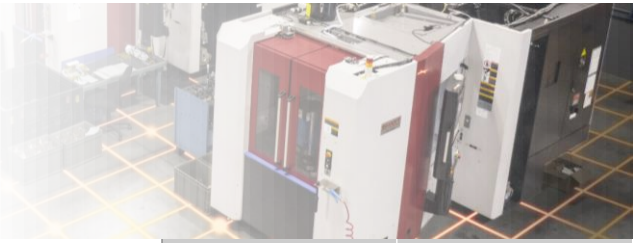




Fusion Manufacturing Extension

Unlock additional capabilities for 3 to 5-axis CNC machining, sheet-based nesting and fabrication, and metals-based additive manufacturing.



Capability Comparison Chart		Fusion	Fusion + Manufacturing Extension
DRILLING	Hole drilling (3-axis) Access a range of 3-axis toolpaths and workflows to efficiently machine holes in your 2D and 3D CAD models. <i>Includes template driven drilling, thread milling, tapping, boring and more.</i>	✓	✓
	Automatic hole recognition and drilling (3-axis and multi-axis) Speed up drilling by recognizing holes in models and creating efficient toolpaths to machine them. <i>Includes automatic feature recognition, machining templates, multi-axis drilling, tapping, thread milling, boring, and more.</i>	-	✓
MILLING	2D and 2.5-axis milling Create toolpaths to produce 2D features using CNC mills, routers, water jet cutters, laser cutters, plasma cutters. <i>Includes 2D adaptive clearing, pocket machining, face milling, slot machining, contouring, and more.</i>	✓	✓
	3-axis milling Access 3-axis strategies to effectively rough and finish machine more complex parts containing free-form 3D geometry. <i>Includes 3D adaptive clearing, flat, parallel, scallop, contour, flow machining, and more.</i>	✓	✓
	3+1 and 3+2 axis positional milling Use the rotary axes of multi-axis machines to simplify the machining of undercuts or difficult to reach features. <i>Includes 4-axis wrapping of 2D toolpaths, align tool axis to view/surface normal, interactive tool axis tilt and turn.</i>	✓	✓
	Machine simulation Build an accurate 3D digital twin of CNC milling hardware and animate the motion of toolpaths. <i>Includes access to a free library of 3D machine models, machine/toolpath animation, and more.</i>	✓	✓
	Automated entire part machining (3-axis and multi-axis) Automate and speed up the programming of complex parts with intelligent strategies that can machine an entire part. <i>Includes 3-axis steep and shallow machining, deburr, geodesic, corner finishing.</i>	-	✓
	4- and 5-axis simultaneous milling Unlock a range of multi-axis toolpaths and tool axis controls to safely and smoothly drive machines. <i>Includes 4-axis rotary, 5-axis steep & shallow, swarf, multi-axis contour, multi-axis flow, and more.</i>	-	✓
	Multi-axis collision avoidance Automatically avoid collisions involving the cutting tool, workpiece, or fixture by tilting your machine's rotary axes. <i>Includes 4- and 5-axis collision avoidance, advanced tool axis smoothing, tool axis tilting limits, and more.</i>	-	✓
TURNING	2-axis turning Program turned parts with ease using a range of simple-to-use strategies and turning tooling. <i>Includes face, profile (rough and finish), groove, thread, chamfer, part-off, part handling sub-spindles, and more.</i>	✓	✓
	Turn-mill machining Combine turning and milling operations together and drive turn-mill, mill-turn, and live tool lathes.	✓	✓
MODIFICATIONS	Toolpath modifications - Limit/split/delete sections Access a suite of editing tools to make quick changes to toolpaths. Limit or split toolpaths using a sketched polygon, delete individual sections or remove entire regions. Modifications can themselves be edited for even greater flexibility and time savings.	-	✓
	Toolpath modifications - Replace tool Modify a toolpath to use a different tool without the need to recalculate the toolpath. Swap the original tool for a longer/shorter tool protrusion, or a different tool holder assembly.	-	✓
INSPECTION & PART ALIGNMENT	Work Coordinate System (WCS) setup probing Adjust work coordinate setups using in-spindle probes to reduce machine setup time and maximize spindle uptime.	✓	✓
	Manual inspection Create an interactive measurement plan for use with hand-held analogue or digital measurement tools. Combine probing results with manual inspection to produce comprehensive quality control reports.	✓	✓
	Geometry probing Use spindle-mounted probes to measure geometric dimensions and locations during machining. Use the measurements to update tool wear parameters to increase subsequent part accuracy, reduce scrap rates, and minimize the need for costly rework	-	✓
	Surface inspection Use spindle-mounted probes to inspect and validate the dimensional accuracy of complex surfaces during the machining process. Use the resulting inspection reports to monitor and control the accuracy of your CNC machining operations.	-	✓
	Part alignment Optimize the position of subsequent machining operations in 3, 4, or 5 axes based on surface inspection results. Use to automate initial part setup or when machining castings or additive parts that are difficult to setup manually.	-	✓
POSTS	Post-processing of NC code Access a library of free, editable post-processors to output machine code for a wide range of different machine types and CNC controllers.	✓	✓

