



The Physics of Theatre



How to break a system down into its component forces and then use that information to design motor systems, fluid power systems, and structure is the essence of the Physics of Theatre.

We have broken this project down into three sections...

I

Simple Linear Movement

Vector Forces & Power
Velocity & Acceleration
Mass & Weight
Static & Kinetic Friction
Static & Dynamic Loading
Inertia & Momentum
Rolling Friction
Torque
Force & the Rake
HP Calculations
PSI and GPM Calculations

II

Complex and Rotational Movement

Turn Tables
Pendulums
Star Trap Elevator Systems
Counterweight
SWL / WLL
Ultimate Breaking Strength
Shock Loading
Braking Systems
Mechanical Advantage
Forces on Sheaves & Bridles
Trajectory

III

Structure

Center of Gravity
Vertical & Lateral Loading
Load Distribution
Tension and Compression
Stress and Strain
X-Bracing
Sheathing
Guy Wires
Effective Bracing Angles
Leverage
Cantilever

Quantitative Research:

We are in the process of gathering funding and equipment to measure coefficients of friction for combinations of typical theatre materials, i.e. UHMW on masonite, waxed lauan on masonite, etc. With the same equipment we can measure various components of rolling friction, including the effects of different surface/wheel combinations, wheel deformation under load, the changes in that deformation as the wheel rolls, and the force necessary to roll through that deformation.

For further information:

The HP Calculator, the PowerPoint presentations on horizontal and vertical movement and additional information as it develops can be found at:

<https://netfiles.uiuc.edu/heermann/www/index.htm>

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