

INNOVATION IN TEACHING AND LEARNING

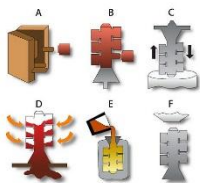
Demonstration using Animation

Subject: Manufacturing Processes

Faculty: Dr. Munish Chhabra

Topic: Investment Casting and Pressure die casting processes

Briefing: Animated videos have been used to explain the process of investment casting and Pressure die casting processes such as hot chamber and cold chamber die casting processes. It helps students to visualize the step by step procedure of these processes and to clear the working principle of these manufacturing processes.



Investment casting process <https://www.youtube.com/watch?v=Ir5WyrT6qx0>

Die casting process https://www.youtube.com/watch?v=1543I_5XMJo

Practical Explanation of Sheet punching process and Jig-Fixture in class room

Subject: Manufacturing Processes

Faculty: Dr. Munish Chhabra

Topic: Working of sheet punching process and Jig-Fixture using paper punching machine

Briefing: Paper punching machine has been used to explain sheet metal punching process and also to explain the working of Jig-Fixture elements such as location, position and tool guiding. It helps students to understand these operations practically within the class room.



Demonstration using Simulation

Subject: Computer Aided Manufacturing

Faculty: Dr. Munish Chhabra

Topic: CNC Part programming of Milling and Turning operations (Fanuc based controller)

Briefing: MTAB simulation software (Fanuc based controller) has been used for teaching programming of CNC Milling and Turning operations. It helps students to learn programming methods effectively and provide platform to visualize the virtual machining steps within the classroom.

Simulation of CNC Turning operations: https://www.youtube.com/watch?v=Rm_2zCvgnAw&t=5s

Demonstration using Animation and Video

Subject: Manufacturing Processes

Faculty: Dr. Munish Chhabra

Topic: Welding Distortion & Welding Joints

Welding distortion: <https://www.youtube.com/watch?v=2vuGlcDwKY>

Welding Joints: <https://www.soldamatic.com/welding-joints/>

Welding Fixture using Industrial video: <https://www.youtube.com/watch?v=tRuqb6wquig>

Demonstration using Virtual Laboratory

Subject: Material Engineering

Faculty: Mr. Sandeep Kumar

Topic: Tensile strength of materials

Briefing: Virtual laboratory have been used to explain the process of Tensile strength testing of any Material.

Link: <https://www.youtube.com/watch?v=cE4Mw9GsdHY>

Demonstration using Animation

Subject: Mechatronics

Faculty: Mr. Sandeep Kumar

Topic: Operational Amplifier

Briefing: Animated videos have been used to explain the working of Operational amplifiers. It help students to visualize the step by step procedure and working of Amplifiers.

Link: https://www.youtube.com/watch?v=_o4ScgRZtNI

Demonstration using Animation

Subject: Mechatronics

Faculty: Mr. Sandeep Kumar

Topic: Transistors

Briefing: Animated videos have been used to explain the working of Transistors. It helps students to visualize the step by step procedure and working of Transistors.

Link: https://www.youtube.com/watch?v=Bine_PbyFSQ

Demonstration using project-based learning

Subject: Material Engineering

Faculty: Mr. Sandeep Kumar

Topic: Composite Materials

Briefing: Glass fiber reinforced epoxy composites made by students in Material testing lab which help students in better understanding the fabrication of composites.

Demonstration using Animation video

Subject: Theory of Machine

Faculty: Mr. Pravesh Chandra

Topic: Quick return Mechanism

Briefing: Animated video has been used to explain the quick return mechanism. It helps the students how each link is attached to pair and how the link transmitting the motion. Students not only visualize but also clarify why the mechanism is called Quick return Mechanism.

