Hettich Hinge Watt I 6-bar Mechanism
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Zero-dof (or less) Structures

Statically Determinate Structure

Statically Indeterminate Structure
One-dof Mechanisms

4-Bar Mechanism

Offset Slider-Crank Mechanism

Spur Gear Mechanism

Cam-and-Follower Mechanism
The Four Slider-Crank Mechanism Inversions

Slider-Crank Mechanism Inversion 1

Slider-Crank Mechanism Inversion 2

Slider-Crank Mechanism Inversion 3

Slider-Crank Mechanism Inversion 4

Two Mechanisms with Slotted-Pin Joints

Scotch-Yoke Mechanism

Geneva Wheel Mechanism
Geared 5-Bar Mechanism vs. 5-Bar Robot

Geared 5-Bar Mechanism

2-dof 5-Bar Parallel Robot
4-Bar Rolling Mechanism

Dual-Slider Mechanism

Pantograph Robot

Ratchet Mechanism

Toggle Mechanism
Five Straight-Line Mechanisms

Watt Straight-Line Mechanism (approximate)

Roberts Straight-Line Mechanism (approximate)

Chebyshev Straight-Line Mechanism (approximate)

Peaucellier Straight-Line Mechanism (exact)

Scott-Russell Straight-Line Mechanism (exact)
Three Quick-Return Mechanisms

Crank-Shaper Quick-Return Mechanism

Whitworth Quick-Return Mechanism  Drag-Link Quick-Return Mechanism
5-bar Slotted Mechanism

5-bar Slotted Slider Mechanism

6-bar Mechanism

6-bar Single-Slider Mechanism

6-bar Crank Dual-Slider Mechanism

6-bar Crank Triple-Slider Mechanism
The Five Classical 6-Bar Mechanisms

Stephenson I 6-Bar Mechanism

Stephenson II 6-Bar Mechanism

Stephenson III 6-Bar Mechanism

Watt I 6-Bar Mechanism

Watt II 6-Bar Mechanism
Some Real-World 4-Bar Mechanisms

- 4-Bar Clamp Mechanism
- 4-Bar Film-Advance Mechanism
- 4-Bar Aircraft Carry-on Bin Mechanism
- 4-Bar Bass Drum Pedal Mechanism
- 4-Bar Conveyor Transfer Mechanism
- Dual 4-bar Balance Scale Mechanism
- 4-Bar Knee Prosthesis
- 4-Bar Crane
- 4-bar Horsehead Pump
Some Real-World 4-Bar Mechanisms (cont.)

How does an Oscillating Fan work

4-Bar Oscillating Fan Mechanism

4-Bar Trashcan Mechanism
Some Real-World Slider-Crank Mechanisms, all 4 inversions

4-Stroke Internal Combustion Engine Mechanism
S-C Inversion 1

Whitworth Mechanism
S-C Inversion 2

MacPherson Strut Mechanism
S-C Inversion 3

Pump Mechanism
S-C Inversion 4
Some Real-World Slider-Crank Mechanisms (cont.)

Air Compressor Mechanism
S-C Inversion 1

Engine Hoist Mechanism
S-C Inversion 3
Real-World Geared 5-Bar Mechanism

Overhead Traveler Braking Geared 5-Bar Mechanism
Some Real-World 6-Bar Mechanisms

6-bar Car Hood Mechanism

6-bar Lift Mechanism

6-bar Window Mechanism

6-bar Dump Truck Mechanism

6-bar Rock Crusher Mechanism

6-bar Sewing Machine Mechanism
Some Real-World 6-Bar Mechanisms (cont.)

6-bar Watt Steam Engine Mechanism      Dual 6-bar Mechanism Collapsible Music Stand

6-bar Leg Press Mechanism               6-bar Drum Brake Mechanism
Some Real-World 7-Bar Mechanisms

7-bar Car Window Mechanism

7-bar Car Jack Mechanism

7-bar Ross Stirling Engine Mechanism

7-bar Grabber/Extender Compound Mechanism
Some Real-World 8-Bar Mechanisms

8-bar Scissor-Lift Mechanism

8-bar Robot Gripper Mechanism

8-Bar Straight-Line Transfer Mechanism
Multi-dof Robots

3-dof 8-bar Desk Lamp Robot

2-dof 9-bar Front-End Loader Robot

3-dof 3-RRR Parallel Robot

3-dof 3-RPR Parallel Robot
Planar 3-dof Robot        Adept 4-dof SCARA Robot

Mitsubishi 5-dof Robot        PUMA 6-dof Robot

NASA 8-dof ARMII Robot        3-dof Carpal Wrist Robot
Real-World Mechanisms / Kinematic Diagrams

4-bar Glider-Rocker Mechanism

Bicycle/Human Leg 4-bar Mechanism (lock ankle)

Hettich Hinge Watt I 6-bar Mechanism

Mountain Bike Rear Suspension Mechanism
MATLAB Simulation/Animation Gallery

All of the following MATLAB graphics/animations were created by Dr. Bob at Ohio University. These are presented according to the Ohio University course they support.

ME 3011 Kinematics & Dynamics of Machines and Introduction to Vibrations

Four-Bar Mechanism

Open Branch

Crossed Branch

Slider-Crank Mechanism

Right Branch

Left Branch
Slider-Crank Mechanism, Inversion 2

Geared Five-Bar Mechanism

Ross-Yoke Stirling Engine Mechanism

Involute Gear Tooth Construction
Gearbox Simulation          Planetary Gear Train Simulation

Cam/Follower Animation
Mechanical Vibrations

1-dof m-k Vibrational System, Undamped Simple Harmonic Motion, Rotating Phasors

1-dof m-k Vibrational System, Underdamped Response with Phase Plot
1-dof Pendulum Vibrational System, Simple Harmonic Motion with Phase Plots

1-dof Pendulum Vibrational System, Simple Harmonic Motion with Energy Plot
Planar 3R robot snapshot

Initial Robot Pose     Final Robot Pose

Planar 4R Kinematically-Redundant Robot Resolved-Rate Control Simulation
Spatial 4R Kinematically-Redundant Robot Resolved-Rate Control Simulation

Adept 550 4-dof SCARA Robot MATLAB Simulation/Animation
Inverse Pose Kinematics Snapshot
(male left, female right)

Human Elbow/Biceps/Triceps Dynamic Simulation (male left, female right)