

# What's New in MBD for ANSYS 18

FunctionBay, Inc.



**MBD** for ANSYS  
Multi-Body Dynamics

 FunctionBay



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# MBD *for ANSYS* Multi-Body Dynamics

Multi-Body Dynamics for ANSYS is...

**Multi-Body Dynamics software**  
**Tightly integrated into**  
**ANSYS® Workbench™**

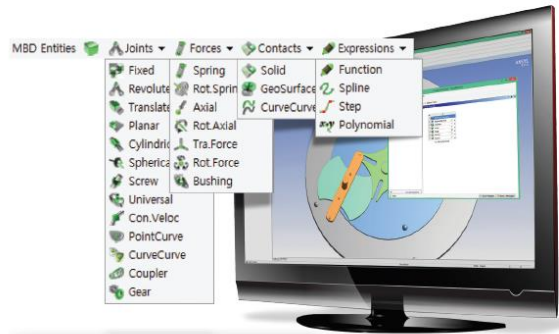


MBD for ANSYS (Multi-Body Dynamics for ANSYS)  
is an add-on module for ANSYS

# 4 Advantages of MBD for ANSYS

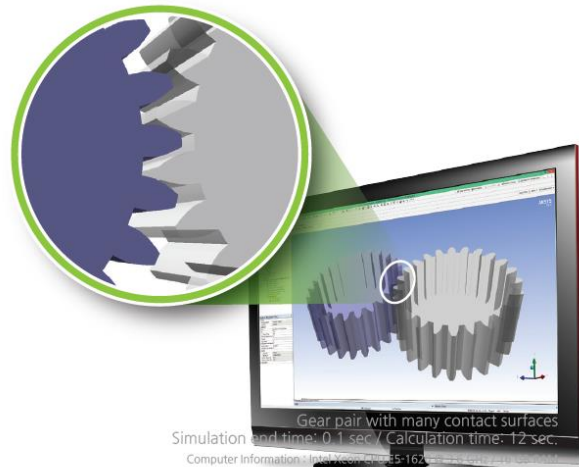
## 1 User-friendly interface integrated with the ANSYS Workbench environment

- An add-on module for ANSYS Workbench that can be installed easily
- A convenient, innovative modeling environment optimized for Multi-Body Dynamics analysis
- Pre-processing, solving, and post-processing possible within the ANSYS Workbench environment



## 2 Fast and robust solver

- Developed by an experienced FunctionBay team.
- Fast simulations using rigid bodies (Transient analysis)
- High performance contact algorithms



## 3 Convenient, Automated Load Transfer

- Apply the Multi-Body Dynamics analysis results as the load conditions for a structural analysis model.
- Easily convert the analysis results into the load conditions for a structural analysis model with Load Transfer.



## 4 Scalability to Multi-Body Dynamics applications

- Convert MBD for ANSYS models into RecurDyn models, to access additional functionality in RecurDyn/Professional.
- You can simulate a complex system with coupled vibrations or other complex applications such as mechatronics or coupled analysis with a fluid.



# Load Transfer for 'Time interval'

- When doing Load Transfer, load conditions over time can be transferred using 'Time interval' option.
- Users can conduct static analysis at the several time instants conveniently.

Load Transfer dialog box showing the 'Time interval' option selected. The dialog includes a table of load data, a graph of force over time, and a 'Selected Time Instants' section.

No.	Select	Time [s]	FX [N]	FY [N]	FZ [N]	TM [Nm]	TX [Nm]	TY [Nm]	TZ [Nm]
53	<input checked="" type="checkbox"/>	1.04	1828.773921	1828.566589	-27.536978	0	0	0	0
54	<input checked="" type="checkbox"/>	1.06	3796.306317	3741.685298	641.664073	0	0	0	0
55	<input checked="" type="checkbox"/>	1.08	5154.890123	4826.992877	1809.152272	0	0	0	0
56	<input checked="" type="checkbox"/>	1.1	5908.559803	5038.863312	3085.601313	0	0	0	0
57	<input checked="" type="checkbox"/>	1.12	6053.249498	4463.640386	4088.733788	0	0	0	0
58	<input checked="" type="checkbox"/>	1.14	5592.718088	3323.82427	4497.853692	0	0	0	0
59	<input checked="" type="checkbox"/>	1.16	4538.15931	1945.950051	4099.776619	0	0	0	0
60	<input checked="" type="checkbox"/>	1.18	2917.239579	715.942807	2828.022747	0	0	0	0