<https://youtu.be/s3G3au-EyAQ>

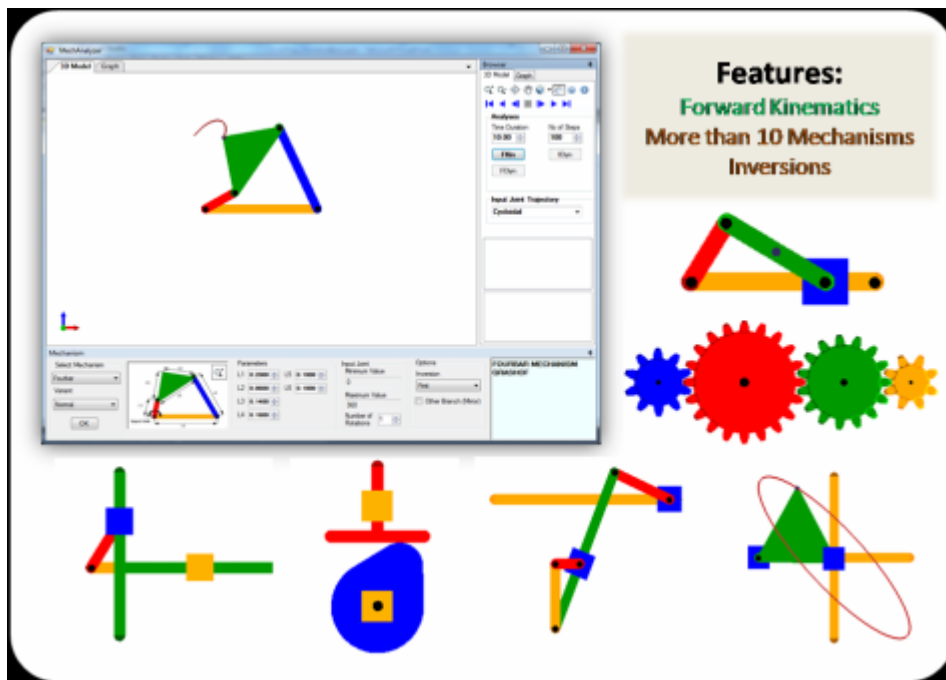
Demonstration using Simulation

Subject: Theory of Machine

Faculty: Mr. Pravesh Chandra

Topic: velocity analysis and to analyze different types of mechanisms.

Briefing: MechAnalyzer is a 3D model-based software is used to do velocity analysis and for analysing different types of mechanism like slider crank mechanism, scotch yoke mechanism cam and follower mechanism etc. Students will able to quick and better understanding through visualization.



Demonstration using Equipment (Shaper Machine)

Subject: Theory of Machine

Faculty: Mr. Pravesh Chandra

Topic: Quick return Mechanism

Briefing: How Quick return Mechanism is worked in shaper machine is shown to student in **machine shop lab**. It helps the students how each link is attached to pair and how the link transmitting the motion. After seeing the live application of quick return mechanism in shaper machine students able to know, why this Mechanism is important and how is it working.



Demonstration through models

Subject: Theory of Machine

Faculty: Mr. Pravesh Chandra

Topic: Inversion of Mechanism

Briefing: All the inversion of four bar mechanism and slider crank mechanism are demonstrated through the working model available in the **Mechanics of Machine Lab**. By demonstration through this models students will clearly able to see which link is fixed and how the chain is behaving after fixing the link one by one.

Demonstration using Animation and Simulation

Subject: Fluid Machinery

Subject Code: NME-021

Session-2017-18

Faculty: Mr. Deepak Singh

Topic: Impact of Jet (Force exerted by a jet on a fixed vertical Plate)

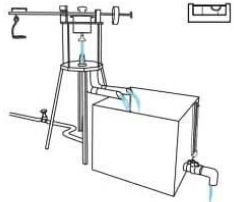
Briefing: Animation and Simulation have been used to explain the way of find the amount of force applied by a jet of diameter (d) on a fixed vertical plate in the direction of motion of jet. It helps students to understand the working principle step by step and find out the amount of force on different parameters at different condition.

Simulator

IMPACT OF JET ON VANES

STEP 5 Open the inlet valve and bring the bubble to centre in spirit level using the counter balance.

TRIAL : 2



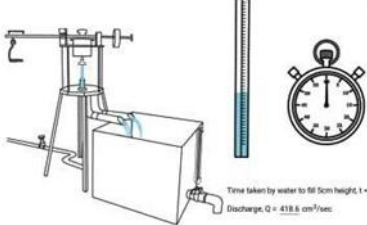
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Simulator

IMPACT OF JET ON VANES

STEP 6 Close outlet valve and find discharge by noting the time taken by water to fill certain height in the collecting tank.

