

# **Mechanism and Machine Theory**

# Introduction

## 0.1 Study Object

### 1. Definition

Mechanism and Machine Theory (MMT)  
= Theory of Machines and Mechanisms (TMM)

### 2. Object

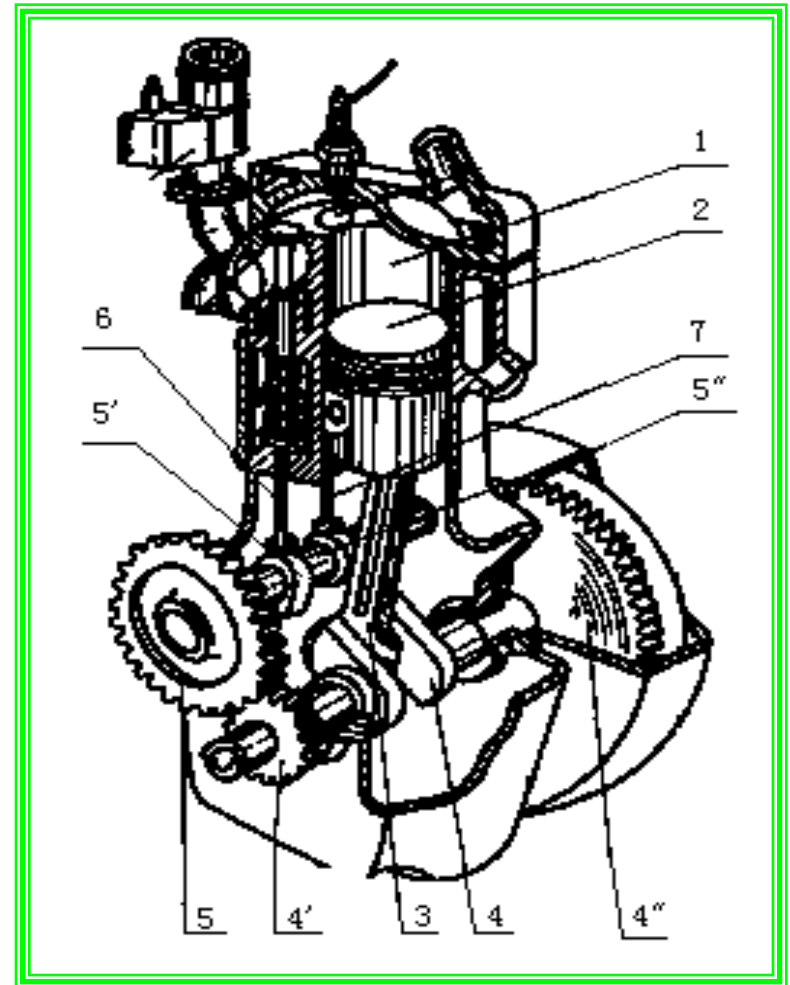
Machinery = Mechanisms + Machines

### 3. Concepts

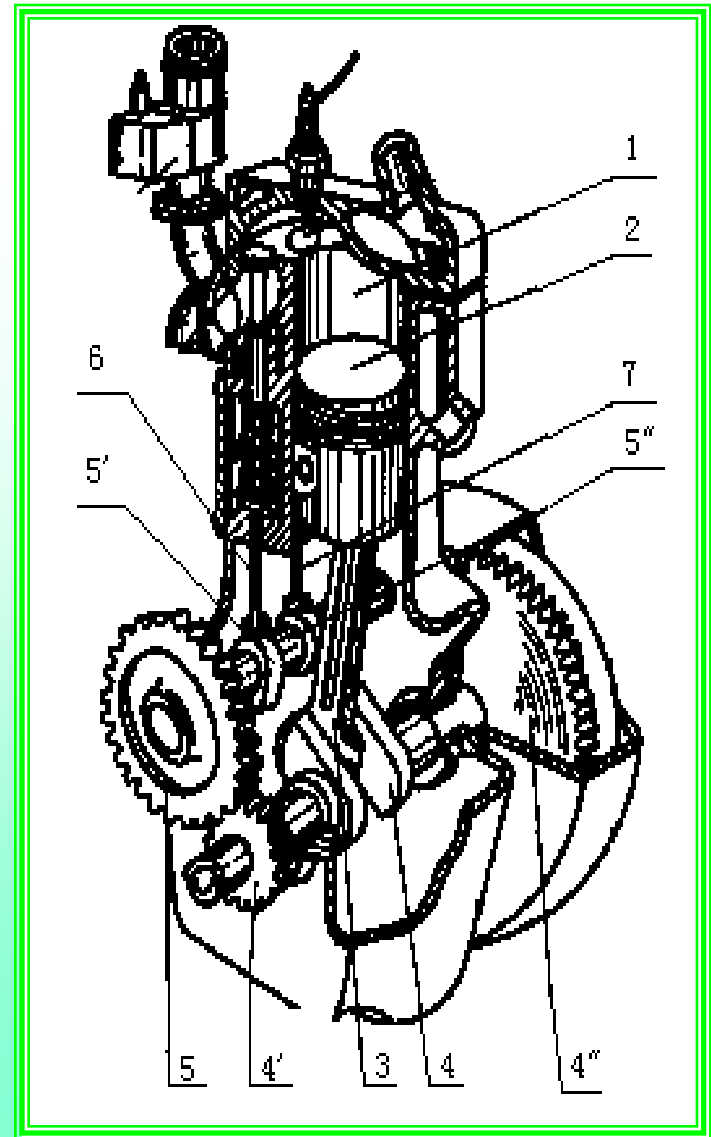
#### 1) Machine

e.g.

Internal combustion engine



- 1 Cylinder
- 2 Piston
- 3 Coupler
- 4 Crank
- 4' Pinion
- 4'' Flywheel
- 5 Gear
- 5' Inlet cam
- 5'' Outlet cam
- 6 Inlet valve
- 7 Outlet valve



# Characteristics:

- (1) It is a composition of **links**.
- (2) There is a **determined relative motion** between links.
- (3) It can transform or transmit **energy**.

## ☆ **Machine:**

It is a system of links that can accomplish determined motion and transform energy.

# Classification

Two kinds of machine:

- ◆ **Working machine** : Machine tool
- ◆ **Generator**: Internal combustion, electric motor

2) **Link**—Motion element (rigid construction)

e.g. Crank 4+4'+4"; Gear 5+5'+5"

Including: Driving (input) link

Driven (output) link

Frame

Different with:

Machine element—Manufacturing element

e.g. Coupler 3: body, nut, bolt,...



### 3) Mechanism

#### ● **Definition:**

A composition of links that can accomplish determined motion.

The difference between **mechanism** and **machine** is: **Whether it transforms or transmits energy.**

