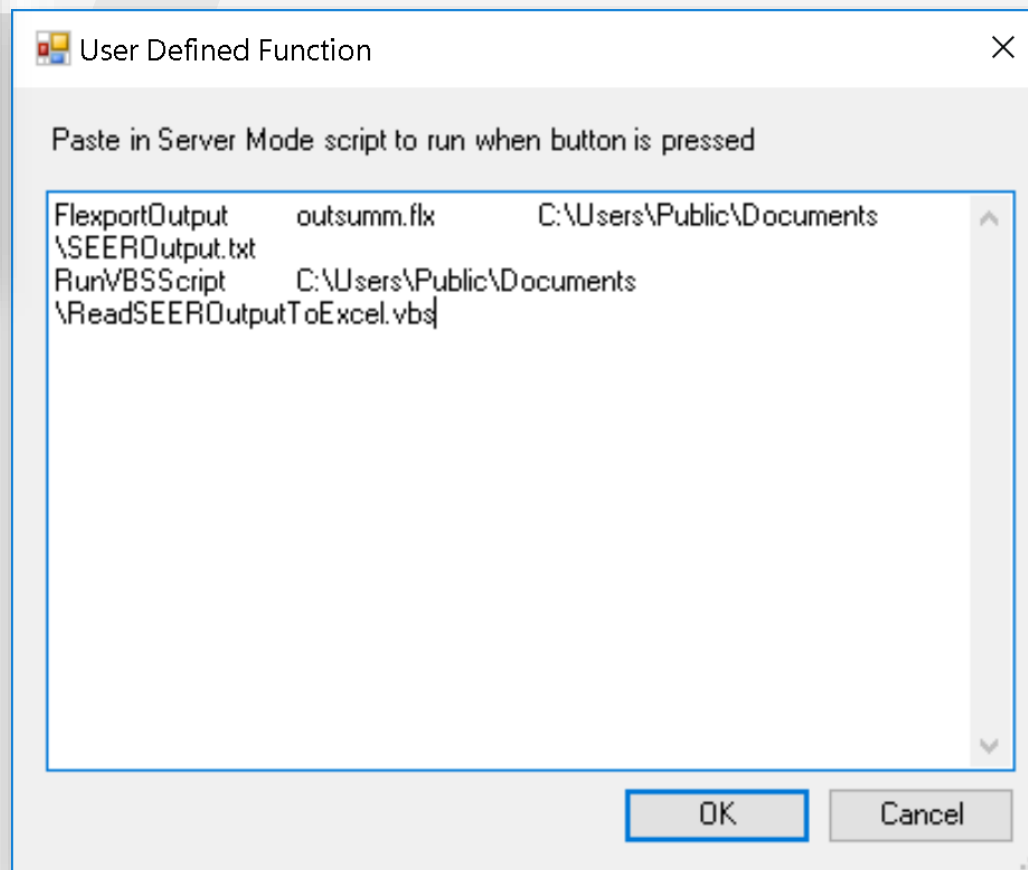
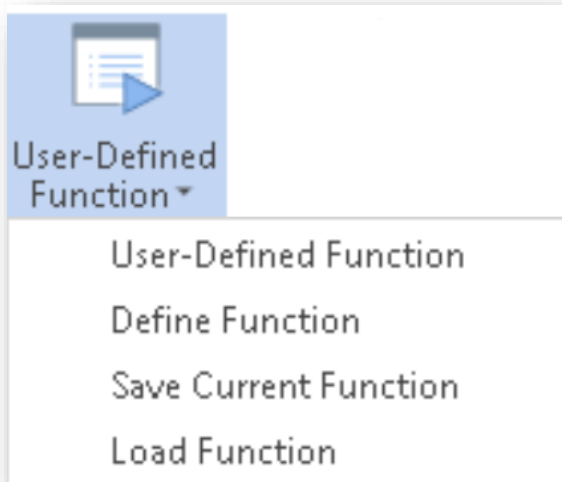


