

## Create parameters

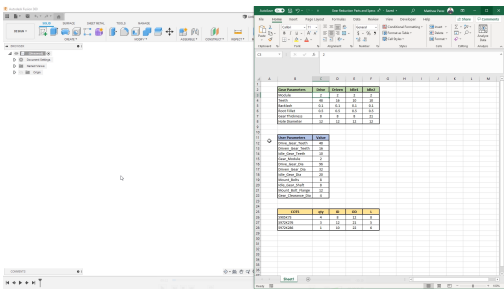
### Learning objectives

- Create a list of user parameters.
- Add model parameters to favorites.

Parameter	Name
▼ Favorites	
★ User Parameter	Drive_Gear_Teeth
★ User Parameter	Driven_Gear_Teeth
★ User Parameter	Idle_Gear_Teeth
★ User Parameter	Gear_Module
★ User Parameter	Drive_Gear_Dia
★ User Parameter	Driven_Gear_Dia
★ User Parameter	Idle_Gear_Dia
▼ User Parameters +	

The completed exercise

1. Open a new untitled document in Fusion 360 and open the supplied *Gear Reduction Parts and Specs.xlsx* file.



2. Notice the Gear Parameters table lists information for the Drive, Driven, Idle1, and Idle2 gears' various parameters.

Gear Parameters	Drive	Driven
Module	2	2
Teeth	48	16
Backlash	0.1	0.1
Root Fillet	0.5	0.5
Gear Thickness	8	8
Hole Diameter	12	12

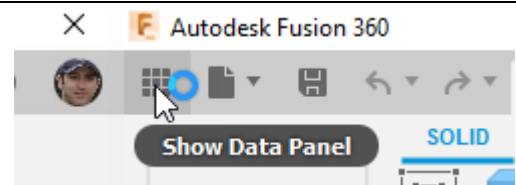
3. Inspect the information in the User Parameters table: this information will be used to create custom parameters inside Fusion 360.

User Parameters	Value
Drive_Gear_Teeth	48
Driven_Gear_Teeth	16
Idle_Gear_Teeth	10
Gear_Module	2
Drive_Gear_Dia	96
Driven_Gear_Dia	32
Idle_Gear_Dia	20

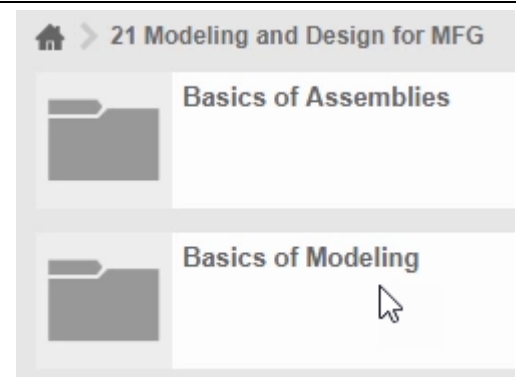
4. The information in the COTS table will be used to source Common Off-The-Shelf parts from McMaster Carr. After you finish exploring the information in the Excel file, keep the document open so that you can easily reference it.

COTS	qty	ID
5905K73	4	8
5972K276	3	12
5972K286	1	10

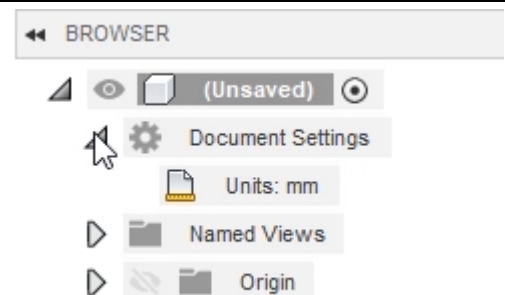
5. Click the Toolbar's Show Data Panel to expand Fusion 360's Data Panel.



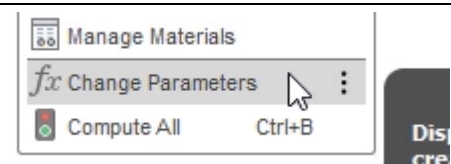
6. Create a folder for the current project. The main project folder could be named **Modeling and Design for MFG**. Inside the main project folder, create two folders: **Basics of Assemblies** and **Basics of Modeling**. Double-click the Basics of Modeling folder to open it in the Data Panel.



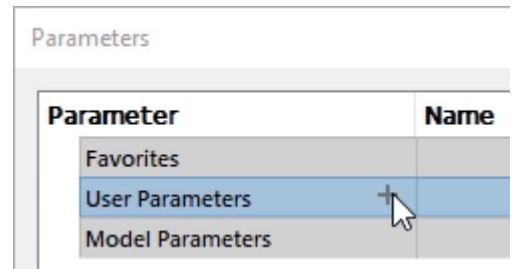
7. Expand the Browser's Document Settings and make sure the Units are set to metric.



