STEAM MACHINES

MATERIAL WORLD

LEVEL

Level 3 – Level 4

ACTIVITY DESCRIPTION

The Scenario – Puffing Billy Railway is experiencing the coldest Melbourne Winter in 100 years. Temperatures are below zero degrees most days, but passenger numbers have increased to 20 people per carriage. Everyone wants to enjoy the Winter Wonderland!

Students must design and construct an innovative 3D moving model train to cater for cold conditions and many visitors. They consider natural and processed materials and investigate the suitability and properties of materials. Community needs, sustainability and the environment must also be considered in the design solution.

THEME

- Suitability and property of materials
- Construction
- Sustainability and Community needs

MATERIALS REQUIRED

- Cardboard boxes
- Sticky notes
- Plastic containers
- Cardboard
- Plywood
- Nails
- Hammers
- Paint
- Toothpicks
- Hot glue gun
- Sticky and masking tape
- Scissors
- String
- Plastic or rubber wheels
- Paper straws

INSTRUCTIONS

Engage students in the project by reading out the scenario. As a whole class discuss the difference between natural and processed materials.

Using the sticky notes, students write down a natural or processed material. They add their sticky note to the white board under the heading of natural or processed, to develop a greater understanding of different types and properties of materials.

Natural materials are ones that occur within the natural environment and have undergone very little modification. Processed materials are often modified from natural materials or do not occur at all in the natural environment but have been designed and manufactured to fulfil a particular purpose.

Using the “Materials and Model trains” worksheet, students design a 3D model train.

Using the materials provided students create a model train and prepare for a short presentation to the class to share their model. Their presentation must include, materials used, construction process, sustainability and community needs.

SUGGESTIONS FOR ASSESSMENT

Two-minute student presentation demonstrating the design and construction of their 3D moving model train. Student consideration for meeting community needs, sustainability and the environment.

BACKGROUND INFORMATION

Puffing Billy workshop undertake the enormous task of building and maintaining carriages and wagons. They undertake the following tasks to preserve Puffing Billy for the future:

- Detailed carpentry and joinery in a range of hard and soft woods.
- Painting booth for preparation and detailed finishing to a high standard, including oil and water-based paints and clear coats.
- Application of waterproof roofing membrane.
- Supply and fitting of weather blinds, seat cushions and upholstery.
- Specialist boiler-making and fabrication capacity.
- Air brake pipework and component installation, maintenance, and fault rectification. Services specific to heritage railway rolling stock include:
- Minor repair to full restoration of wooden bodied carriages, wagons and vans.
- Sourcing or design and manufacturing of replacement components including hinges, door locks, handles, handrails and luggage racks.
- Replacement doors and windows, including glazing.
- Identifying original finishing and colour schemes.
- Lettering layout for signwriting or application of vinyl lettering.
- Repair or replacement of blinds, seating, and other upholstery.
- Manufacture of steel or replacement timber underframes and associated components.
- Design, manufacture and management of complete carriages.
- Restoration, repair or manufacture of bogies, wheelsets, couplers, draft-gear and brake rigging

CURRICULUM LINKS

DESIGN AND TECHNOLOGIES

Investigate the suitability of materials, systems, components, tools and equipment for a range of purposes (VCDSTC027)

Critique needs or opportunities for designing and explore and test a variety of materials, components, tools and equipment and the techniques needed to create designed solutions (VCDSCD028)

Generate, develop, and communicate design ideas and decisions using appropriate technical terms and graphical representation techniques (VCDSCD029)

Evaluate design ideas, processes and solutions based on criteria for success developed with guidance and including care for the environment and communities (VCDSCD031)

MATERIALS AND MODEL TRAINS WORKSHEET

MODEL TRAIN DESIGN				
MATERIALS USED				
SOURCE				
WHY DID YOU USE IT?				
IS IT SUSTAINABLE?				
DOES MY MODEL MEET THE COMMUNITY'S NEEDS? WHY? OR WHY NOT?				