BUSI/ENGR 3510 Fall 2012

First class project

“Engineering specifications of common objects”
Skateboard Components

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The Modern Skateboard

• Major Components:
  – Skateboard Deck
  – Truck
  – Wheel Bearings
  – Wheels
  – Miscellaneous nuts screws and washers

• These components are put together to form the modern skateboard
Skateboard deck

• Part of the skateboard that the rider stands on
  – Deck differences based on rider’s height and weight
• Made out of 7-ply Maple wood
• Curved at ends and sides
• Top lined with grip tape
  – Adds traction
• Two axles
  – 2 wheels per axle
Industry Standards

• Low risk, low precision device
  – No highly specific standards associated
• Must be able to support rider and stresses from use
• Wheels must be attachable without cracking board
Dimensions

- 78.5cm long
- 19.3 cm wide
- Sides concave up (.8cm higher than center)
- Ends of skateboard curved upward by 4.4 cm
  - Curve starts 16 cm from ends (14 degree angle)
Tolerances

- Decks are machine cut, so errors are miniscule.
- Engineers not concerned with variations of a few micrometers because deck is not a highly integrated or moving part.
Material Standards

- Sugar Maple Wood- Acer Saccharum
- Density: 0.676g/(cm^3)
- Modulus of Rupture: 10.97kg/(mm^2)
  - Describes bend strength
- Modulus of Elasticity: 1290kg/(mm^2)
  - Tensile and Compressive strength
The “Trucks”

• The axels of the Skateboard
• Two main components
  • The Baseplate and Hanger
• Baseplate and Hanger are connected by a “Kingpin”
  • A bolt with rubber bushings that allow smooth turning
Wheel Bearing

- Allows wheels to rotate about axel.
- Seven ball bearings equally distanced by retainer.
- Protective shields on each side of bearing
Industry Standards

• ABEC rating between 1 and 9
  – Specifies manufacturing precision
  – More expensive bearings have higher ABEC ratings and last longer and spin more efficiently

• These bearings are ABEC 3
Dimensions (Size 608 Bearings)

- Inside Diameter- 8mm
- Outside Diameter- 22mm
- Width(double shielded)- 7mm
  - Shields help protect against contamination by dust.
Tolerances

• Eccentricity (roundness) <= .0050
• Outside Diameter: +0.000 -.003mm
• Width tolerance: +0.000 -0.005mm
• Radial Runout (inconsistencies in radius) .0004mm
Material Standards

- Stainless steel (AISI 440C)
- Density: 7800 kg/m^3
- Modulus of Elasticity 200GPA
- Poisson’s ratio: .27-.30
- Hardness 97HRB
Spitfire 51.5mm Skateboard Wheel

- Skateboard wheels were revolutionized in the 1970’s when polyurethane began to be used in their production as opposed to clay or steel.
  - polyurethane rubber has high abrasion resistance, high resiliency, and adequate gripping characteristics.
- Wheels come in different shapes, colors, sizes, and hardness
- Wheels are customizable to meet the riders’ demands
Dimensions

- The wheel is 51.5mm in diameter and 35mm thick.
- There is a 22mm diameter hole in the center used for housing the size 608 bearings and axel.
Industry Standards

- All skateboard wheels have a standard sized center core to house an industry standard size 608 bearing which measures 22mm in diameter
- Bearings can be interchanged among skateboard wheels
Tolerance

• The wheels allow a much higher margin of error than the bearings do. Wheels can vary a millimeter or two without having any effect on the functionality.
Material Standards

• Some skateboard wheels are harder than others.
• The hardness of these wheels is measured on the Shore Durameter scale.
• Shore A 75 being the softest wheels and Shore A 100 being the hardest wheel. These particular wheels are rated as Shore A 99 (very hard).
Questions?
Websites Used

- http://skateboard.about.com/od/skateboardingdictionary/g/GlossA.htm
- http://www.warehouseskateboards.com/how-to-buy-a-skateboard
- http://www.google.com/imghp?hl=en&tab=wi
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- http://skateboard.about.com/od/boardscience/a/DoctownHistory_2.htm