User Defined Function

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



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

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

Clipboard Font Alignment Number

	A	B	C	D	E
99	Finish & Heat Treat - Description: Finishing				
100	Finish & Heat Treat Operations	Set-up Minutes	Direct Minutes	Inspection Minutes	Rework Minutes
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 Minutes
105	- Hand Write ID/Tag	0.0219	0.8549	0	0
106	- Rubber Stamp	0.0219	0.1036	0	0

Output to
Excel or
other
Applications

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 COSTS
- ADDITIONAL DATA - ELECTRICAL
- ADDITIONAL DATA - TUBE, FAB, V
- ADDITIONAL DATA - PCB BOARD
- ADDITIONAL DATA - ADDITIVE M

Selected Choices

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

Buttons: Move Up, Move Down, Remove, Remove All

Current Template: Export Save Template Close Help



Options > Set Project Parameters > Format Outputs > Precision

Project Parameters

WBS Numbering: Line Outline
 Project Outline Start Number:
 Base Year:
 Monte Carlo Iterations:
 UoM: Imperial Metric Convert Inputs
Format Outputs
 Custom Output Categories

Machining Database:
 User Specified Passes (Machining)
 Fabrication Part Based Processing
 Direct Labor Rate Detail Parameter
 Set-up Labor Rate Detail Parameter

Inflation Table In Use

Currency and Exchange Rate

 Code & Symbol:
 Exchange Rate: Multi-Currency

Stepped Learning
 Learning Curve Analysis
 Compute T1 Based on Slope
 Use Default Slope & Quantity
 Unit Cumulative Average

Precision... Format Outputs Dialog Ratio/Factor Added

Reports

Quick Estimate Detailed Analysis Production Lot Multi-Currency Summary

TOTAL SETUP & DIRECT (min)	586.45
Calculated Slice Count	3,131
Envelope Volume (in ³)	180.00
Part To Env. Volume Ratio	0.21
Solid Part Volume (in ³)	180.00
Part Shell Volume (in ³)	0.54
Part Infill Volume (in ³)	49.73
Support Volume (in ³)	0.00
Total Build Volume (in ³)	50.27
Part Slice Perimeter (in)	46,965
Part Slice Build Area (in ²)	58,706

Decimal Precision Updated on Reports

Format Outputs

Category:	0 - 4:	Category:	0 - 4:
Cost:	<input type="text" value="2"/>	Weight:	<input type="text" value="2"/>
Minute:	<input type="text" value="2"/>	Volume:	<input type="text" value="2"/>
Hour:	<input type="text" value="2"/>	Rate:	<input type="text" value="2"/>
Quantity:	<input type="text" value="0"/>	Percentage:	<input type="text" value="0"/>
Dimension:	<input type="text" value="0"/>	Ratio/Factor:	<input type="text" value="2"/>



NDT Dialog Updates

NDT Scan Type

Add Next NDT Operation Here

Notes:

NDT Type:

Description:

Load/Unload:

Part Area (in²):

Point Quantity: Scan %: Re-Inspection %:

Dead Head %: Transducers: Insp. Interval:

Setup (min): Rate (min/point): Scan (in²/min):

Apply SEER Adjustments Scan Point

Non-Destructive Testing (NDT)
 YES/NO choice. Enter Y (Yes) if NDT is to be computed. Enter N (No) if NDT is not required. Non Destructive Testing is an umbrella term for a range of testing technologies that do not damage the component under test (for example: ultrasonic, X ray, holographic).
 NDT time is added to inspection.
 Entering Y (Yes) allows you to add up to ten NDT operations, using Add Next Here.
Note: For Detailed Composites Non-Destructive Testing, see: [Detailed Composites NDT](#)
 The following parameter entries are used to describe an NDT operation:

Field	Description
NDT Type	Choose an NDT Type from the available options. See Also: NDT Type Note. NDT Type data may be customized. The configurable data is stored in [NDT-TYPE] table in the MFGData.INI file.
Load/Unload	Choose from either Load/Unload, Load Only, Unload Only, or None. Load & Unload (default) Calculates the time required to load and position