TRIAL : 1



Time taken by water to fill 5cm height, $t = 4.3$ sec
Discharge, $Q = 418.6 \text{ cm}^3/\text{sec}$

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Simulator

IMPACT OF JET ON VANES

Calculation:

For Flat vane:

Velocity of jet, $V = \frac{Q}{A} = 3.41 \text{ cm/sec}$

Theoretical force, $F_{th} = \rho AV^2 = 1.429 \text{ N}$

Actual force, $F_{act} = \frac{W \times b}{a} = 1.145 \text{ N}$

Coefficient of impact, $C_1 = \frac{F_{act}}{F_{th}} = 0.801$

Observations

TRIAL : 1

Length of channel = 60cm
Breadth of channel = 60cm
Area of collecting tank = 3600cm²
Diameter of nozzle, $d = 1.25 \text{ cm}$
Area of the nozzle, $A = 1.2266\text{cm}^2$
Discharge of water, $Q = 418.6\text{cm}^3/\text{sec}$
Density of water, $\rho = 1\text{g/cm}^3$
Distance $a = 13.5\text{cm}$
Distance $b = 63\text{cm}$
Weight on the pan, $W = 25\text{g}$

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Demonstration using Animation and Simulation

Subject: IC Engine & Compressor

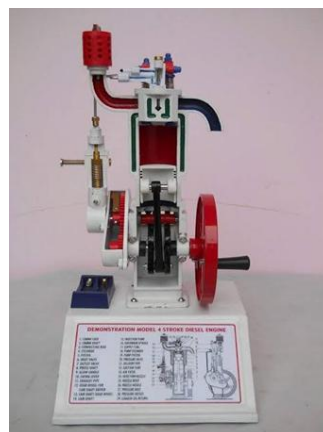
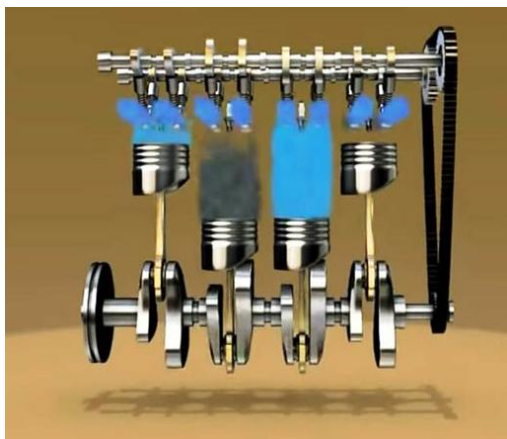
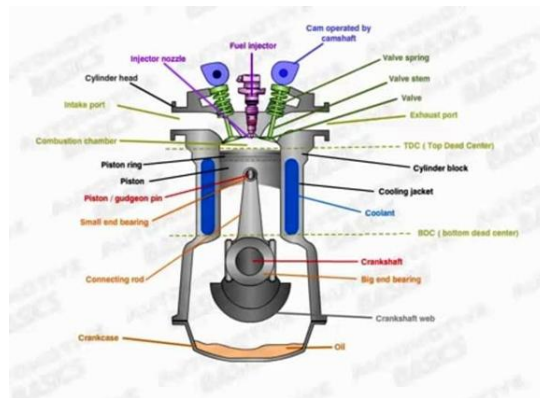
Subject Code: NME-505

Session-2017-18

Faculty: Mr. Deepak Singh

Topic: Working of 4-Stroke CI Engine

Briefing: Animation and Simulation have been used to explain the working of 4-Stroke Compression ignition engine. With the help of animation students become able to understand that how air is entered in the cylinder and various processes like compression, expansion and exhaust occurs in a CI engine. It helps students to understand the step by stem working of compression ignition engine.



Demonstration using self-recorded video from the automobile workshop.

Subject: Automobile Engineering

Faculty: Mr. Prashant Singh

Topic: configuration of clutch

Briefing: To show the actual configuration of clutch, a video has been recorded at an automobile workshop in which various components of clutches shown to the students.

