



Autodesk Inventor Tutorials

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Using Threads in iParts

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Now that you are familiar with the basics of iParts it is time to tackle some of the "less documented" aspects of iParts.

In this lesson we will explore controlling threads and expanding our use of keys. Begin by creating a block of the following dimensions.

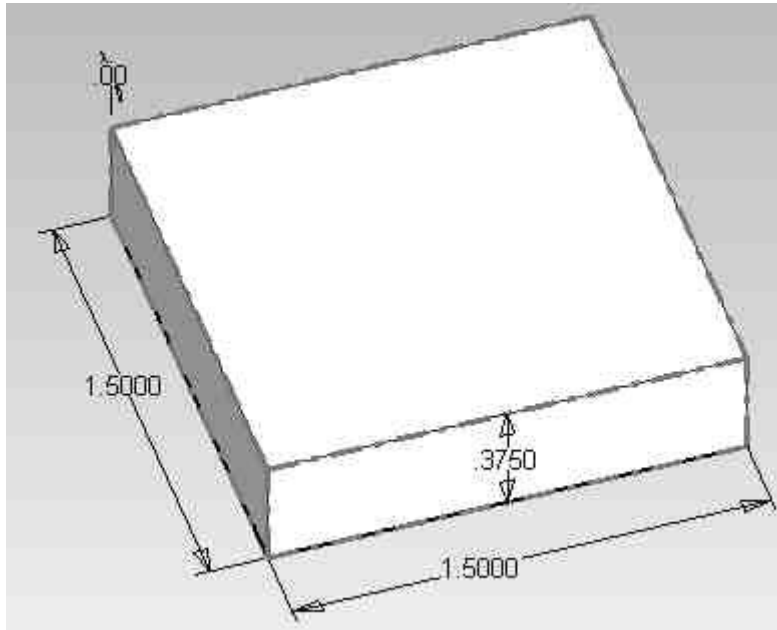


Figure 1 - Basic Block

Next start a new sketch and extrude (cut) a circle in the middle of the block

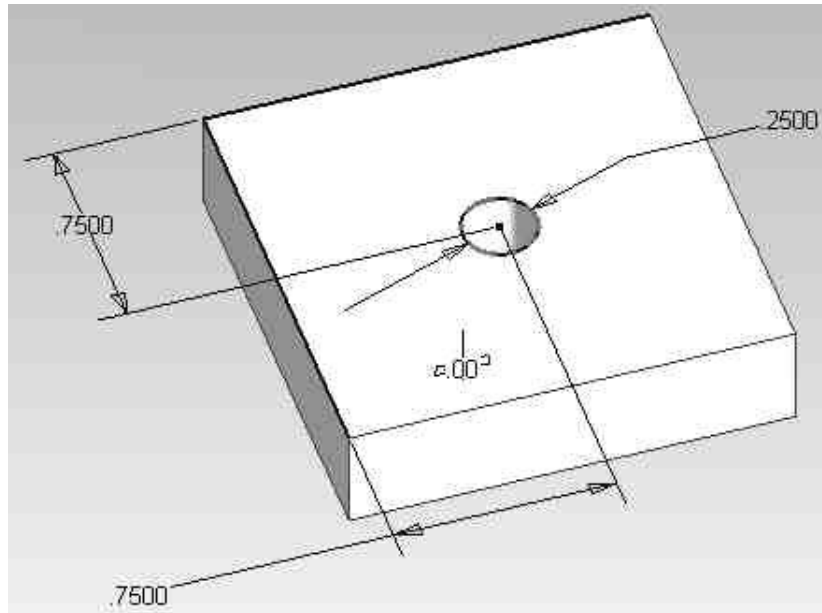


Figure 2 - Block with Hole

One important aspect of threads in iParts is that you do not use the Hole command. You must create a circular extrusion or cut and then place threads on the feature. Click on the thread tool and place threads on the inner surface of the extrusion. Only allow the threads to be 0.125 deep. Do this by unchecking the "full length" box and entering a value in the box.