Selected Time Instants: 1.04 ~ 1.2 sec

Graph: Force(N) or Moment(N\*mm) vs Time(sec)

Details of "Revolute2\_Force Acting on Body"

Steps	Time [s]	X [N]	Y [N]	Z [N]	
1	0.	= 1700.9	= -671.94	= 0.	
2	1	1.04	1700.9	-671.94	0.
3	2	1.06	3529.	-1399.4	0.
4	3	1.08	4791.9	-1900.1	0.
5	4	1.1	5493.4	-2175.7	0.
6	5	1.12	5629.5	-2225.	0.
7	6	1.14	5203.6	-2049.6	0.
8	7	1.16	4226.1	-1653.8	0.
9	8	1.18	2722.5	-1048.1	0.
10	9	1.2	788.62	-271.15	0.

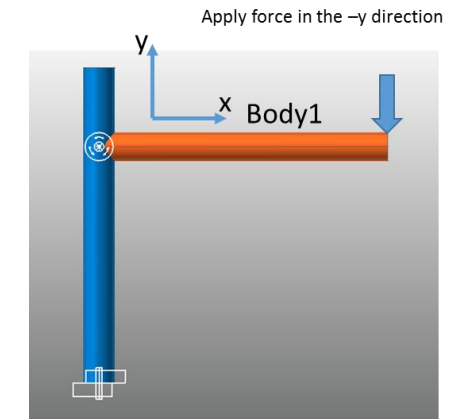
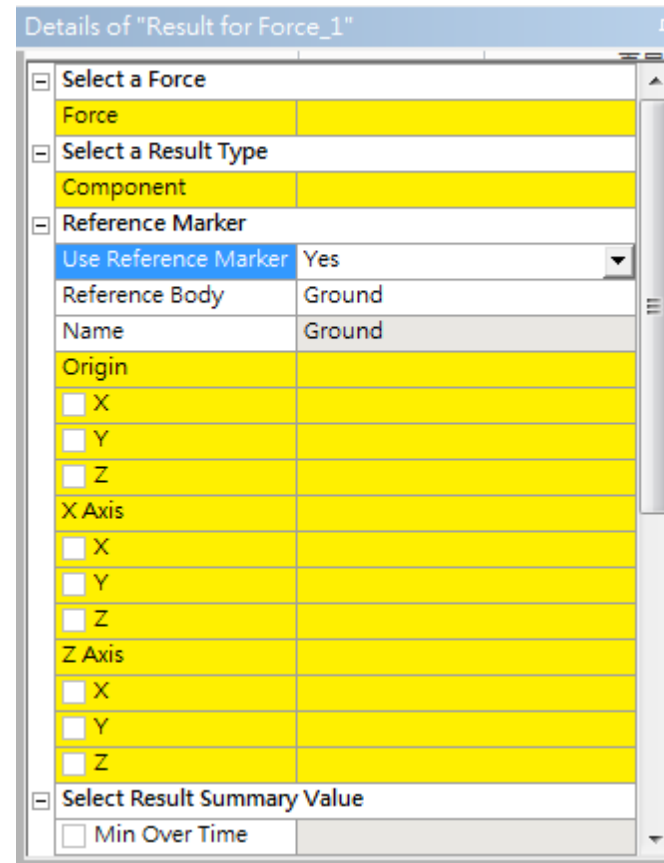
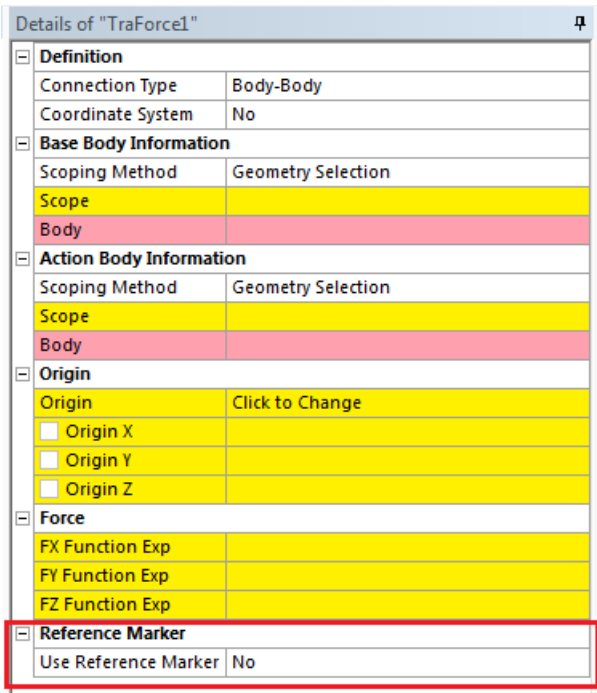
$t = 1.04s \sim 1.2s$