NDT Point Type

Add Next NDT Operation Here

Notes:

NDT Type:

Description:

Load/Unload:

Part Area (in²):

Point Quantity: Scan %: Re-Inspection %:

Dead Head %: Transducers: Insp. Interval:

Setup (min): Rate (min/point): Scan (in²/min):

Apply SEER Adjustments Scan Point

Non-Destructive Testing (NDT)
 YES/NO choice. Enter Y (Yes) if NDT is to be computed. Enter N (No) if NDT is not required. Non Destructive Testing is an umbrella term for a range of testing technologies that do not damage the component under test (for example: ultrasonic, X ray, holographic).
 NDT time is added to inspection.
 Entering Y (Yes) allows you to add up to ten NDT operations, using Add Next Here.
Note: For Detailed Composites Non-Destructive Testing, see: [Detailed Composites NDT](#)
 The following parameter entries are used to describe an NDT operation:

Field	Description
NDT Type	Choose an NDT Type from the available options. See Also: NDT Type Note. NDT Type data may be customized. The configurable data is stored in [NDT-TYPE] table in the MFGData.INI file.
Load/Unload	Choose from either Load/Unload, Load Only, Unload Only, or None. Load & Unload (default) Calculates the time required to load and position

Scan or Point Inputs activated based on Selection





Reports, Charts, and Paths Dialog Updates

Reports

Choose Available Ch...

Reports

- Summary
 - Cover Sheet
 - Quick Estimate
 - Detailed Analysis**
 - Trade-Off Analysis
 - Rollup Total Production Cost Risk
 - Multi-Currency Summary
 - Cost Contribution Summary
 - DFM/DFA Cost Avoidance
 - Production Lot
 - Lot Tooling
 - Hourly Labor Rate Details
 - Operation Details
- Inputs
 - Inputs
 - Inputs vs. Reference
 - Inputs with Notes
 - Inputs Hourly Labor Rate Details
 - Inputs vs. Knowledge Base

Detailed Analysis
Shows a detailed output of the selected work element. Divided into three main sections: A Summary top section, and mid and bottom sections displaying details pertinent to the selected work element.

OK Cancel Help

Select All

Charts

Choose Available Ch...

Charts

- Cost
 - Cost Allocation**
 - Cost Analysis
 - Cost Risk
 - Cost Sensitivity
 - Production Lot
- Computed Labor Rates
 - Direct Hourly Labor Rate
 - Setup Hourly Labor Rate

Cost Allocation
Graphically display...

OK Cancel Help

Paths

SEER-MFG Paths

LOCATIONS	
Projects	C:\Users\chris\Documents\Galorath\MFG\~Wips\SEER-MFG 8.1.10 with Aero 5.1.5 - WII ...
Knowledge Bases	C:\Users\chris\Documents\Galorath\MFG\~Wips\SEER-MFG 8.1.10 with Aero 5.1.5 - WIP\K...
Program Files	C:\Users\chris\Documents\Galorath\MFG\~Wips\SEER-MFG 8.1.10 with Aero 5.1.5 - WIP
INI Files	C:\Users\chris\Documents\Galorath\MFG\~Wips\SEER-MFG 8.1.10 with Aero 5.1.5 - WIP
Inflation Tables	C:\Users\chris\Documents\Galorath\MFG\~Wips\SEER-MFG 8.1.10 with Aero 5.1.5 - WIP\Ir...

Projects
Type the path to the location where you want to save your projects by default, or click ... to choose a location.

OK Cancel Help

Make changes default

Deselect All

New selection Options and Descriptions





Expression Editor



Multiline Expression Editor

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

PRODUCT DESCRIPTION - Production Quantity

To use a global quantity, select from the Global Quantities parameter list.
You can also select from the list of parameters for the current work element.
To create an expression, include operators or functions with your parameter selections.