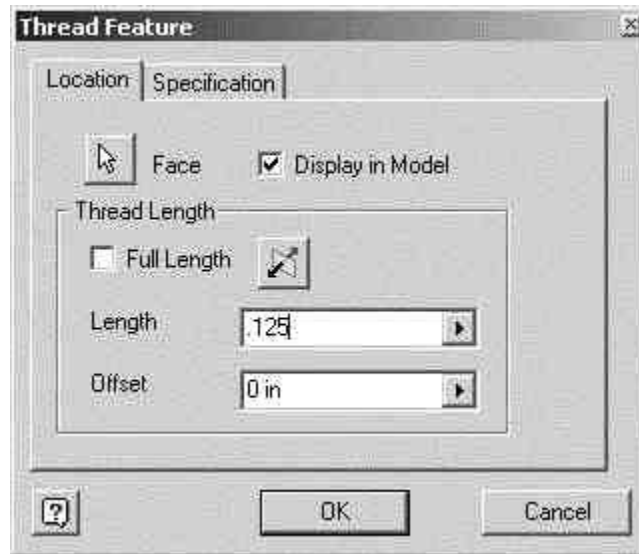


Figure 3 - Unchecking the Full Length Option

Go to the Specification tab and select the proper values. Note that you cannot place anything except a 1/4-20 (or 28) thread in this hole as it's diameter was set to 0.25" You must match the diameter of the hole to the threads that you want to apply.

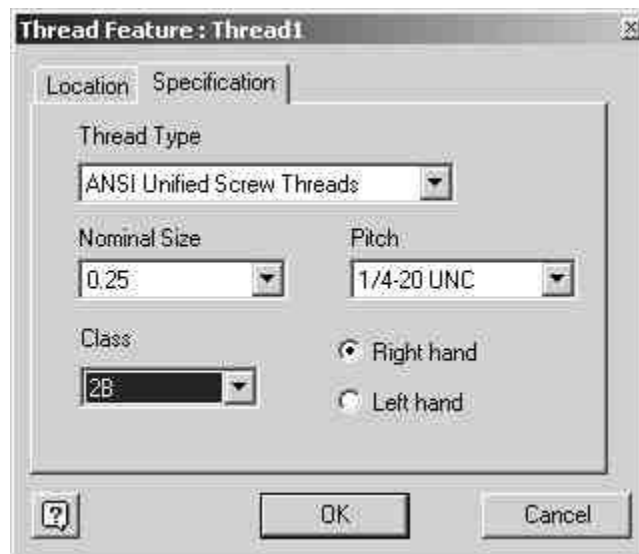


Figure 4 - Thread Specification Tab

Close the thread feature box and open the Parameters box. Here we will rename some of the dimensions that we want to control. We will rename the diameters of the circle (d12 in this case) to **holediam** and the depth of the threads (d15) to **threaddepth**. Since these are the only two parameters we want to control we can leave the rest of the dimensions alone. "But wait" you say, "What about the threads". That will be dealt with in the iPart Author. Your parameter table should look something like Figure 5.

Parameter Name	Unit	Equation	Value		Comment
d6	in	1.5 in	1.500000	<input type="checkbox"/>	
d7	in	1.5 in	1.500000	<input type="checkbox"/>	
d8	in	0.375 in	0.375000	<input type="checkbox"/>	
d9	deg	0 deg	0.000000	<input type="checkbox"/>	
d10	in	0.75 in	0.750000	<input type="checkbox"/>	
d11	in	0.75 in	0.750000	<input type="checkbox"/>	
holediam	in	0.25 in	0.250000	<input type="checkbox"/>	
d14	deg	0 deg	0.000000	<input type="checkbox"/>	
threaddepth	in	0.125 in	0.125000	<input checked="" type="checkbox"/>	
d16	in	0 in	0.000000	<input type="checkbox"/>	

Display only parameters used in equations

Figure 5 - Parameters Table

We can now enter the iPart Author and you will see that the parameters that we just renamed have automatically been transferred over to the table

Parameters | Properties | Suppression | iMates | Other

threads.ipt

- Extrusion3
 - x:= d6 [1.5 in]
 - x:= d7 [1.5 in]
 - x:= d8 [0.375 in]
 - x:= d9 [0 deg]
- Extrusion4

Name	
holediam	
threaddepth	

	holediam	threaddepth
1	0.25 in	0.125 in

Figure 6 - iPart Author with Parameters Transferred

At this time you can add property, suppression or imate fields that you wish. These were covered in the first lesson. Click on the Other tab and add the fields as shown in the photo below. Notice the first three fields. These are **Thread1:Class**, **Thread1:Designation** and **Thread1:Family**. These are the parameters that control the size and type of threads. If your thread in your browser was named Thread2 then you would need to type **Thread2:Class** etc.. This is probably the source of most of the problems that people have with iPart threads. You can tell if you messed this up when you try to change the iPart and you get the error *Failed to Make Factory Part*.