Tabular Data

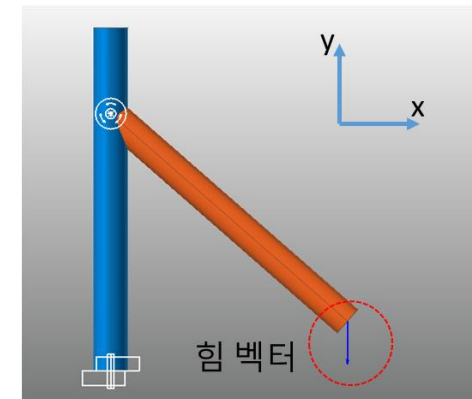
Steps	Time [s]	X [N]	Y [N]	Z [N]	
1	0.	= 1700.9	= -671.94	= 0.	
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# Use Reference Marker for Rotational Force and Translational Force

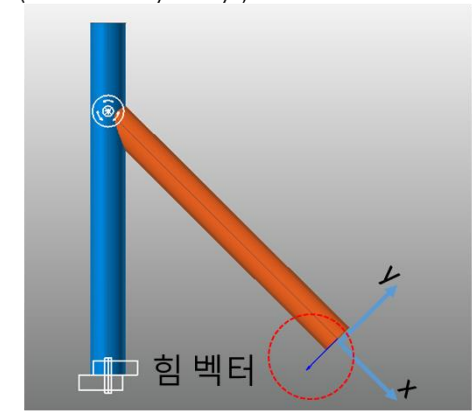
- The user can select an option to use a reference marker for rotational forces and translational forces.
- The user now can define the force relative to the arbitrary orientation.
- If the reference body is used, the force can be applied relative to the changing orientation over time.

