

# Leveraging the New Sketch Tools in Autodesk® Inventor™ 2008

In today's market, with tight deadlines and strong competition, designers need to be as efficient and productive as possible. To meet this need, 3D modeling is becoming commonplace.

Autodesk® Inventor™ software helps designers reach the next level of efficiency by making it easier and more effective to reuse design data, convey design intent, and manage relationships between 2D sketch objects.

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# Reuse Existing Sketch Data

Reusing existing sketch geometry requires certain operations, such as Scale, Stretch, Move, and Copy. To meet this important requirement, the 2D Sketch environment in Inventor 2008 includes two new tools: Scale Geometry and Stretch Geometry. In addition, the Move and Copy tools have been rebuilt to provide a more efficient interface.

A new, common interface (Figure 1) provides a consistent workflow for the sketch editing tools. The interface provides access to the Precise Input toolbar (Figure 2), which affords a comfortable method for precise geometry manipulation.

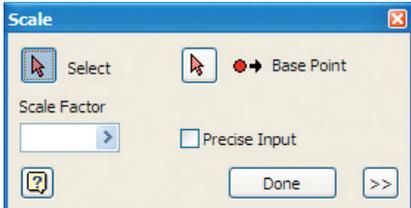


Figure 1: New interface.



Figure 2: Precise Input toolbar.

The interface provides default settings that determine how existing dimensions and constraints are handled as the geometry is changed (Figure 3).

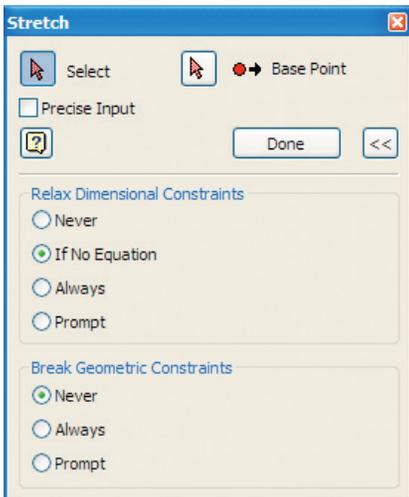


Figure 3: Default dimension and constraint behavior.

The last several releases of Inventor have included a Move and Copy tool. As part of the new interface, however, the two tools have been separated (Figure 4).

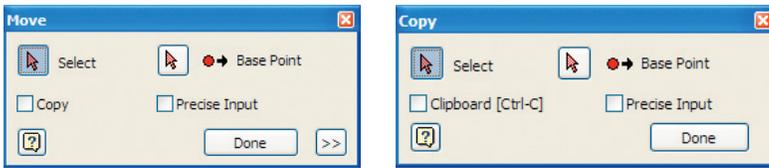


Figure 4: Separate Move and Copy tools.

In addition to the Move and Copy tools, Inventor 2008 also now includes Scale and Stretch tools. These four tools behave in a similar fashion. The user selects geometry, either with a window or a crossing window. The user next selects a base point. In the case of the Move, Copy, and Stretch tools, the user selects a new location for the base point. In the case of the Scale tool, the base point serves as an anchor to scale the geometry (Figure 5).

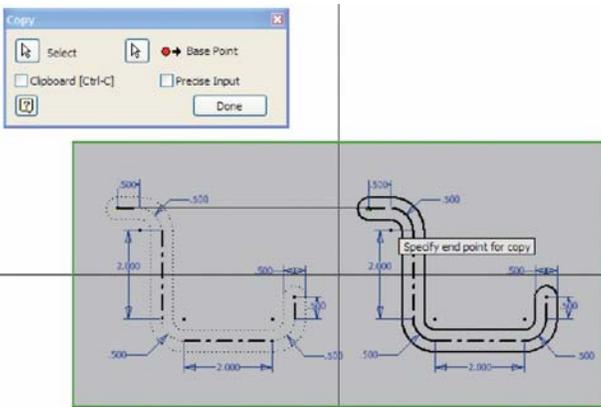


Figure 5: The Copy tool in action.

With these sketch editing tools, it is now easier to reuse design data. This capability means designers can spend more time on design rather than re-creating tedious sketch geometry.

## Work Scenario

You have just completed the design of a complex cylinder head. Upon review, your client determines that the combustion chambers need to be 1.3 times larger and that more space is required between the cylinders.

Making these changes has been possible but complicated in previous releases of the software. With the new sketch tools in Inventor 2008, it is now much easier and more efficient to make these complex changes.

Using the Scale tool, you can increase the size of 2D geometry that drives the combustion chamber size. With the Move tool, you can move the geometry farther apart.

You can make these changes quickly and easily and move on to your next project.

# Capture and Convey Design Intent

One of the highly touted features of parametric design is its ability to convey the underlying purpose of a particular design element, or design intent. Formulated in the designer's mind, design intent may also be governed by engineering practices or even business rules. Throughout the design cycle, many different designers may come in contact with the design so it is beneficial to have the ability to capture and convey the underlying design intent to downstream users.