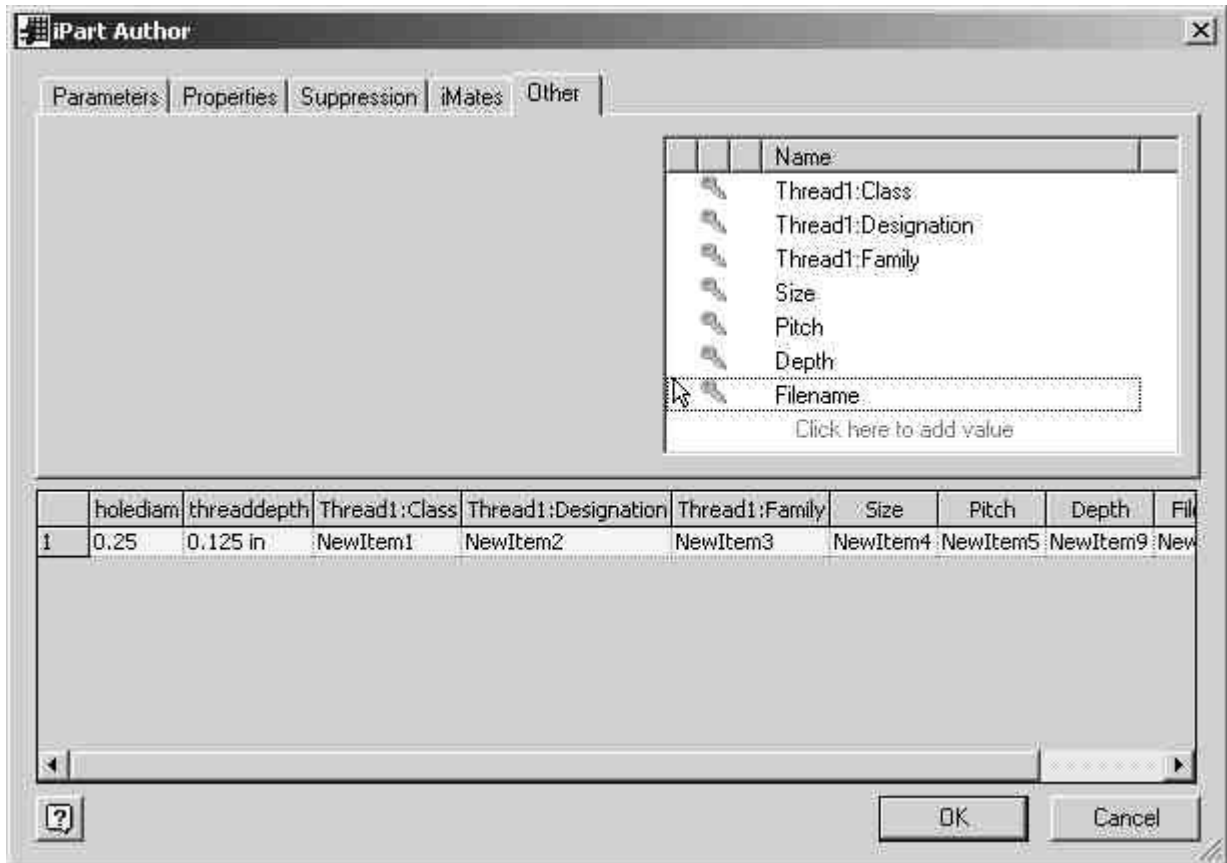


Figure 7 - Adding Threads Parameters to iPart Author

We have also added values for **Size**, **Pitch**, **Depth** and **Filename**. Remember to make the **Filename** value a *File Name* Column (see Lesson 1). We will use the other three values to control the iPart. Since these are the values of interest we will make them keys. RMB on the values and make them keys #1-3. (see Figure 8)

Exit out of the iPart Author and then RMB on the *Table Icon* and select *Edit via Spreadsheet*. (see Figure 9a)

Replace the values in the second row with the rows as shown in Figure 9b.