#### ◆ **Mechanism:** (internal part)

Construction, kinematics, dynamics properties

#### ◆ **Machine:** (external part)

Transformation of energy



## **0-2 Study Content**

1. Construction, kinematics, dynamics
2. Analysis and synthesis (design)
3. Linkage, cam, gear, etc.

# 0-3 Development of MMT

## 1. IFToMM

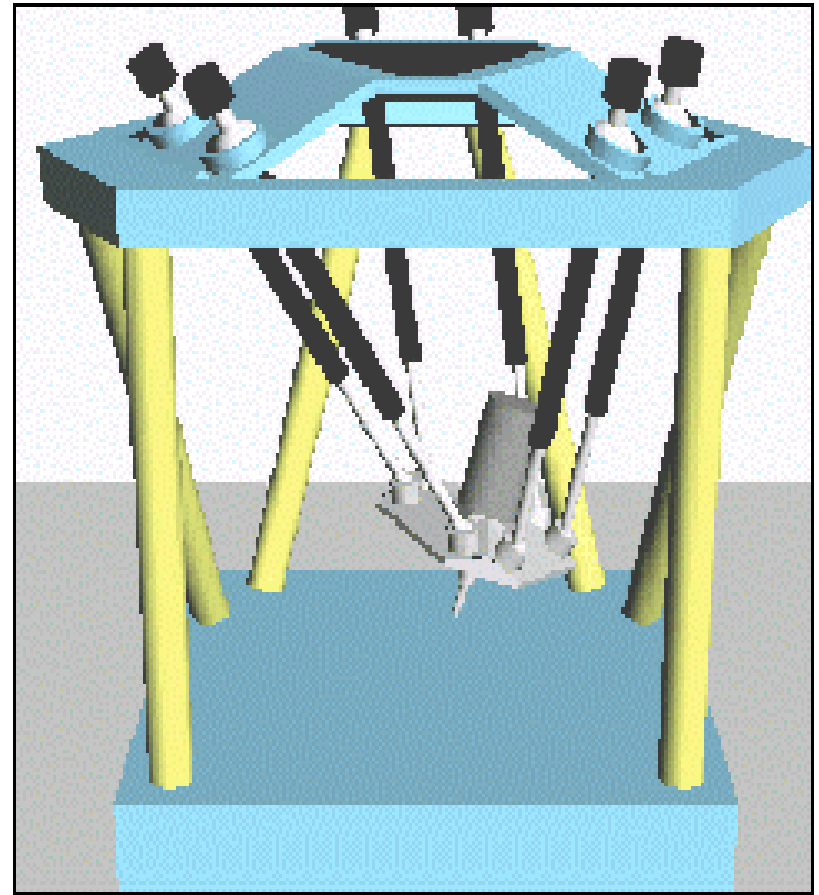
(International Federation for Theory of Machines and Mechanisms)

## 2. Kinematics and Dynamics

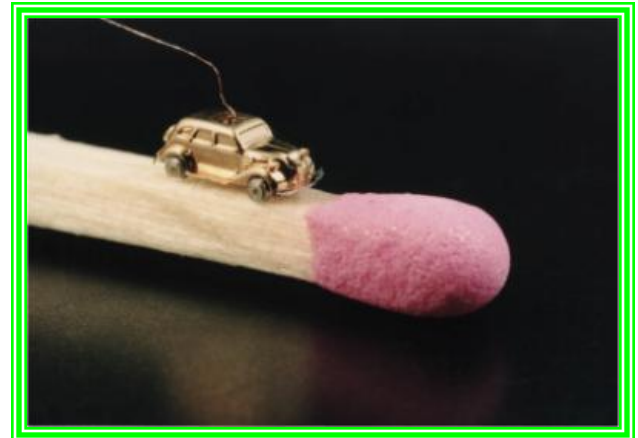
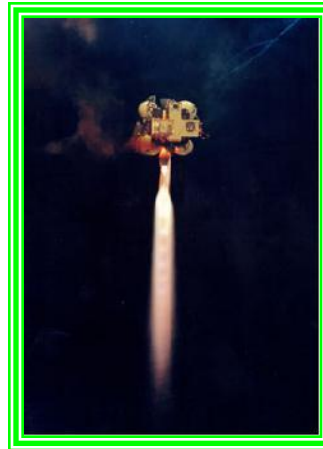
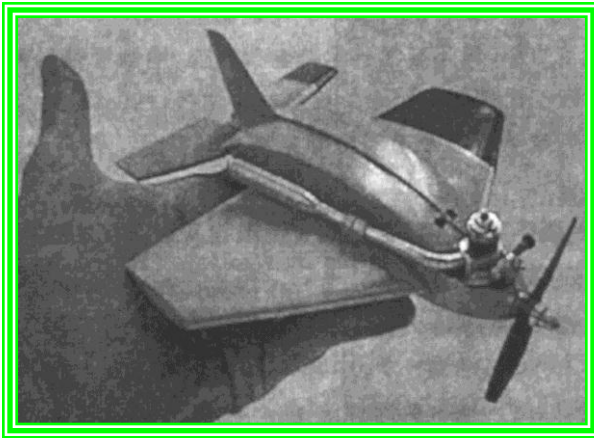
(High speed, precision, efficiency, etc.)

