**Basic Definitions**

- **Mechanism**: A combination of rigid and/or flexible bodies connected in such away to do work and there are definite constrained relative motions between them.

*Figure*: A schematic diagram of cam operating a valve.
Basic Definitions

- **Structure**: The same definition of mechanism, but its purpose is not to do work and there is no relative motion between its parts.

*Figure: A 3D truss structure*
**Basic Definitions**

- **Machine**: An arrangement of parts and/or mechanisms for doing work and there are constrained relative motions between its parts.

![Center Lathe machine diagram](image)

1. Apron
2. Saddle
3. Gearbox
4. Motor
5. Headstock
6. Chuck
7. Cross slide
8. Toolpost
9. Top slide
10. Tailstock
11. Bed
12. Leadscrew
13. Feed shaft
14. Spindle-control shaft
15. Coolant and swarf tray
16. Cabinet base
**Statics**: The part of mechanics, which deals with the action of forces on bodies at rest.

![Statics Problem](image-url)

**Figure**: Statics Problem
Basic Definitions

- **Kinematics**: Study of motion without reference to the forces causing the motion.

**Figure**: Loader
**Kinetics**: Relates the action of forces on bodies to their resulting motions

*Figure: Loader*
Basic Definitions

- **Dynamics**: The part of mechanics, which deals with the action of forces on bodies in motion

**Figure**: Loader
**Mechanics**: Deals with the action of forces on bodies at rest and in motion
There are two types of connecting pairing elements: lower pairs and higher pairs. Lower pairs have surface contact between mating elements and higher pairs have line or point contact.

**Figure**: Eight frequently used kinematic pairs
There are two types of connecting pairing elements: lower pairs and higher pairs. Lower pairs have surface contact between mating elements and higher pairs have line or point contact.

<table>
<thead>
<tr>
<th>Kinematic Pair</th>
<th>Symbol</th>
<th>Joint DOF</th>
<th>Rotational</th>
<th>Translational</th>
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<tr>
<td>Revolute</td>
<td>$R$</td>
<td>1</td>
<td>1</td>
<td>0</td>
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<tr>
<td>Prismatic</td>
<td>$P$</td>
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<td>1</td>
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<tr>
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<td>$C$</td>
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<td>1</td>
<td>1</td>
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<tr>
<td>Helical</td>
<td>$H$</td>
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<tr>
<td>Spherical</td>
<td>$S$</td>
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<td>0</td>
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<td>Plane</td>
<td>$E$</td>
<td>3</td>
<td>1</td>
<td>2</td>
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<tr>
<td>Gear Pair</td>
<td>$G$</td>
<td>2</td>
<td>1</td>
<td>1</td>
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<tr>
<td>Cam Pair</td>
<td>$C_p$</td>
<td>2</td>
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</table>

**Figure:** Eight frequently used kinematic pairs
Mechanism Links

A link is called a binary link if it is connected to only two other links, a ternary link if it is connected to three other links, a quaternary link if it is connected to four other links, and so on. A joint is called a binary joint, if it connects only two links, and a multiple joint, if it connects more than two links.

Figure: Types of links (a) binary, (b) ternary, (c) quaternary