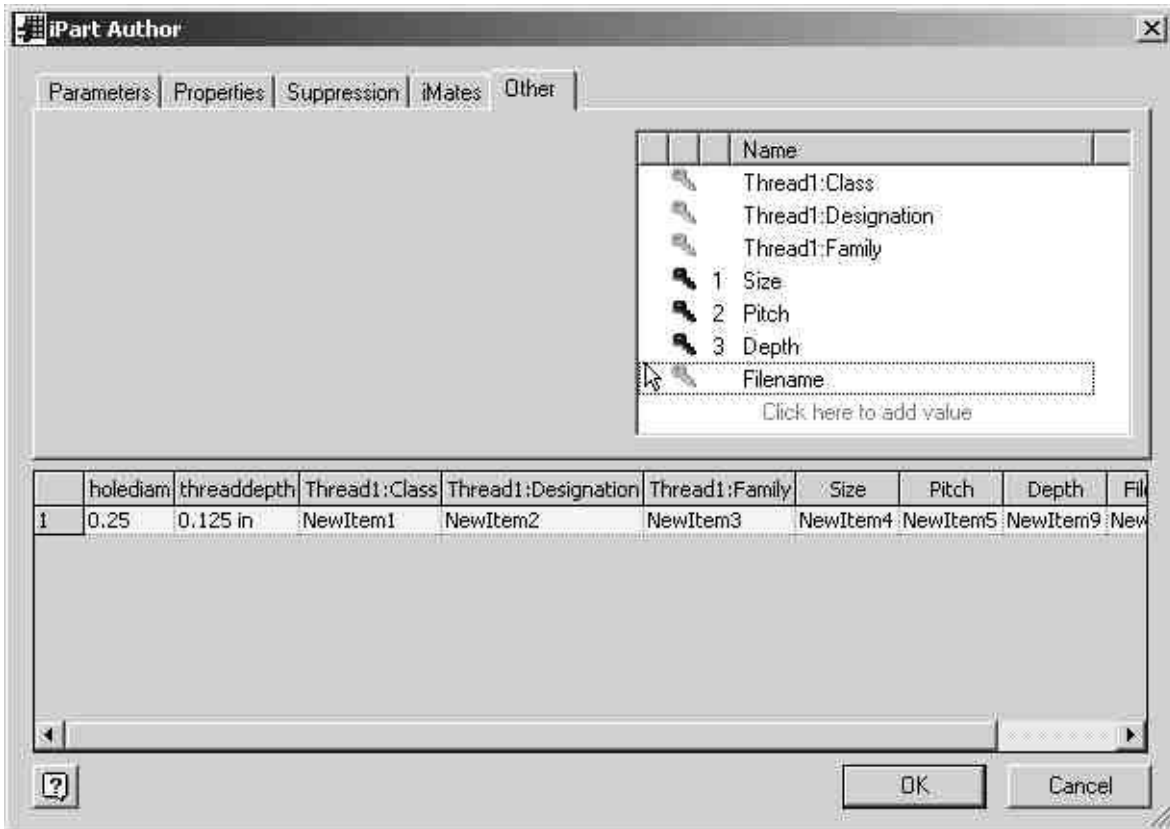


Figure 8 - Adding Keys to iPart Author

	A	B	C	D	E	F	G	H	I	J
1	holediam	threaddepth	Thread1:Class	Thread1:Designation	Thread1:Family	Size	Pitch	Depth	Filename	
2	0.25	0.125 in	NewItem1	NewItem2	NewItem3	NewItem4	NewItem5	NewItem1	6-32-HALF	
3										
4										
5										
6										

	A	B	C	D	E	F	G	H	I
1	holediam	threaddepth	Thread1:Class	Thread1:Designation	Thread1:Family	Size	Pitch	Depth	Filename
2	0.138	0.1875	2B	6-32 UNC	ANSI Unified Screw Threads	#6	UNC	Half	6-32-HALF
3	0.164	0.1875	2B	8-32 UNC	ANSI Unified Screw Threads	#8	UNC	Half	8-32-HALF
4	0.19	0.1875	2B	10-24 UNC	ANSI Unified Screw Threads	#10	UNC	Half	10-24-HALF
5	0.25	0.1875	2B	1/4-20 UNC	ANSI Unified Screw Threads	1/4	UNC	Half	1/4-20-HALF
6	0.3125	0.1875	2B	5/16-18 UNC	ANSI Unified Screw Threads	5/16	UNC	Half	5-16-18-HALF

Figure 9(a & b) - Empty and Filled Out Excel Tables

Notice the text values in the **Thread1:Class**, **Thread1:Designation** and **Thread1:Family** columns. You must be sure to type these values EXACTLY as they appear in the threads feature dialogue box. This is probably the second most common problem with threads in iParts.