Demonstration using Animation

Subject: Automobile Engineering

Faculty: Mr. Prashant Singh

Topic: Automobile Transmission System

Briefing: Animated videos have been used to explain the working of transmission system of a typical Automobile. Working of different parts like clutches, torque convertor, manual transmission system, automatic transmission system, universal joint, differential gear mechanism, etc.

[How Car Transmission System Works - YouTube](#)

[Clutch, How does it work? - YouTube](#)

[Learn How a Clutch Works - Basic Clutch Operation and Tips - YouTube](#)

[Torque Converter, How does it work? - YouTube](#)

Demonstration using Animation

Subject: Automobile Engineering

Faculty: Mr. Prashant Singh

Topic: Braking System of an automotive

Briefing: Through the series of videos the component and types of breaking like mechanical and hydraulic breaking have been demonstrated to the students. Some key technologies such as antilock braking system (ABS) and electronic break force distribution (EBD) were also demonstrated to the students through animated videos.

<https://youtu.be/wCu9W9xNwtI>

https://youtu.be/u_y1S8C0Hmc

Demonstration using Animation

Subject: Automobile Engineering

Faculty: Mr. Prashant Singh

Topic: Chassis and suspension system

Briefing: Animated videos have been used to demonstrate the automobile chassis overview and Suspension system in which suspension system along with its functions and components have been shown.

<https://youtu.be/AVsBgoU88MU>

Demonstration using Magazine Article

Subject: Renewable Energy Resources

Faculty: Mr. Prashant Singh

Topic: Geothermal and Ocean energy scenario in India

Briefing: Topic has been elaborated with the help of technical article written by Dr. Anubhav Uppal in a magazine named “YOJANA” published by the Ministry of Information and Broadcasting.

https://drive.google.com/file/d/1kGyaLpUWaJAhVA2GgUOL96bS_Pb4A5Ex/view?usp=drivesdk

Demonstration using Research Article

Subject: Renewable Energy Resources

Faculty: Mr. Prashant Singh

Topic: Role of Renewable energy resources

Briefing: The key aspects of Indian energy scenario like energy deficit, energy inequity and threats to energy security has been discussed with the students by using the article. The article is published by Mr. Rhythm Singh in Renewable and Sustainable Energy Review Journal.

<https://drive.google.com/file/d/1IscYbdYEKbXMIgFhkrmNGNVbk0bEacCl/view?usp=drivesdk>

Demonstration using Research Article

Subject: Renewable Energy Resources

Faculty: Mr. Prashant Singh

Topic: Energy sufficiency aspirations of India and the role of renewable resources

Briefing: By the paper published by Professor Mala Ramesh and Rajeshwer Prasad Saini from the department of Hydro and Renewable, Indian Institute of Technology Roorkee, the feasibility of hybrid renewable energy system has been discussed with the students.

https://drive.google.com/file/d/1hX0bxiguCUSWu0MBYCIrUgr8Jm6ueD_f/view?usp=drivesdk

Demonstration using Animation and Simulation

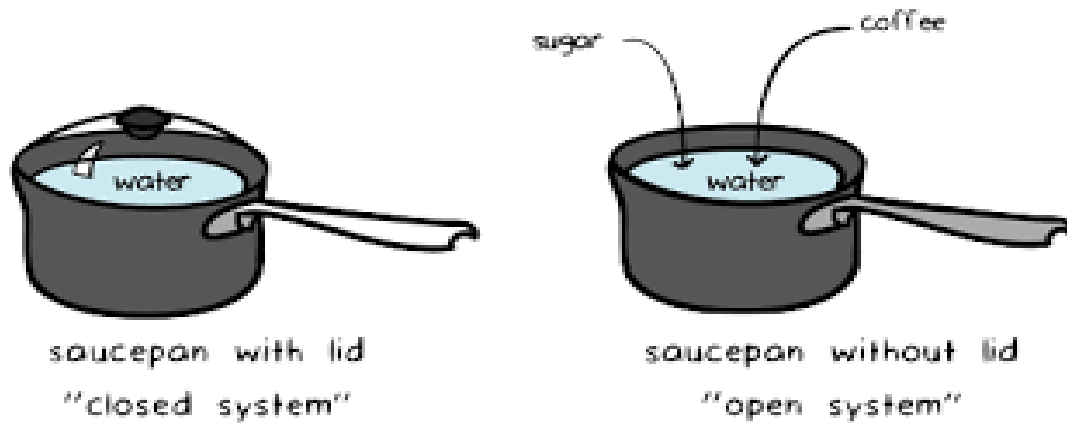
Demonstration through real life examples with photographs

Subject: Thermodynamics

Faculty: Mr. Rakesh Kumar Gangwar

Topic: Open system, Closed system and Isolated System

Briefing: Real world pictures are used to explain the open, closed and isolated system. It helps students to understand the topic easily.

