Get More Out of Fusion 360 with Nesting

Phillip Doup and Ravi Javia
Architect and Product Manager for Nesting
Introduction
About the speaker

Phillip Doup

Phillip Doup joined Autodesk along with the acquisition of Magestic Systems, Inc. and has a background in manufacturing, specifically automated manufacturing process for composites such as Automated Fiber Placement and Automated Tape laying. He has worked closely with machine tool vendors and customers alike in development of design and CAM software for these processes since his graduating from college. He is currently responsible for the architecture for products under the Cutting and Composites group under the Digital Manufacturing Group (DMG).
Ravi Javia is a Product Manager at Autodesk. Ravi graduated from Stevens Institute of Technology with BE in Mechanical Engineering (concentration in robotics and mechatronics) and an ME in Engineering Mgmt/Systems Engineering. He pursued his interest in Advanced Manufacturing while working with Magestic Systems Inc. which was later acquired by Autodesk in July 2014. Ravi has developed his expertise in nesting, cutting, and fabrication while working with various customers.
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What is nesting?

THE DICTIONARY DEFINITION
Nest (verb): to fit or place one within another

THE PRACTICAL DEFINITION
Positioning parts in an efficient manner to:
- Improve manufacturing efficiency
- Reduce waste

ULTIMATELY TO REDUCE COST
What is nesting in Fusion 360?

**NOW**
Nesting sheet metal parts by like material and thickness on a variety of material stock sizes

**FUTURE**
- Sketches and Solids
- 2D fabrication
- 3D additive
- Circuit boards
- Rectangular nesting
- Linear nesting
- High-volume nesting
- Pre-tooled parts
What happens with nested results?

Nesting creates manufacturing models
How to use nested results?

Manufacturing models are automatically available in the manufacturing workspace. Use them just like any other geometry (2D profile in this case).
Selecting What to Nest

ANY NUMBER OF TOP-LEVEL ASSEMBLIES
Fusion documents containing hierarchical structures of nestable components

ANY NUMBER OF PARTS
Fusion documents containing a single nestable component

SELECTED RIGHT FROM THE CLOUD
Defining Materials

MATERIAL DEFINED BY COMBINATION OF TYPE AND THICKNESS
Type being steel (of a particular grade) for instance, aluminum, etc.

ROTATION CONTROL
Allow part rotation of 90, 180, and 270 degrees, with deviation and increment

GRAIN DEFINITION
Orientation of grain relative to the material

SEPARATION AND FRAME
Each material has control of item separation and frame size
Defining Packaging

PACKAGING DEFINES EACH DISTINCT SIZE FOR A MATERIAL
Size being a distinct combination of length and width available

PACKAGING-SPECIFIC TRIM
Each packaging can define a specific left, top, right, and bottom trim value

DEFAULT PACKAGING TO USE
For each material, you can control which packaging are used by default
Bill of Materials Extracted

INSTANCES COUNTED FOR EACH DISTINCT COMPONENT
EXTRACTED GEOMETRY IS SHOWN GRAPHICALLY

Coloring of shapes can be controlled by different properties of each shape (e.g. by material)
**Shape Properties**

**PRIORITY**
Specify ordering of the shape in the nest

**MIRRORING**
Force parts to be a mirror image

**CONTROL ORIENTATION**
Orientation is relative to material grain. Part can be rotated to 90, 180, and 270 degrees with a deviation and increment

**BINDING TO MATERIAL**
Forces orientation adjustments to match material

**PRE-KITTING**
Places part in pairs to increase efficiency
Creating Nesting Study (Part 1)

COMPLETE CONTROL OVER QUANTITIES
Can multiply all assemblies and parts by a single number or specify each part or material quantity explicitly

SUPPORT FOR NESTING STACKS OF MATERIAL
Cutting multiple sheets of material on top of each other on the machine
Creating Nesting Study (Part 2)

**DEFINE EXACTLY WHAT SHAPES TO NEST**

Can exclude parts individually for a particular nest study

**SHAPES ADDED AUTOMATICALLY**

Shapes can be automatically added to nests after nesting study is created
Creating Nesting Study (Part 3)

DEFINE EXACTLY PACKAGING TO USE
Can define exactly which sheet sizes to consider and exact quantities. Nesting can choose which sheet to use based on order or best mixture or size.

ANY COMBINATION OF PACKAGING
Same packaging can be listed multiple times with different quantities (or infinite).

PACKAGING ADDED AUTOMATICALLY
Any newly created packaging can be added to nests automatically (or not).
Creating Nesting Study (Part 4)

WHICH CORNER OF MATERIAL TO USE
Can use top left, top right, bottom left or bottom right

CONTROL RUN TIME OF ALGORITHMS
Can force it to compute more quickly for complicated nests based on time and yield

REMNANT OPTIMIZATION
Specifies whether to minimize length of remnants, width of remnants, or both
Creating Nesting Study (Part 5)

EXCLUDE FROM OUTPUT
Only include in manufacturing models if desired

INCLUDE SKETCHES
Manufacturing model can optionally include sketches of parts

INCLUDE STOCK
Manufacturing model can create a body representing stock material
FULLY CUSTOMIZABLE
Easy HTML template allows control over everything you see. CSS can be used to further customize (for advanced users)

IMAGES OF SHEETS AND PARTS
Preview the contents of nests in graphical form

COST CALCULATIONS
Costs are available based on material consumption, optionally accounting for remnants

SAVE IN HTML OR PDF
Reports can be saved in HTML or PDF format for sharing or printed
Nest Editing

INCREDI BLY FINE-GRAINED CONTROL

Override any parameters desired on a per-shape basis in each individual nest (if desired) or bind to the original shape.
QUESTIONS?