For thread designation the format is 6-40 UNF or 1/4 -20 UNC. Note the space between the TPI and UNC/UNF. For the class 2B, 1A etc.. For family the entire family name must be spelled out e.g. ANSI Unified Screw Threads (not Thread).

In this example we have used the key **Depth** to reflect the depth of the threads by referring to the parameter **threaddepth**. We chose to do this so that we could represent the choices by the words **HALF** and **FULL**. Had there been multiple choices we probably would have wanted to use the parameter **threaddepth** as a key and omit the key **Depth**. Also in this example we have a choice of UNC and UNF threads (coarse and fine). In most situations if you have a large number of thread choices (as in a bolt) you would want to split the UNF and UNC into two separate files. If you have too much data in your iPart it will be slow to load and slow to change sizes. Most of the hardware parts at www.cbliss.com/inventor are divided like this.

We can now copy down the previous values and change one of the keys while holding the others constant. Notice that in this example we hold the **Depth** constant while varying the pitch.

Worksheet in threads.ipt									
	A	B	C	D	E	F	G	H	I
1	holediam<defaultR	threaddepth	ThreadClass	ThreadDesignation	ThreadFamily	Size<key:0</key>	Pitch<key:1</key>	Depth<key:2</key>	Filename<filename></filename>
2	0.138	0.1875	2B	6-32 UNC	ANSI Unified Screw Threads	#6	UNC	Half	6-32-HALF
3	0.164	0.1875	2B	8-32 UNC	ANSI Unified Screw Threads	#8	UNC	Half	8-32-HALF
4	0.19	0.1875	2B	10-24 UNC	ANSI Unified Screw Threads	#10	UNC	Half	10-24-HALF
5	0.25	0.1875	2B	1/4-20 UNC	ANSI Unified Screw Threads	1/4	UNC	Half	1/4-20-HALF
6	0.3125	0.1875	2B	5/16-18 UNC	ANSI Unified Screw Threads	5/16	UNC	Half	5/16-18-HALF
7	0.138	0.1875	2B	6-40 UNF	ANSI Unified Screw Threads	#6	UNF	Half	6-32-HALF
8	0.164	0.1875	2B	8-36 UNF	ANSI Unified Screw Threads	#8	UNF	Half	8-32-HALF
9	0.19	0.1875	2B	10-32 UNF	ANSI Unified Screw Threads	#10	UNF	Half	10-24-HALF
10	0.25	0.1875	2B	1/4-28 UNF	ANSI Unified Screw Threads	1/4	UNF	Half	1/4-20-HALF
11	0.3125	0.1875	2B	5/16-24 UNF	ANSI Unified Screw Threads	5/16	UNF	Half	5/16-18-HALF

Figure 10 - Hold Depth Constant and Vary Pitch

We can now copy the first two sets of data and simply change the **threaddepth** and **Depth** columns. This gives us every combination of **Depth**, **Pitch** and **Size**. The complete table is shown below.