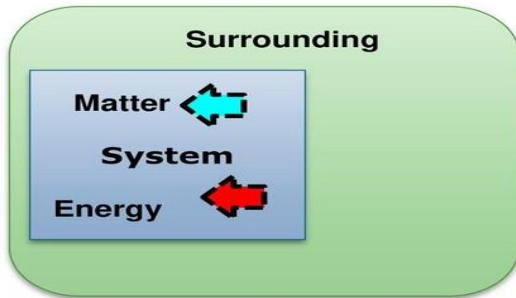


Isolated System

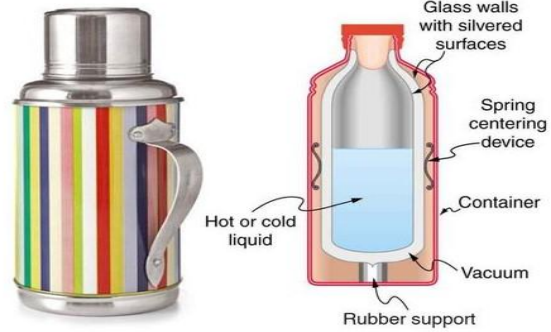


Definition: An **isolated system** can exchange neither energy nor matter with its surroundings.

How does it work?



Example:



Demonstration through real life photographs

Subject: Refrigeration and Air Conditioning

Faculty: Mr. Rakesh Kumar Gangwar

Topic: Vapour Compression refrigeration cycle

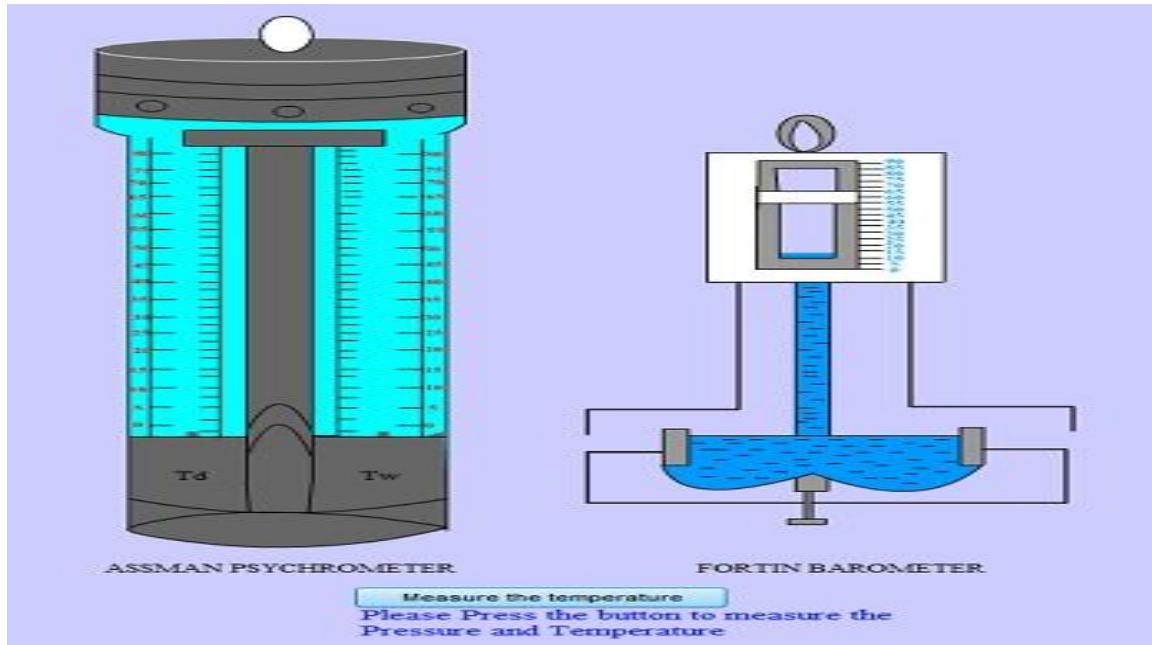
Briefing: Real world pictures are used to explain the vapour compression refrigeration cycle. It helps students to understand the vapour refrigeration cycle easily.