### 3. Robot

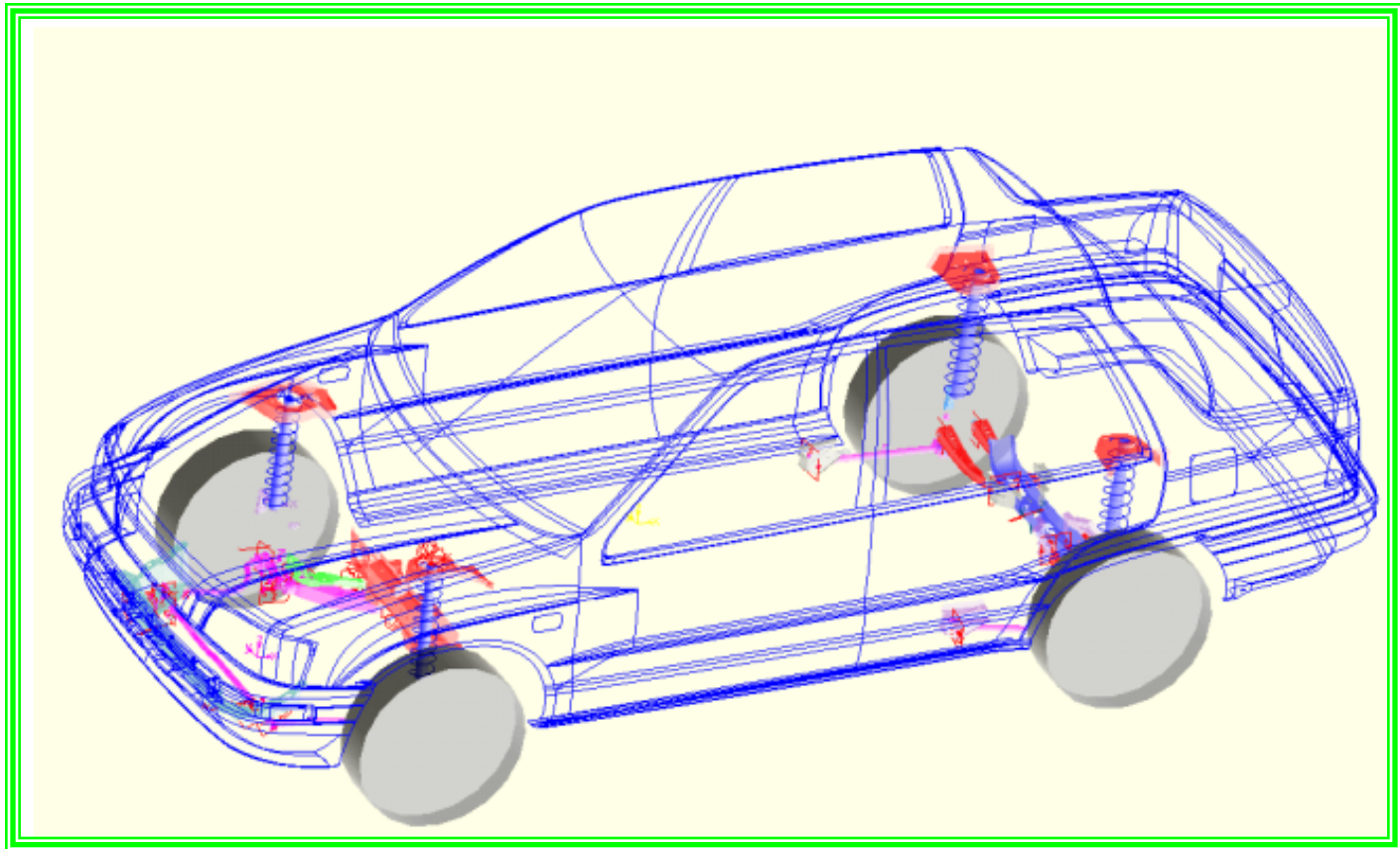
(Manipulator, Parallel machine tool)



## 4. Micro Engine of Mechanical System ( $\mu\text{m}$ , $\text{nm}$ )



## 5. Car Design and Simulation



# Needs Basic Course

Basic courses

Mathematics, Physics,  
Mechanics, etc.

Basic courses  
for specialty

**MMT**  
Machine Element

Courses for  
specialty

Mechanical Design,  
Mechanical  
Manufacturing,...

A silver metal spiral binding is visible along the left edge of the page, with the wire looping through a series of holes in the paper.

**THANK YOU**