Worksheet in threads.ipt									
	A	B	C	D	E	F	G	H	I
1	holediam<defaultR	threaddepth	ThreadClass	ThreadDesignation	ThreadFamily	Size<key:0</key>	Pitch<key:1</key>	Depth<key:2</key>	Filename<filename></filename>
2	0.138	0.1875	2B	6-32 UNC	ANSI Unified Screw Threads	#6	UNC	Half	6-32-HALF
3	0.164	0.1875	2B	8-32 UNC	ANSI Unified Screw Threads	#8	UNC	Half	8-32-HALF
4	0.19	0.1875	2B	10-24 UNC	ANSI Unified Screw Threads	#10	UNC	Half	10-24-HALF
5	0.25	0.1875	2B	1/4-20 UNC	ANSI Unified Screw Threads	1/4	UNC	Half	1/4-20-HALF
6	0.3125	0.1875	2B	5/16-18 UNC	ANSI Unified Screw Threads	5/16	UNC	Half	5/16-18-HALF
7	0.138	0.1875	2B	6-40 UNF	ANSI Unified Screw Threads	#6	UNF	Half	6-32-HALF
8	0.164	0.1875	2B	8-36 UNF	ANSI Unified Screw Threads	#8	UNF	Half	8-32-HALF
9	0.19	0.1875	2B	10-32 UNF	ANSI Unified Screw Threads	#10	UNF	Half	10-24-HALF
10	0.25	0.1875	2B	1/4-28 UNF	ANSI Unified Screw Threads	1/4	UNF	Half	1/4-20-HALF
11	0.3125	0.1875	2B	5/16-24 UNF	ANSI Unified Screw Threads	5/16	UNF	Half	5/16-18-HALF
12	0.138	0.375	2B	6-32 UNC	ANSI Unified Screw Threads	#6	UNC	Full	6-32-FULL
13	0.164	0.375	2B	8-32 UNC	ANSI Unified Screw Threads	#8	UNC	Full	8-32-FULL
14	0.19	0.375	2B	10-24 UNC	ANSI Unified Screw Threads	#10	UNC	Full	10-24-FULL
15	0.25	0.375	2B	1/4-20 UNC	ANSI Unified Screw Threads	1/4	UNC	Full	1/4-20-FULL
16	0.3125	0.375	2B	5/16-18 UNC	ANSI Unified Screw Threads	5/16	UNC	Full	5/16-18-FULL
17	0.138	0.375	2B	6-40 UNF	ANSI Unified Screw Threads	#6	UNF	Full	6-32-FULL
18	0.164	0.375	2B	8-36 UNF	ANSI Unified Screw Threads	#8	UNF	Full	8-32-FULL
19	0.19	0.375	2B	10-32 UNF	ANSI Unified Screw Threads	#10	UNF	Full	10-24-FULL
20	0.25	0.375	2B	1/4-28 UNF	ANSI Unified Screw Threads	1/4	UNF	Full	1/4-20-FULL
21	0.3125	0.375	2B	5/16-24 UNF	ANSI Unified Screw Threads	5/16	UNF	Full	5/16-18-FULL

Figure 11 - Continue Filling Out Excel Table

Save the spreadsheet and select *File>Close and Return to...* to return to the model. You will likely receive the "Part does not match the table" error. Hit OK and the part will update to the current table row.

Figures 12 & 13 show photos of the completed part. Note that the photos show a sliced section to illustrate the thread depth.