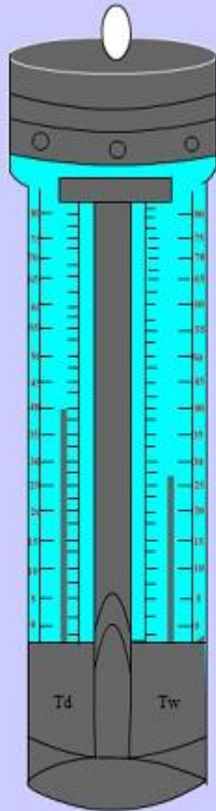
Demonstration using Animation and Simulation

Topic: Psychrometric

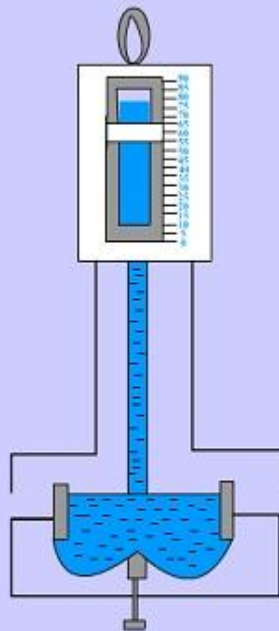
Simulation software has been used to explain and estimate the psychrometric properties. It helps students to understand the psychrometric properties and also learn virtually, how to calculate psychrometric properties.



The simulation interface shows the Assman Psychrometer and Fortin Barometer on the left. On the right, there is a section titled 'Temperature Readings. For Calculating Psychrometric property'. It contains three input fields: 'DryBulbTemp' with the value '37' and unit 'Cen', 'WetBulbTemp' with the value '30' and unit 'Cen', and 'BaroMeter Pressure' with the value '100' and unit 'KPa'. Below these fields is a text prompt: 'Press the button to calculate the psychrometric properties' and a 'Calculate' button. In the top right corner, there is a red 'CLOSE' button. At the bottom right, there is a box titled 'Range of Temp. and Pressure' containing the following text: 'Range of DryBulb Temp, WetBulb Temp and Barometer Pressure: DryBulb Temp: 25 degree to 39 degree, WetBulb Temp: 20 degree to 30 degree, Barometer Pressure: 99KPa to 103KPa'.



ASSMAN PSYCHROMETER



FORTIN BAROMETER

Temperature Readings.
For Calculating Psychrometric property

DryBulbTemp Cen

WetBulbTemp Cen

BaroMeter Pressure KPa



Vapour Pressure KPa

Moisture Content g/Kg

Specific Volume m³/Kg

Density Kg/m³

Enthalpy KJ/Kg

Sigma Heat KJ/Kg

Relative Humidity %

Dew Point Temp Cen

Want to Measure again for different place please reset it

Range of Temp. and Pressure

Range of DryBulb Temp, WetBulb Temp and Barometer Pressure:
 DryBulb Temp: 25 degree to 39 degree
 WetBulb Temp: 20 degree to 30 degree
 Barometer Pressure: 99KPa to 103KPa

