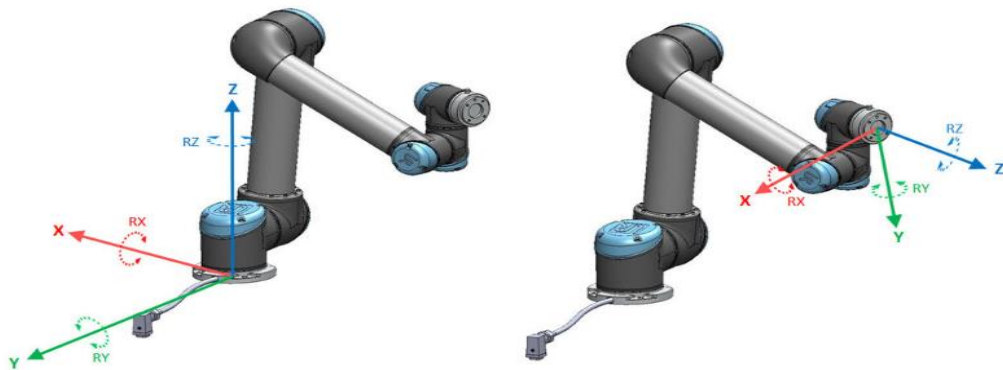


ROBOTIC JOINT

A robot joint is a mechanism that permits relative movement between parts of a robot arm. The joints of a robot are designed to enable the robot to move its end-effector along a path from one position to another as desired. The basic movements required for a desired motion of most industrial robots are:

- Rotational movement: This enables the robot to place its arm in any direction on a horizontal plane.
- Radial movement: This enables the robot to move its end-effector radially to reach distant points.
- Vertical movement: This enables the robot to take its end-effector to different heights.



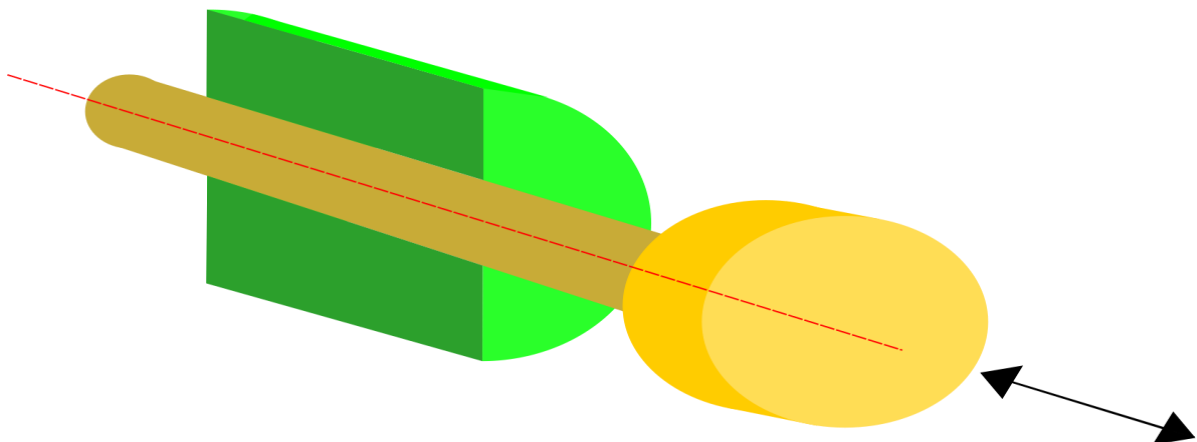
Degrees of freedom, independently or in combination with others, define the complete motion of the endeffector. These motions are accomplished by movements of individual joints of the robot arm. The joint movements are basically the same as relative motion of adjoining links.

Classification of Joints

- Prismatic joints
- Revolute joints

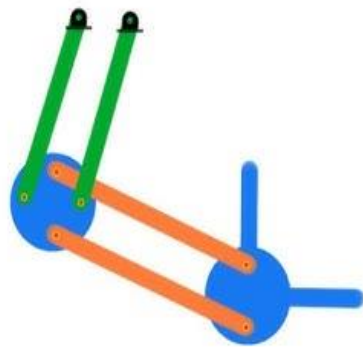
Prismatic joints:

Prismatic joints are also known as sliding as well as linear joints. They are called prismatic because the cross section of the joint is considered as a generalized prism. They permit links to make a linear displacement along a fixed axis. In other words, one link slides on the other along a straight line. These joints are used in gantry, cylindrical, or similar joint configurations.

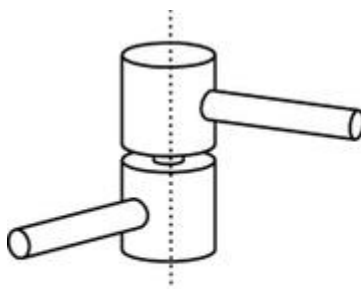
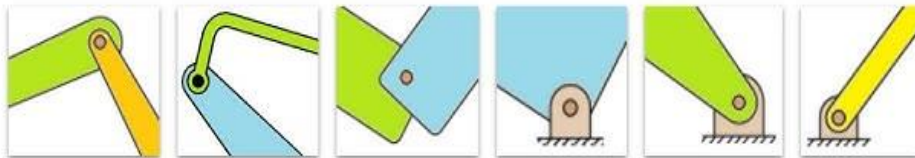


➤ Revolute joints

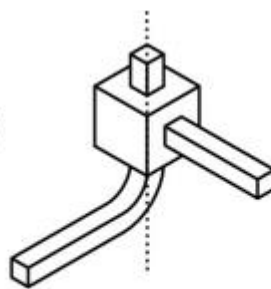
Revolute joints, the second type of joint is a revolute joint where a pair of links rotates about a fixed axis. Revolute joints are commonly used in assemblies of multiple moving bodies. They are also used in numerous applications such as door hinges, mechanisms, and other uni-axial rotation devices