8. Custom parameters can be created inside Fusion 360. In the Toolbar, expand the Modify group's drop-down menu and click Modify> Change Parameters.



9. To create a new custom user parameter, click the plus icon next to User Parameters.

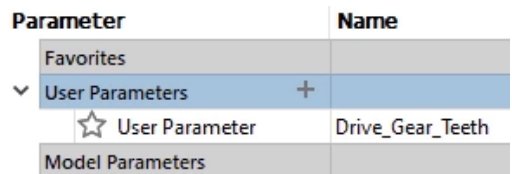


10. Use the information from the Excel file to create the first custom user parameter. Enter **Drive\_Gear\_Teeth** into the Name box, then enter **48** into the Expression box. Choose the No Units option from the Unit menu, then OK the Add User Parameter dialog.

The Add User Parameter dialog box is shown with the following fields: Name (Drive\_Gear\_Teeth), Unit (No Units), Expression (48), Value (48), and Comment (Enter Comment). The OK button is highlighted.

Name	Unit	Expression	Value	Comment
Drive_Gear_Teeth	No Units	48	48	Enter Comment

11. The custom user parameter is created and added to the User Parameters section of the Parameters dialog.

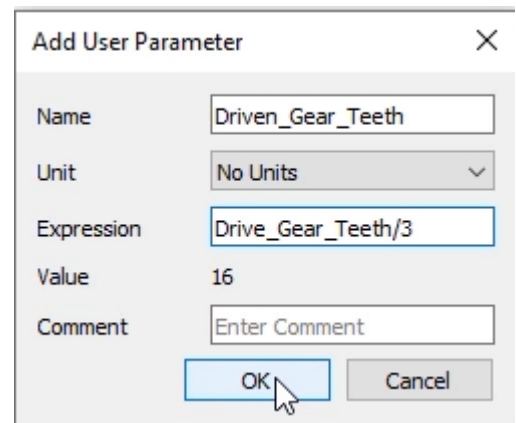


12. Click the User Parameters section's plus icon to create another new User Parameter. Enter **Driven\_Gear\_Teeth** into the Name box and choose the No Units option from the Unit menu. Since the gear ratio is intended to be a 3:1 ratio, the previous user parameter can be used to create the new parameter's expression. Begin typing **Drive** into the Expression box, then choose the existing User Parameter from the drop-down menu.

The Add User Parameter dialog box is shown with the following fields: Name (Driven\_Gear\_Teeth), Unit (No Units), Expression (D), Value (Drive\_Gear\_Teeth User F), and Comment (Enter Comment). The OK button is highlighted.

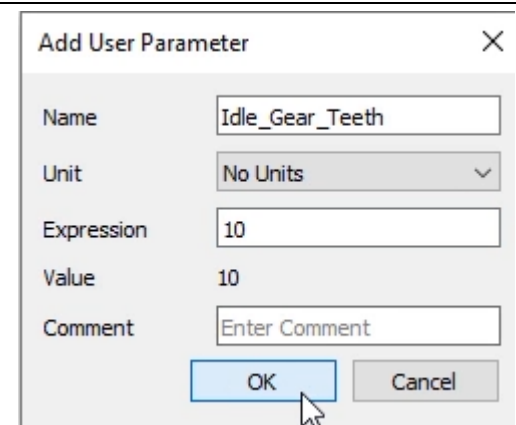
Name	Unit	Expression	Value	Comment
Driven_Gear_Teeth	No Units	D	Drive_Gear_Teeth User F	Enter Comment

**13.** Modify the expression by adding **/3** to the end of it. This will ensure that the number of teeth on the driven gear will always be one third of the drive gear's number of teeth. Since the drive gear currently has 48 teeth, the driven gear's expression calculates 16 teeth. If the drive gear's number of teeth changes, the driven gear's number of teeth will automatically update. OK the dialog.



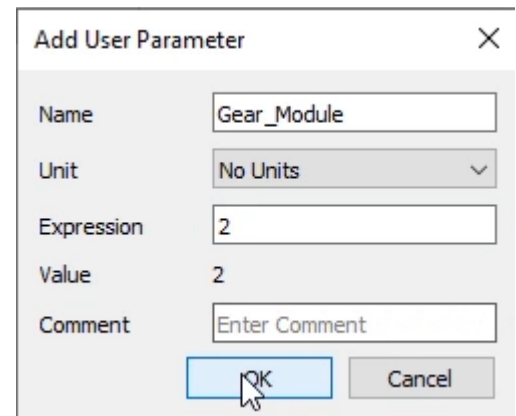
The 'Add User Parameter' dialog box is shown with the following fields: Name: 'Driven\_Gear\_Teeth', Unit: 'No Units' (selected from a dropdown), Expression: 'Drive\_Gear\_Teeth/3', Value: '16', and Comment: 'Enter Comment'. The 'OK' button is highlighted with a mouse cursor.