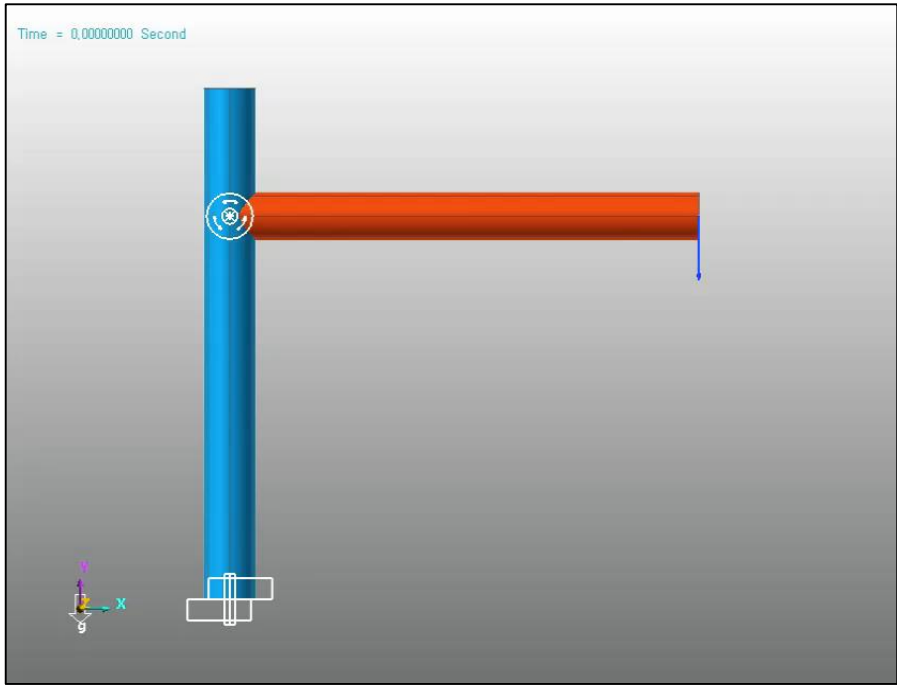


When it is relative to absolute coordinate

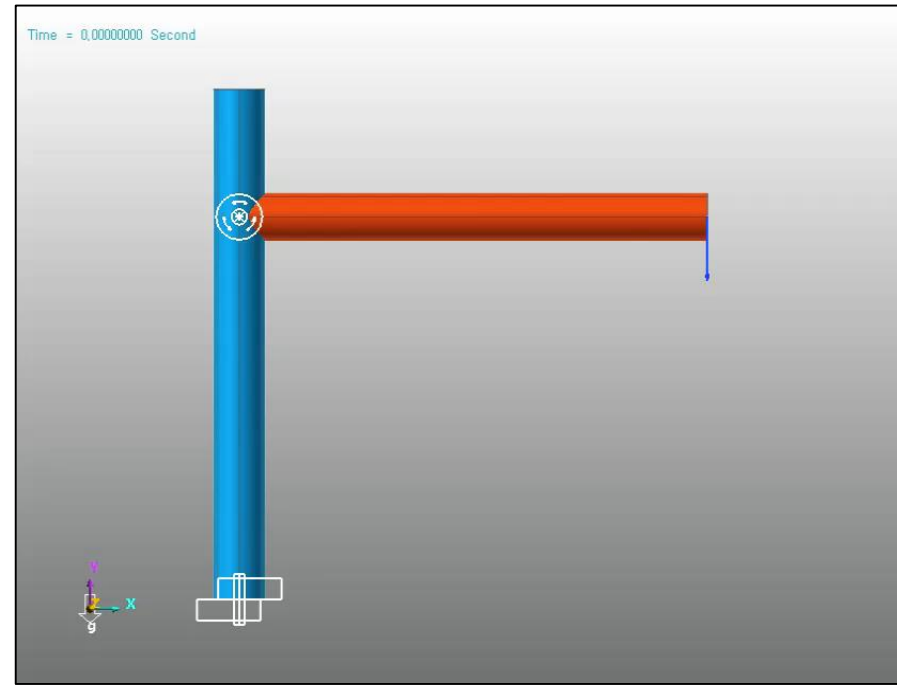


When the coordinate is attached to Body1 (Reference Body = Body1)

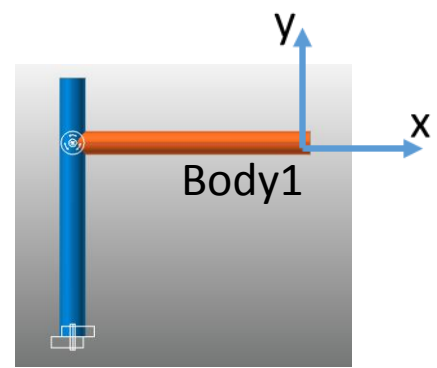




The direction of the force  
-y direction of the global coordinate



The direction of the force  
-y direction attached to the body1



# Support coordinate system for origin and orientation

- The Coordinate System field allows the user to use a custom coordinate system for defining the joint or the force.
- User can reuse the coordinate system for the same position and orientation and make use of the convenient coordinate system toolbar for transformation.

