Abstract – Leslie McNutt

Many students are not even aware of the many activities related to the US Space Program. The intent of this presentation is to introduce students to the world of space exploration and encourage them to pursue math, science, and engineering careers. If this is not their particular interest, I want to encourage them to pursue their dream.
Space Shuttle Overview

NASA

Leslie McNutt
Where is the Shuttle Made?

MSFC – Shuttle Propulsion Office
Huntsville, AL
• SSME • SRB
• ET • RSRM
• PSE&I

NASA Headquarters
Washington DC

KSC – Launch & Landing
Kennedy Space Center, FL

SSME Turbopumps
West Palm Beach, FL

SSC – SSME Testing
Stennis Space Center, MS

MAF – External Tank
New Orleans, LA

JSC – Space Shuttle Program office & Orbiter Project
Johnson Space Center, TX

Alternate Landing Site
Edwards AFB, CA

Space Flight & Exploration
Huntington Beach, CA

Space Shuttle Main Engine
Canoga Park, CA

Reusable Solid Rocket Motor
Brigham City, Utah
Space Shuttle Solid Rocket Booster (SRB) & Reusable Solid Rocket Motor (RSRM)

Amazing Facts

- World's largest solid rocket
- 149.1 feet high and 12.2 feet wide (1/2 football field long)
- After 2 minutes, boosters separate at 28 miles altitude at a speed of 3,100 mph.
- Three 136-foot wide parachutes slow the SRBs to a safe splashdown in the Atlantic Ocean.
- Boosters are recovered, refurbished and reused.
- The boosters are the heaviest object ever to be parachuted safely back to the surface!
Space Shuttle External Tank (ET) Amazing Facts

- Holds 380,000 gallons of liquid hydrogen (−423 °F)
- 140,000 gallons of liquid oxygen (−300 °F)
- Only major expendable Shuttle element
- ET covered with spray-on foam insulation that keeps the LH₂ at −423 °F even in the hot sun
- Skin of the ET is less than 0.25 inches thick
Space Shuttle Main Engine

Amazing Facts

- High Pressure Fuel Turbopump (HPFTP) alone delivers as much horsepower as 28 locomotives

- Three main engines operate for 8 minutes, 40 seconds for each flight

- Combustion Chamber reaches +6,000 °F (hotter than the boiling point of iron)

- Turbine Blades are one of the most critical components on the Shuttle

- Three engines produce equivalent power of 23 Hoover Dams

First Stage Turbine Blade
Space Shuttle
Going to the Pad (Rollout)
Living in Space
Pictures of Earth from Space

Coast of the Sahara Desert

Sinai Peninsula

Manhattan in the snow
NASA Spin-offs

- Bar coding
- Joystick controllers
  - Computer games
  - Vehicles for people with disabilities
- Smoke detector
- Invisible Braces
- Cordless Tools
- Portable Computer
- Satellite TV
- Non-Chlorine Water Purifier
- Video Stabilizer and Picture Extraction
- Thermal Gloves and Boots
- Space Pens
- Laser Angioplasty
- Fire Fighter equipment
  - Air tanks
  - Fire protection suits
- Improved Sports equipment
  - The Wave Shaft
  - Liquidmetal used in tennis rackets and baseball bats
  - Shock Absorbing Helmets
NASA Spin-offs

- Computer Reader for the Blind
- Cool Suit
- Advanced Wheelchair
- Food Processing Control
- Radiation-Blocking lenses
- Safety Grooving
- Lightning Protection
- Advanced Pacemaker
- Implantable Heart Aid
- Implantable and External Pumps
- Temperature Pill
- Infrared Thermometer
- Body Imaging
SSME Hardware
STS-114 Crew of Discovery