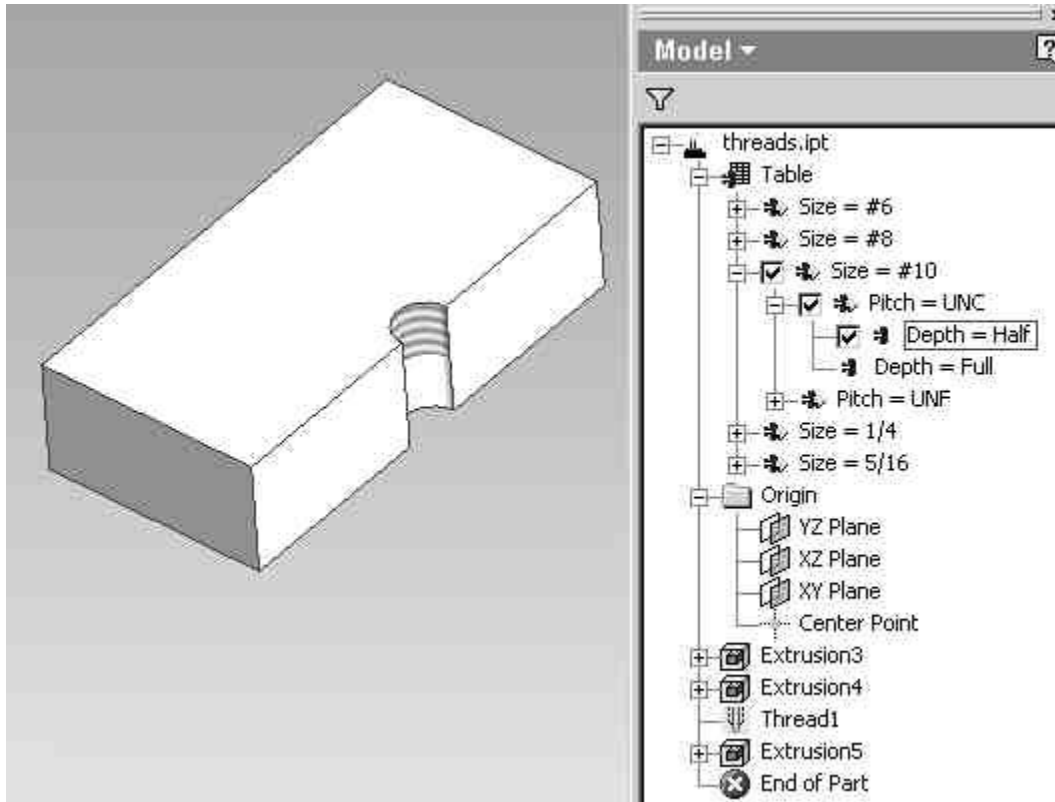


Figure 12 - Completed iPart (Half Threads)

All that is left is to enter the iPart table and set the default row and save the part.

When you have complete the lesson you can download the part [here](#) in case you have any problems getting yours to work.

The next lesson will use this same part and show you how to change colors and materials.

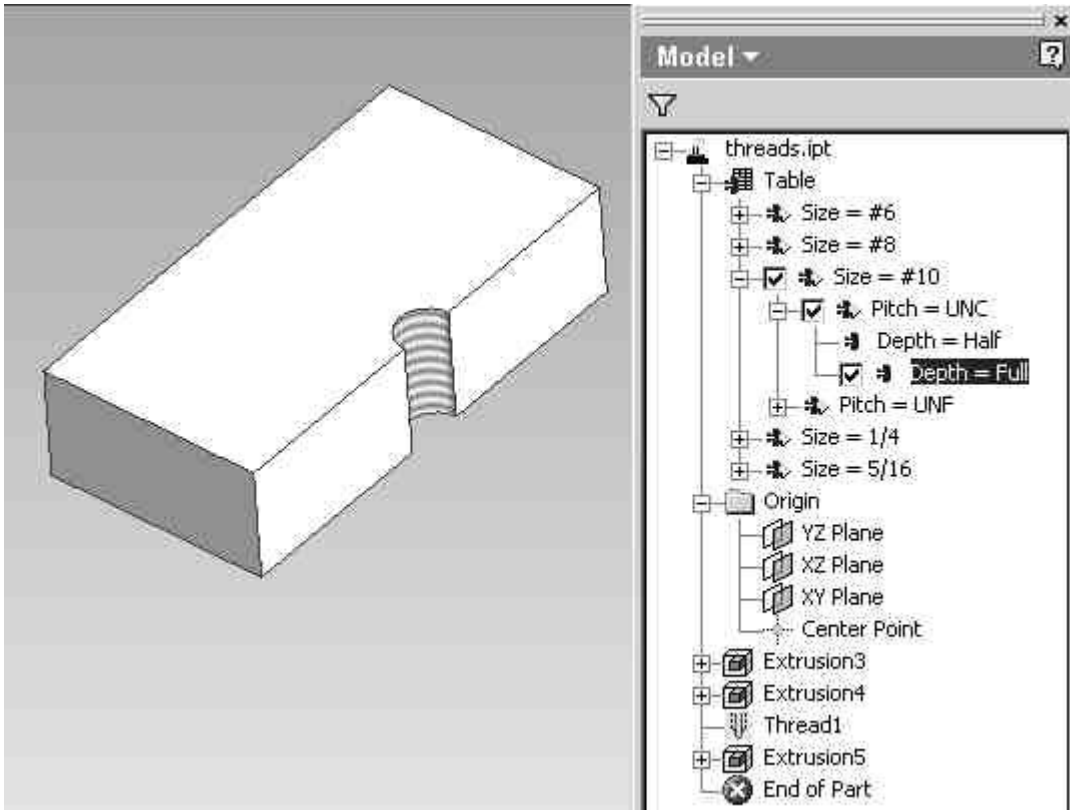


Figure 13 - Completed iPart (Full Threads)