Operators, Punctuation and Functions

+ - × ÷ ^ ?:() exp √x log ln

DateOffset() [v] Insert

Expression

```
@Production Quantity (Global)@ *  
_PRODUCT DESCRIPTION - Quantity Per Next Higher Assem
```

Least Result: 1000.0000 Likely Result: 1000.0000 Most Result: 1000.0000

Available Parameters

Double click on an item to add it to the Expression.

Global Quantities

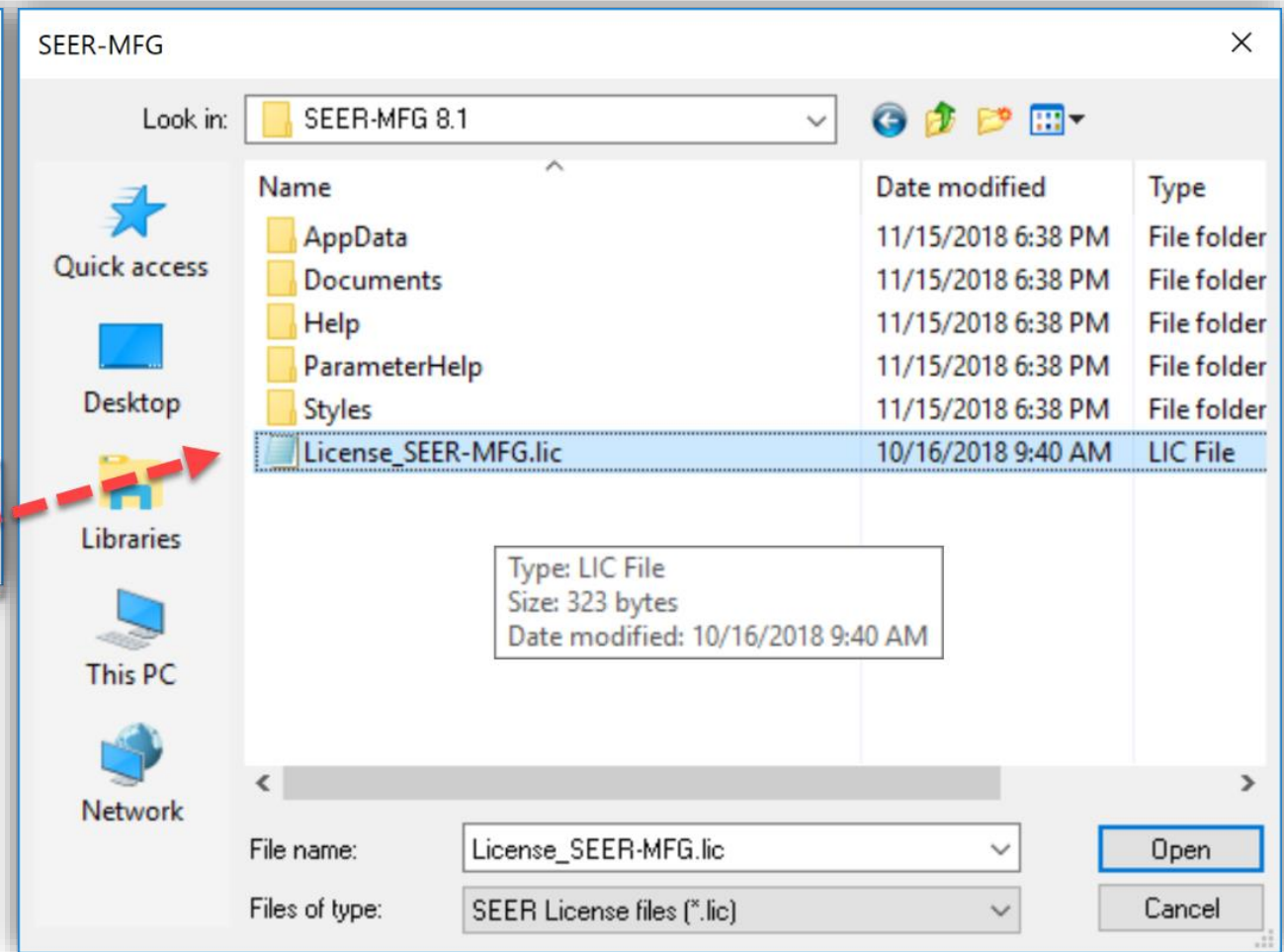
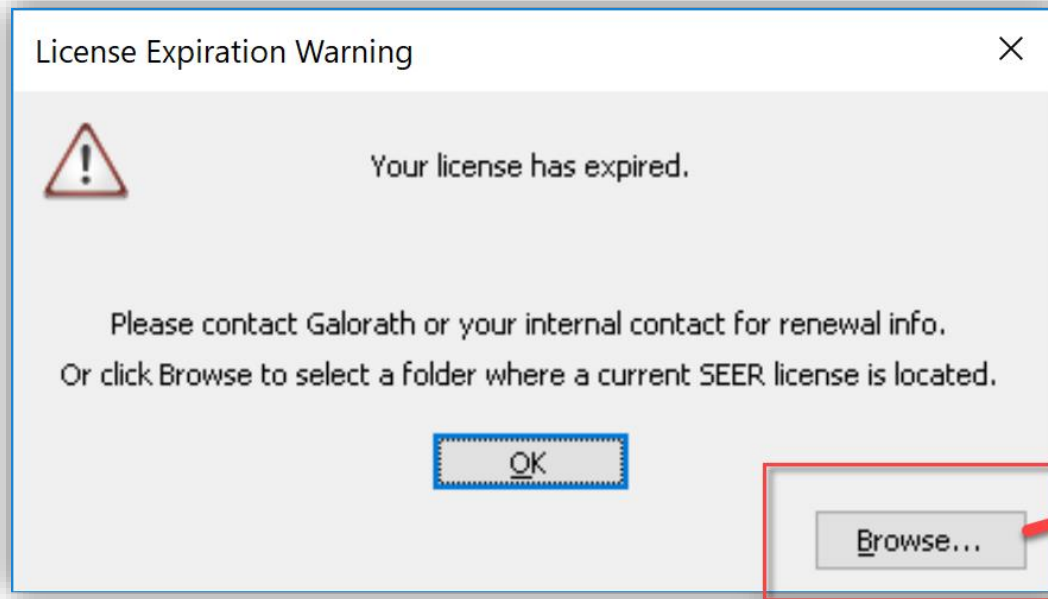
- Production Quantity (Global)

