Linear Motion Components



Linear Bearings

- moving carriage
- moving shaft
- sleeve bearing
- rolling element bearing

Hygienic Considerations

- particulate generation
- cleanliness

Generating Linear Motion

- leadscrews (rotary to linear conversion)
- pneumatics

Pneumatic Systems

- Pneumatic power very popular in industry
 - High force, economical actuators
 - Force is independent of stroke
 - Non-flammable, compressible, storable medium
 - Compact, low heat production actuators
- Pneumatics best suited to discrete motion (not proportional)
- Energy costs of pneumatics are very high
 - ~\$0.005 / cu.ft. / year
 - 1" cylinder with 6" stroke once/sec=>\$392/year

Pneumatic System Layout



Air Compression



s://commons.wikimedia.org/wiki/File:ScrewCompressorCompression.webm

Air Preparation



Single-Acting Cylinder



Single-Acting Cylinder



Double-Acting Cylinder



Pneumatic Cylinder Mounting

- Off-axis loading must be prevented!
- Pivoting mounts can eliminate axial loading:
 - Clevis mount
 - Trunnion mount
 - Universal joints
- Shaft may rotate unless antirotation model is used

Trunnion Mount



Pneumatic Twin Cylinder



Grippers



Pneumatic Rotary Actuators



Pneumatic Schematics

Not actuated



Pneumatic Schematics

Actuated



Vacuum Pickups