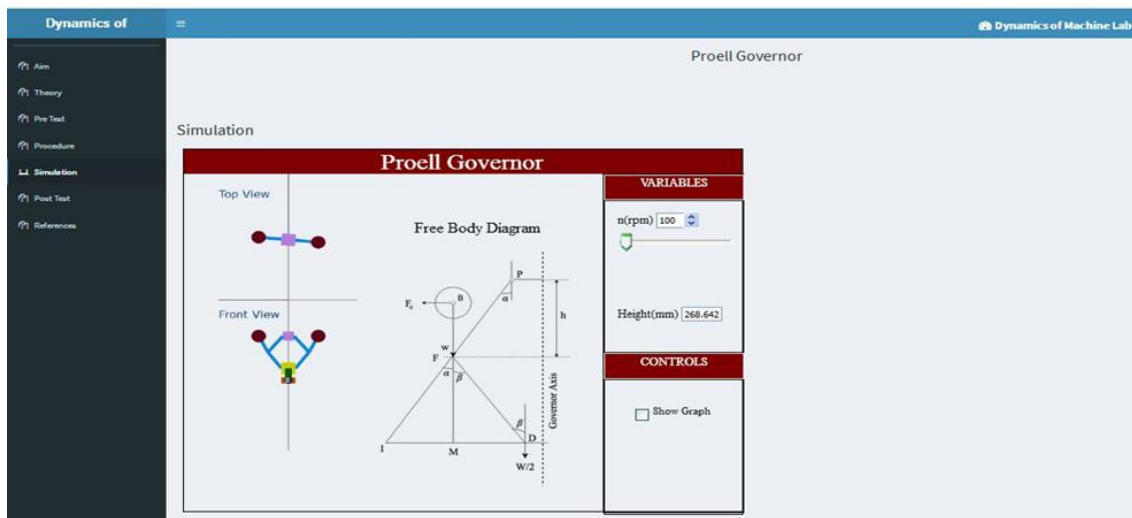
Demonstration using Animation and Simulation

Subject: Theory of Machines

Faculty: Mr. Atul Sharma

Topic: Dynamic Analysis, Controlling of Governor

Briefing: Animation and Simulation have been used to explain the controlling of different governor and dynamic analysis of different kinematic mechanism. It helps students to understand the working principle step by step and analyze different parameters at different condition.



Proell Governor

Simulation

Top View

Front View

Free Body Diagram

VARIABLES

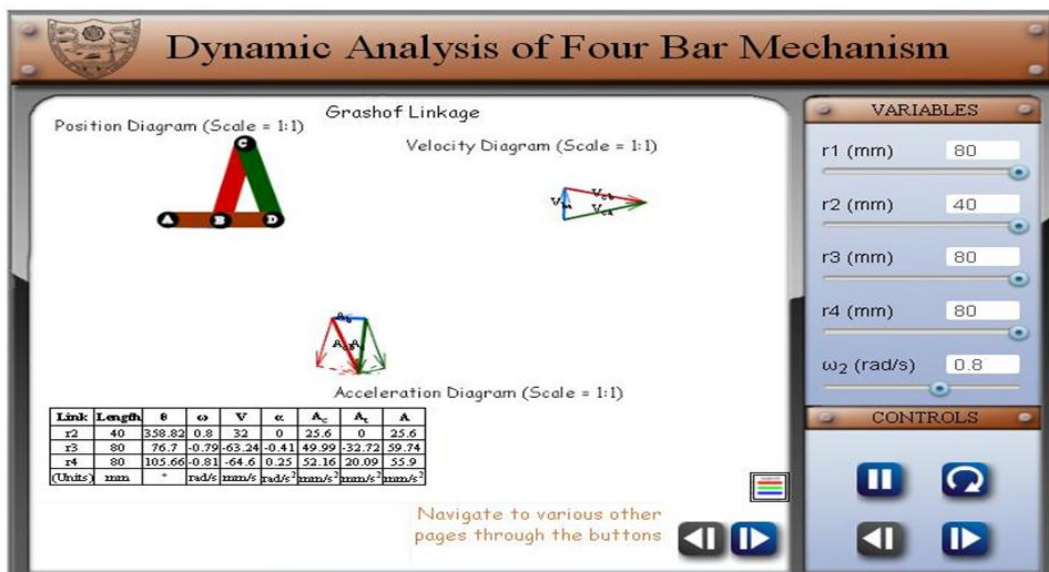
n(rpm) 100

Height(mm) 268.642

CONTROLS

Show Graph

Simulation



Dynamic Analysis of Four Bar Mechanism

Grashof Linkage

Position Diagram (Scale = 1:1)

Velocity Diagram (Scale = 1:1)

Acceleration Diagram (Scale = 1:1)