**14.** Create another new User Parameter. Enter **Idle\_Gear\_Teeth** into the Name box, then choose the No Units option from the Unit menu. Enter **10** into the Expression box, then OK the dialog.



The 'Add User Parameter' dialog box is shown with the following fields: Name: 'Idle\_Gear\_Teeth', Unit: 'No Units' (selected from a dropdown), Expression: '10', Value: '10', and Comment: 'Enter Comment'. The 'OK' button is highlighted with a mouse cursor.

**15.** Create another new User Parameter. Enter **Gear\_Module** into the Name box, then choose the No Units option from the Unit menu. Enter **2** into the Expression box, then OK the dialog.



The 'Add User Parameter' dialog box is shown with the following fields: Name: 'Gear\_Module', Unit: 'No Units' (selected from a dropdown), Expression: '2', Value: '2', and Comment: 'Enter Comment'. The 'OK' button is highlighted with a mouse cursor.

- 16.** Create another new User Parameter.  
Enter **Drive\_Gear\_Dia** into the Name box.  
Enter **((Drive\_Gear\_Teeth \* Gear\_Module) \* 1mm)** into the Expression box, then OK the dialog. This User Parameter describes the drive gear's diameter.

The 'Add User Parameter' dialog box is shown with the following fields:

- Name: Drive\_Gear\_Dia
- Unit: mm (selected from a dropdown menu)
- Expression:  $((\text{Drive\_Gear\_Teeth} * \text{Gear\_Module}) * 1\text{mm})$
- Value: 96.00
- Comment: Enter Comment

The OK button is highlighted with a mouse cursor.

- 17.** Create another new User Parameter.  
Enter **Driven\_Gear\_Dia** into the Name box. Enter **((Driven\_Gear\_Teeth \* Gear\_Module) \* 1mm)** into the Expression box, then OK the dialog. This User Parameter describes the driven gear's diameter.

The 'Add User Parameter' dialog box is shown with the following fields:

- Name: Driven\_Gear\_Dia
- Unit: mm (selected from a dropdown menu)
- Expression:  $((\text{Driven\_Gear\_Teeth} * \text{Gear\_Module}) * 1\text{mm})$
- Value: 32.00
- Comment: Enter Comment

The OK button is highlighted with a mouse cursor.

- 18.** Create another new User Parameter.  
Enter **Idle\_Gear\_Dia** into the Name box. Enter **((Idle\_Gear\_Teeth \* Gear\_Module) \* 1mm)** into the Expression box, then OK the dialog. This User Parameter describes the idle gear's diameter.

The 'Add User Parameter' dialog box is shown with the following fields:

- Name: Idle\_Gear\_Dia
- Unit: mm (selected from a dropdown menu)
- Expression:  $((\text{Idle\_Gear\_Teeth} * \text{Gear\_Module}) * 1\text{mm})$
- Value: 20.00
- Comment: Enter Comment

The OK button is highlighted with a mouse cursor.

- 19.** Continue to make User Parameters for the Remaining Items in the Excel file's User Parameters table. All of these values are intended to be metric values so the mm option needs to be chosen from the Add User Parameter dialog's Unit menu.

Driven_Gear_Dia	32
Idle_Gear_Dia	20
Mount_Bolts	8
Idle_Gear_Shaft	8
Mount_Bolt_Flange	12
Gear_Clearance_Dia	4

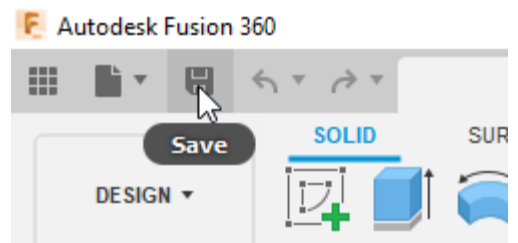
**20.** A User Parameter can be added to the Favorites section by clicking the star next to it. When a project has many User Parameters, adding specific parameters to the Favorites section can help increase your efficiency when trying to find them.

Parameter	Name
▼ Favorites	
★ User Parameter	Drive_Gear
▼ User Parameters +	
★ User Parameter	Drive_Gear
★ User Parameter	Driven_Gear
★ User Parameter	Idle_Gear

**21.** Click the Drive\_Gear\_Teeth parameter's Expression value and change it to **60**. Notice that a few of the other User Parameters' values automatically update because they use this parameter's expression. After noting the changes, return the Drive\_Gear\_Teeth parameter's Expression value to **48**. OK the Parameters dialog to accept the changes.

Expression	Value
60	60
Drive_Gear_Teeth / 3	20
10	10
2	2

**22.** Save the file.



**23.** In the Save dialog, enter **Gear Reduction Housing** into the Name box, then make sure that the file is being saved into the Basics of Modeling folder. Click the Save dialog's Save, then continue to the next module.

Name:

Gear Reduction Housing

Location:

21 Modeling and Design for MFG > Basics of Modeling