For more information on Fusion visit www.autodesk.com/fusion

Learn about Fusion Extensions at www.autodesk.com/products/fusion-360/extensions

Learn about the Fusion Manufacturing Extension at www.autodesk.com/products/fusion-360/manufacturing-extension





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Capability Comparison Chart		Fusion	Fusion + Manufacturing Extension
SHEET-BASED NESTING	Basic arrange Single-sheet nesting. Arrange multiple objects on a sketch/plane/face.	✓	✓
	Associative nesting updates Automatically update nests in the event of a design change to any of the nested objects.	✓	✓
	Nest preparation Access additional settings to control how individual design items are nested (with options to include/ignore elements).	-	✓
	Advanced arrange & advanced nesting Multi-sheet nesting of selected objects. Advanced nesting also provides automatic material, thickness, and quantity detection.	-	✓
	Advanced part & material controls Define and override parameters including part quantity, orientation, grain alignment, allowed rotations, cost, and more.	-	✓
	Process material library Improve collaboration across your team by building a cloud-based library of sheet stock with commonly used sizes and prices.	-	✓
	Customizable nest reports Create custom HTML reports that can be saved and shared in PDF format.	-	✓
	Nest comparison Quickly compare nest studies, nests, and sheets with varying parameters to assist with raw material purchasing, quoting, and estimating.	-	✓
Part labels Automatically generate custom part labels that can be affixed to cut parts for easier off-loading and/or tracking.	-	✓	
SHEET-BASED FABRICATION	Toolpath generation Generate highly efficient toolpaths for use with laser, plasma, router, and waterjet cutting machines.	✓	✓
	Advanced workflow automation Streamline common operations by generating setups and toolpaths for existing nest results to reduce CAM programming times.	✓	✓
	Automatic remnant cutting Generate sketches that can be used to separate remnants from the nested area on sheets for faster processing and off-loading.	-	✓
	DXF export with layer mapping Export nested sheet layouts as a DXF file (with data mapped to layers) for use with 3rd party CAM software.	-	✓
METALS BASED ADDITIVE MANUFACTURING	2D and 3D part nesting and arrange Arrange multiple parts within the specified build volume of printing hardware with control over spacing, orientation, and more.	✓	✓
	Fused Deposition Modeling (FDM) and Binder Jetting Use a built-in library of machines, materials, print parameters, and automated workflows to prepare parts for 3D printing. <i>Includes: Automatic part orientation, process specific support structures, export to machine.</i>	✓	✓
	3MF file export Export 3MF files containing data about support structures, metadata, and machine information for import into other software for in-depth analysis, simulation, and downstream production.	✓	✓
	Metal Powder Bed Fusion (MPBF) Use a built-in library of machines, materials, print parameters and automated workflows to prepare parts for 3D printing. <i>Includes: Automatic part orientation, process specific support structures, export to machine.</i>	-	✓
	Directed Energy Deposition (DED) – incl. multi-axis Access a suite of specialized 3- and 5-axis toolpaths to effectively program additive/hybrid manufacturing with CNC machines. <i>Includes: Automatic part orientation, multi-axis toolpaths, machine simulation, collision checking, post-processing of G-code.</i>	-	✓
	Process simulation for Metal Powder Bed Fusion Use thermal simulation tools to validate the powder bed printing process and avoid costly print failures.	-	✓

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