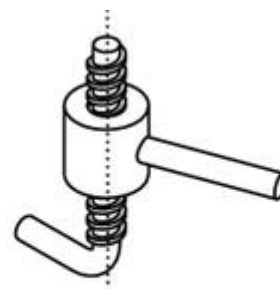
Revolute Joint



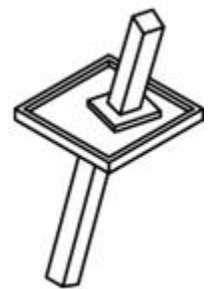
Revolute joint



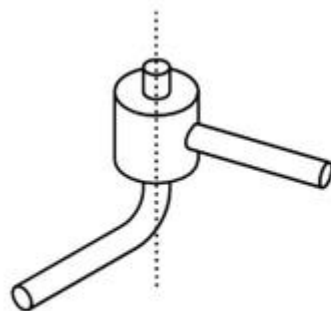
Prismatic joint



Helical joint



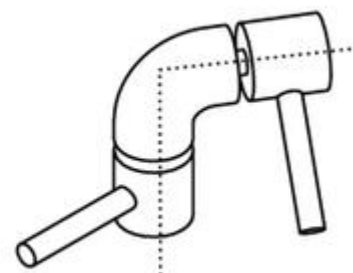
Planar joint



Cylindrical joint



Spherical joint



Universal joint

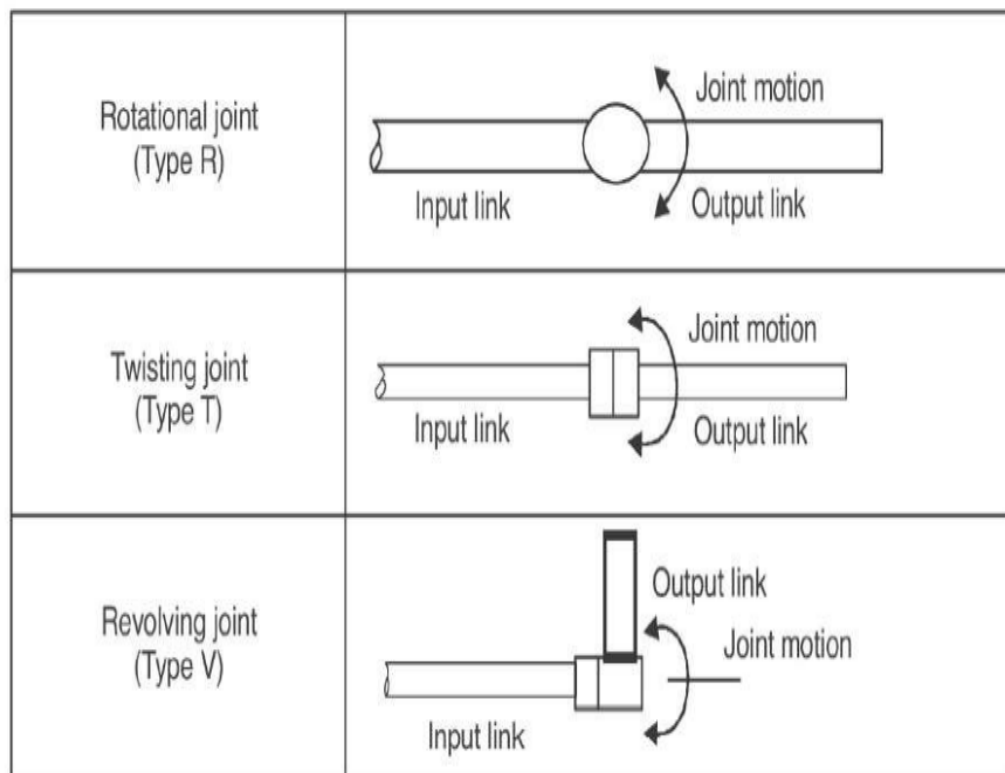
The variations of revolute joints shown include:

- Rotational joint (R)
- Twisting joint (T)
- Revolving joint (V)

Rotational joint (R): Is identified by its motion, rotation about an axis perpendicular to the adjoining links. Here, the lengths of adjoining links do not change but the relative position of the links with respect to one another changes as the rotation takes place.

Twisting Joint (T): Is also a rotational joint, where the rotation takes place about an axis that is parallel to both adjoining links.

Revolving Joint (V): is another rotational joint, where the rotation takes place about an axis that is parallel to one of the adjoining links. Usually, the links are aligned perpendicular to one another at this kind of joint. The rotation involves revolution of one link about another.



Types Of Mechanical Joints

- 1.Linear joint(L joint): A linear joint is not a commonly used term in robotics or mechanical engineering. However, a prismatic joint allows for linear relative motion between two links. It is a one-degree-of-freedom kinematic pair that constrains the motion of two bodies to sliding along a common axis, without rotation. Prismatic joints are often utilized in hydraulic and pneumatic cylinders.
- 2.Orthogonal joint(O joint): An orthogonal joint provides rotational relative motion with the axis of rotation perpendicular to the axis of the input and output links.
- 3.Rotational joint(R joint): A rotational joint allows two 3-dimensional bodies to rotate relative to each other about a fixed axis and permits no other relative motion. It is, by far, the most common type of joint in robotics
- 4.Twisting joint(T joint): Twisting joint is not a commonly used term in robotics or mechanical engineering. However, screw joint allows relative rotation and translation between two links.
- 5.Revolving joint(V joint): A revolute joint is like a hinge and and allows relative rotate between two links.