The image displays a software interface for defining a revolute joint. On the left, the 'Details of "Revolute1"' panel shows the 'Coordinate System' field set to 'No'. A blue arrow points from this field to the 'Details of "Revolute1"' panel on the right, where the 'Coordinate System' is now set to 'Yes' and the 'Coordinate System' dropdown is expanded, showing 'Global Coordinate System', 'Coordinate System\_RevJoint1', and 'Coordinate System\_RevJoint2'. A blue dashed box highlights these options. A blue arrow also points from the 'Coordinate System' dropdown to the 'Coordinate Systems' toolbar in the 'A : Multi-Body Dynamics - Mechanical [ANSYS Multiphysics]' window, which is highlighted with a red dashed box. The toolbar contains icons for creating and transforming coordinate systems. The central tree view shows the model structure with 'Coordinate Systems' and 'Multi-Body Dynamics (A5)' sections.

Coordinate system toolbar helps to define the position and the orientation easily.



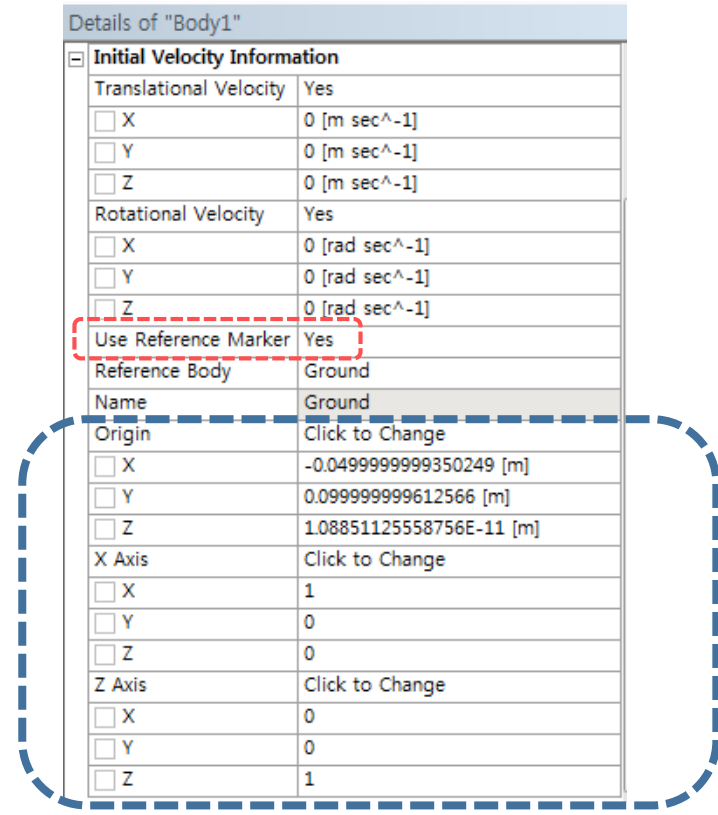
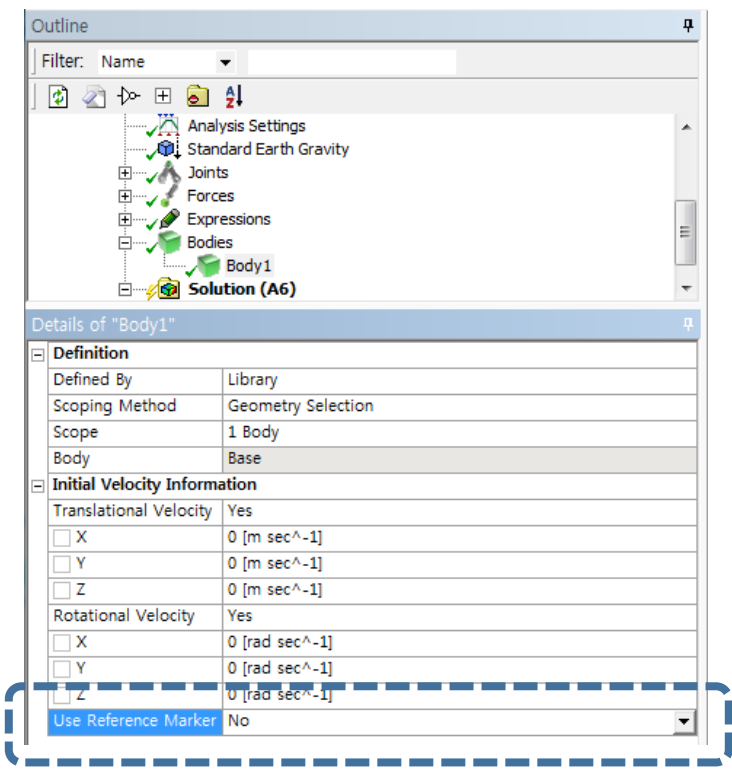
# Group Geometry with Fixed joints