To make it easier to convey design intent, the Autodesk Inventor interface provides tools to manipulate the properties of sketch elements. Designers can make these changes before or after geometry creation.

In Autodesk Inventor, designers can specify geometry properties such as color, line weight, and line type for individual sketch elements. A toolbar provides the interface for this new functionality (Figure 6). Designers can quickly toggle between the overridden properties and Inventor software's standard sketch display as required.

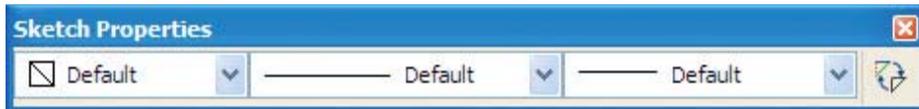


Figure 6: Sketch Properties toolbar.

Organizations can develop a set of sketch property standards defining certain design elements as they pertain to the intended design parameters. As design teams manipulate the design, the unique properties of the geometry maintain the prescribed design intent downstream.

## Work Scenario

You are a member of a design team responsible for a large design project. As part of the project requirements, each revision will be tracked using a different color. The revisions will be documented in a spreadsheet using the same colors.

As the design progresses, the design becomes more complicated. Each designer on the team has played a part in creating and editing the design.

Toward the end of the design cycle, it becomes your responsibility to make final changes to the assembly. During the editing process, you discover some changes made to sketch geometry that do not seem to be in line with the current design direction. This particular sketch geometry is green.

Using this information, you are able to query the accompanying spreadsheet and determine when, why, and by whom the changes were made.

You are able to trace the design changes quickly and easily and move on to your next task.

# Manage 2D Constraints

A parametric sketch consists of lines, curves, points, and relationships. The relationships control the interaction between the lines, curves, and points. These relationships, called constraints, may also maintain design intent.

You may find it necessary to frequently work with constraints. To make it easier, Autodesk Inventor provides improved sketch constraint management tools (Figure 7).

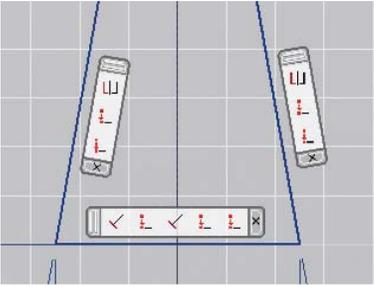


Figure 7: Redesigned constraint display.

Autodesk Inventor 2008 adds functionality that enables designers to display the constraints pertaining to window-selected geometry. A filtering mechanism enables designers to specify which constraints are displayed in the graphics area (Figure 8).

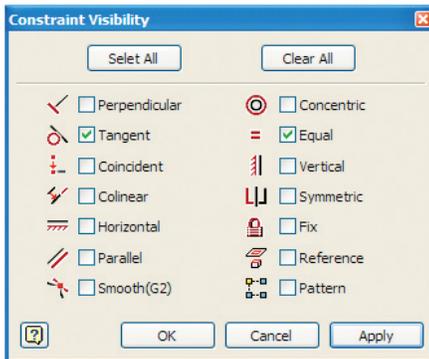


Figure 8: Constraint Visibility filter control.

Geometry projected from existing geometry is marked with a new reference constraint. The addition of bidirectional cross-highlighting between constraint glyphs and associated geometry (Figure 9) has improved designers' ability to examine constraint relationships.

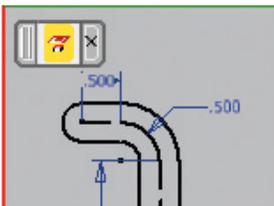


Figure 9: New reference constraint cross-highlighted with associated geometry.

As a design moves through various iterations, sketches are manipulated many times. By taking full advantage of the new and improved sketch constraint management toolset in Inventor software, designers can interpret and react to the changing design parameters.

## Work Scenario

It is your responsibility to make changes to geometry in a complex shared sketch. Many features are controlled by this sketch. It contains arcs, lines, points, and many constraints.

Among the changes you need to make is moving the location of a line. Currently this line is projected from another feature of the part. It needs to be offset from the edge of the existing feature.

Improvements to the sketch constraint tools make this process simple, even though your sketch is complex.

Simply select the line, and click the Show Constraints tool. The constraints that are acting on the line are displayed in the graphics area. To isolate the reference constraint, right-click, and select Constraint Visibility. In the dialog box that appears, clear all constraint types except Reference. This ensures that only the reference constraint is visible. Delete this constraint and apply the necessary dimension to relocate the line.

The constraint visibility control enables you to isolate the type of constraints you need to work with. This makes it much more intuitive to manage these relationships in complex sketches, making it easier for you to do your job.

## It's All About Efficiency

Efficiency is fostered by design reuse, preserving design intent, and managing geometric relationships effectively. By using Inventor 2008 to address these challenges, organizations can gain a fast return on investment and a competitive advantage now and into the future.