Part I: Overview of the history of machines, mechanisms, kinematics

Machines: Primarily used in war machinery

Also toys, magic

Vitruvius: Roman Architect, reported on a variety of mechanisms used at that time. Emphasis on the wooden lever (Emphasis on Civil eng. And War)

200 BC

62 AD

Greek Philosophers:

Speculated on nature of mechanics as well as other topics.

Archimedes 200BC: Early contributer to mechanics and mechanisms
Catapaults, pump, pulleys "could lift the world if only given a place to stand"

28 BC

Hero of Alexandria: Catalogs five-primary elements of machinery: 1) lever, 2) windlass, 3) Screw, 4) Wedge, 5) Pulley Machines: Began to find use in agriculture. Harnessing wind power

200 AD 1200 AD

ME 3610 Course Notes, S. Canfield Part I - 2

Machinery and Documentation comes into vogue

Leapold: First to systematically classify machines according to motion components (modify motion)

15th Cent

1670

Leonardo da Vinci:

Famed for invention and art

1600

Galileo: Led to the understanding of motion Experimentalist and Thought experiments

Newton: Formalized laws of motion, gravity law

Watt: Synthesis of motion: First to look at motion of intermediate links (coupler pt. motion) Built double-acting steam engine, engine governor Machines: Mechanism design comes of age

Ampere: 1834 Coins the name, kinematics (Cine'matique, Kinematik) and defines it

Peaucellier: 1864 First true straight-line mechanism

Johann Bernoulli: Developed method of Instant Center

1742

1784

Monge 1806: 1st course on Machine elements/kinematics at Ecole' Ploly technique (founder of this University, first in Europe)

Willis: 1841 "Principles of Mechanics" Gave a systematic approach to the design of mechanisms

1736 -1819

Euler: 1) kinematic anaysis

- 2) motion: translation and rotation
- 3)Separated study into kinematics and dynamics

1806

Coriolis: W=F*d

Hatchette 1811: "First" kinematics text, classified mechanisms by their function in chart form

Chasles, Poinsot: Advanced development on motion of bodies, Screw theory

ME 3610 Course Notes, S. Canfield

Machines: Machine design comes of age

Franz Reuleaux: 1875 "Theoretishe

Kinematik"

Father of our current methods for

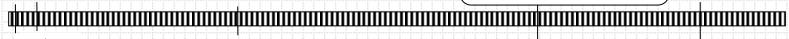
kinematics

Motion constraints, surfaces

Grubler's Equation 1883

Chebyshev: 1890 Russian

kinematician



19th century

Burmester, Mehmke, Mohr

1880's German kinematicians, develop synthesis and analysis techniques (V&A polygons, etc)

ME 3610 Course Notes, S. Canfield Part I - 5

Modern Kinematics

Denavit & Hartenberg 1964 Symbolic notation, Formulation for serial robots Duffy, McCarthy: Spherical mechanisms

Optimization in Mechanisms

20th century

Freudenstein: 1950's "Father of Modern Kinematics" Applies numerical techniques to solve kinematic problems.

Freudenstein and Sandor: Dimensional synthesis

> Kota and Howell: Compliant Mechanisms, MEMS mechanisms

ME 3610 Course Notes, S. Canfield Part I - 6