- This tool can be used to automatically create fixed joints between any number of selected bodies.
- Some of the imported geometry may become multiple bodies even when the original solids were grouped into a single body. There is a need to regroup the bodies into a single merged body. This tool automates the grouping process and reduces the model preparation time.

The image illustrates the workflow for using the 'Generate Fixed Joints' tool. It starts with the MBD Tools toolbar, where the 'Generate Fixed Joints' icon is highlighted. A blue arrow points to the 'Details of "Generate Fixed Joints"' dialog box. The dialog shows 'Select bodies' with 'Scoping Method' set to 'Geometry Selection' and 'Geometry' set to '3 Bodies'. The 'Generate' section contains a 'Generate Fixed Joints' button, an 'Apply' button, and a 'Cancel' button. A blue arrow points from the dialog to the 'Outline' tree, which shows the model structure. A blue arrow points from the 'Outline' tree to a 3D model of a mechanical assembly. A blue arrow points from the 3D model to the 'Multi-Body Dynamics (A5)' environment, which shows the 'Joints' section. The 'Joints' section contains two folders: 'Attached\_Body\_FixedJoint1' and 'Attached\_Body\_FixedJoint2'. The 'Attached\_Body\_FixedJoint1' folder contains three joints: 'Fix\_Attach\_Right\_cyl\_Right\_mid\_cyl', 'Fix\_Attach\_Right\_mid\_cyl\_Right\_ball', and 'Fix\_Attach\_Left\_ball\_Left\_cyl'. The 'Attached\_Body\_FixedJoint2' folder contains two joints: 'Fix\_Attach\_Left\_cyl\_Left\_mid\_cyl' and 'Fix\_Attach\_Left\_mid\_cyl\_Left\_ball'.

# Use Reference Marker for Initial velocity of MBD Body

- The user can select an option to use a reference marker for the initial velocity of MBD Body.
- The user now can define the initial velocity relative to the arbitrary orientation.

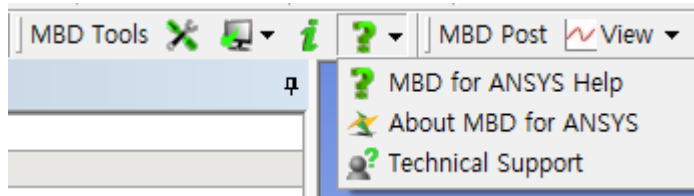


- The MBD for ANSYS tutorials provide a hands-on setting for learning how to use the software within the ANSYS Workbench environment. The table below shows the areas of emphasis for each tutorial

MBD for ANSYS 17

	Post Processing	Contact Modeling	Load Transfer	Export to RecurDyn
Geneva Wheel Tutorial, Part 1	Yes	Yes		
Hoekens Mechanism Tutorial	Yes		Yes (joints, forces)	
Inverted Pendulum Tutorial	Yes			Yes
Geneva Wheel Tutorial, Part 2	Yes	Yes	Yes (contacts)	

- Technical support site can be accessed from the toolbar directly



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MBD for ANSYS 17.1