Work Element Parameters

- LOCAL USER DEFINED PARAMETERS
 - PRODUCT DESCRIPTION
 - Quantity Per Next Higher Assem
 - Set-up Amortization Quantity (O
 - Tooling Amort. Quantity (Option
 - Direct Hourly Labor Rate
 - Setup Hourly Labor Rate
 - Production Experience/Optimizat
 - Product Classification
 - ENGINEERING DESCRIPTION
 - Raw Weight (lb)
 - Length (in)
 - Width (in)
 - Height (in)
 - Finished Weight (lb)

OK Cancel Help

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

Add Next Operation Here

Notes:

Operation Type:

Description:

Cut Length (in)	Thickness (in)	Blade Life (hr)
<input type="text" value="100"/>	<input type="text" value="0.75"/>	<input type="text" value="0.0000"/>
Cut-off Width (in)	Rate (in/min)	
<input type="text" value="2.5"/>	<input type="text" value="35.7143"/>	

Required for this operation

Set-up Load/Unload Apply SEER Adjustments

Buttons: OK, Cancel, Prev, Next, KBase, More_Help

Parameter Help

Machining Operations

Select a machining operation from the list below. Notes that are generally applicable appear below the lists.

Angled Faces	Profile (Rough or Finish)
Automated Production Equipment	Pocket (Rough or Finish)
Band Saw	Radial Mill (Rough or Finish)
Bore (Rough or Finish)	Radial Saw
Broaching	Ream
Chemical Mill	Screw Machine
Centerless Grind (Rough or Finish)	Shape (Rough or Finish)

End Mill Slot Rough

Add Next Operation Here

Notes:

Operation Type:

Description:

Length (in)	Diameter (in)	Depth (in)
<input type="text" value="0.0000"/>	<input type="text" value="0.0000"/>	<input type="text" value="0.0000"/>
Width (in)	Cut-off Width (in)	
<input type="text" value="0.0000"/>	<input type="text" value="0.00"/>	

Required for this operation

Set-up Load/Unload Use Machining Details

Buttons: OK, Cancel, Prev, Next, KBase, More_Help

Parameter Help

Machining Operations

Select a machining operation from the list below. Notes that are generally applicable appear below the lists.

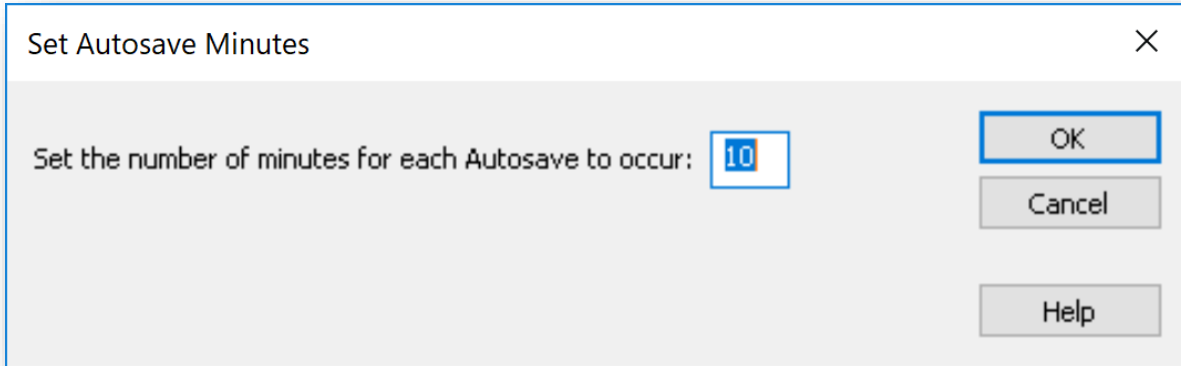
Angled Faces	Profile (Rough or Finish)
Automated Production Equipment	Pocket (Rough or Finish)
Band Saw	Radial Mill (Rough or Finish)
Bore (Rough or Finish)	Radial Saw
Broaching	Ream
Chemical Mill	Screw Machine
Centerless Grind (Rough or Finish)	Shape (Rough or Finish)
Core	Springs & Coils
Cylindrical Grind (Rough or Finish)	Stringer Run Out
Deburr	Surface Grind (Rough or Finish)

New inputs added



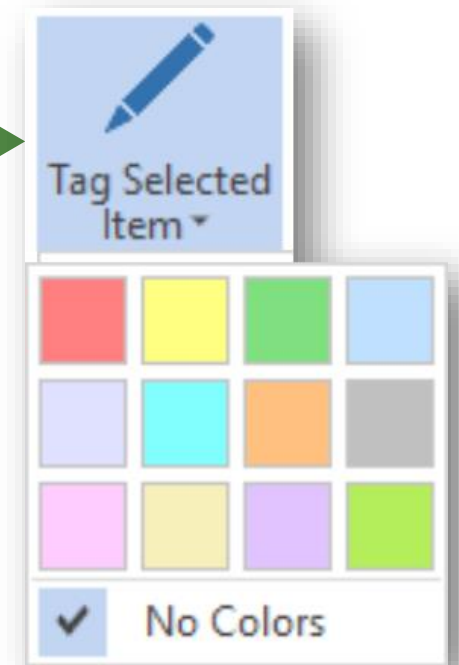
Other Updates

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**

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