Link	Length	θ	ω	V	α	A_c	A_t	A
r2	40	358.82	0.8	32	0	25.6	0	25.6
r3	80	76.7	-0.79	-63.24	-0.41	49.99	-32.72	59.74
r4	80	105.66	-0.81	-64.6	0.25	52.16	20.09	55.9

(Units) mm ° rad/s mm/s rad/s² mm/s² mm/s² mm/s²

VARIABLES

r1 (mm) 80

r2 (mm) 40

r3 (mm) 80

r4 (mm) 80

ω_2 (rad/s) 0.8

CONTROLS

Navigation buttons: Play/Pause, Previous, Next, Home, End

Navigate to various other pages through the buttons

Demonstration using Animation and Simulation

Subject: Fluid Mechanics

Faculty: Mr. Atul Sharma

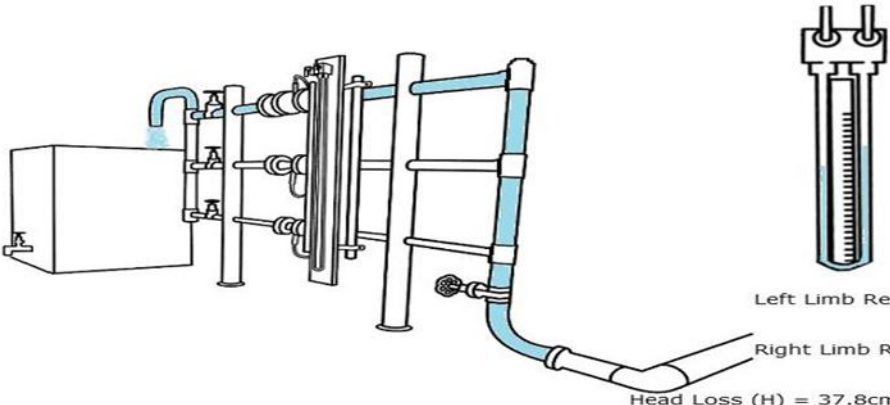
Topic: Application of Bernoulli's equation, Flow through pipes

Briefing: Animation and Simulation have been used to explain the flow of liquid in pipes in different application of Bernoulli's equation and continuity equation. It helps students to understand the working principle step by step of flow of liquid and analysis of flow parameters at different condition.

VENTURIMETER

STEP 3 The knob is then kept in the read position and note down the manometer reading.

TRIAL : 1



Left Limb Reading (LL) = 37cm
Right Limb Reading (RL) = 34cm
Head Loss (H) = 37.8cm

V

VENTURIMETER

Observations

TRIAL : 1

$d_1 = 5\text{cm}$
 $d_2 = 2.72\text{cm}$
Area $A_1 = 19.625\text{cm}^2$
Area $A_2 = 5.81\text{cm}^2$
Area of collecting tank (A) = 6750cm^2
Rise (h) = 5cm
Time taken (t) = 21sec
Head Loss (H) = 37.80cm
Acceleration due to gravity (g) = 981 cm/sec^2

Calculations

$Q_{\text{act}} = \underline{1607.14\text{cm}^3/\text{sec}}$
 $Q_{\text{th}} = \underline{1656.494\text{cm}^3/\text{sec}}$
 $C_d = \underline{0.97}$

V

Demonstration using Animation and Simulation

Subject- Supply Chain Management (RME-072)

Faculty-Dr. Parul Gupta

Topics- Dabbawalas' Unique Supply Chain Model

Briefing- A case study has been discussed to explain supply chain performance of Mumbai Dabbawalas'.

<http://www.ideassonline.org/public/pdf/Dabbawalas-ENG.pdf>

Demonstration using Animation and Simulation

Subject- Power Plant Engineering

Faculty- Dr. Abhishek Saxena

Topic – Solar Power Plants

Briefing- A research article has been used to explain the solar radiation. It helps to students in understanding that what is the input energy to a solar power plant, how does it work and how do we select an appropriate geographical location for solar energy based power plants? Students took interest in that and got clear their fundamentals about solar energy as an input energy source to a thermal or electrical application.

Reference: *S. A. Khalil, Parameterization models for solar radiation and solar technology applications, Energy Conversion and Management 49 (2008) 2384-2391*