Wind Tunnel Challenge

Workshop goals
Questacon Smart Skills workshops are developed to give secondary school students a challenging hands-on experience with science and technology. The open ended nature of these workshops allows students to explore different ways to solve a problem and helps to build their confidence in trying and testing new ideas.

The Wind Tunnel Challenge presents students with the challenge of engineering an object using limited materials that will float in a wind tunnel for a minimum of 10 seconds. It takes students through the innovation process of think, make, try and refine. This environment encourages and allows students to learn from their mistakes, which is integral and invaluable to the learning process as a whole. Scientific concepts such as air resistance and lift are reinforced through the process rather than being the main driver for the workshops.

This guided process gives students the opportunity to make discoveries at their own pace in an interesting and safe environment. Students will learn about what makes certain shapes and materials more effective than others and how to use these to their advantage in their designs.

The Australian National Curriculum
The Wind Tunnel Challenge addresses all three science strands of the Australian National Curriculum with a strong focus on Science Inquiry Skills.

Science Inquiry Skills
This workshop’s activities relate to Science Inquiry Skills across all years by encouraging:

- Questioning and predicting
- Planning and conducting
- Processing and analysing data and information
- Evaluating
- Communicating

Science Understanding
This activity links to Physical sciences units in the Science Understanding Strand. This activity can be used to investigate physical concepts such as air resistance, surface area and weight distribution and their effects on the ability of an object to float in the air.

Science as a Human Endeavour
This workshop is linked to the Science as Human Endeavour Strand through the exploration of the process by which all products undergo to meet a need or want in society. This can be further investigated in the classroom using various related real life examples such as aerodynamic and efficient car design.
The Australian National Science Curriculum Links

Year 7 & Year 8

Science Understanding
Change to an object's motion is caused by unbalanced forces acting on the object (ACSSU117)

Earth's gravity pulls objects towards the centre of the Earth (ACSSU118)

Science as a Human Endeavour
Science and technology contribute to finding solutions to a range of contemporary issues; these solutions may impact on other areas of society and involve ethical considerations (ACSHE120; ACSHE135)

Science knowledge can develop through collaboration and connecting ideas across disciplines of science (ACSHE223; ACSHE226)

Science Inquiry Skills
Identify questions and problems that can be investigated scientifically and make predictions based on scientific knowledge (ACSIS124; ACSIS139)

Collaboratively and individually plan and conduct a range of investigation types, including fieldwork and experiments, ensuring safety and ethical guidelines are followed (ACSIS125; ACSIS140)

Reflect on the method used to investigate a question or solve a problem, including evaluating the quality of the data collected, and identify improvements to the method (ACSIS131; ACSIS146)

Year 9 & Year 10

Science Understanding
The motion of objects can be described and predicted using the laws of physics (ACSSU229)

Science as a Human Endeavour
Advances in Scientific understanding often rely on developments in technology and technological advances are often linked to scientific discoveries (ACSHE158; ACSHE192)

Advances in science and emerging science and technologies can significantly affect people’s lives, including generating new career opportunities (ACSHE161; ACSHE195)

The values and needs of contemporary society can influence the focus of scientific research (ACSHE228; ACSHE230)

Science Inquiry Skills
Plan, select and use appropriate investigation methods, including field work and laboratory experimentation, to collect reliable data; assess risk and address ethical issues associated with these methods (ACSIS165; ACSIS199)

Analyse patterns and trends in data, including describing relationships between variables and identifying inconsistencies (ACSIS169; ACSIS203)

Evaluate conclusions, including identifying sources of uncertainty and possible alternative explanations, and describe specific ways to improve the quality of the data (ACSIS171; ACSIS205)
The Australian National Design & Technology Curriculum Links

The Wind Tunnel Challenge workshop addresses both strands of the Design and Technologies curriculum. Students will experience the process of planning, designing and refining a number of prototypes. The innovation cycle taught in this workshop can be applied to a range of technologies to help further strengthen understanding of various current technologies and their impact on society (i.e. assistive technologies).

**Year 7 & Year 8**
**Design and Technologies Knowledge and Understanding**
Investigate the ways in which products, services and environments evolve locally, regionally and globally through the creativity, innovation and enterprise of individuals and groups (ACTDEK030)

Analyse ways to produce designed solutions through selecting and combining characteristics and properties of materials, systems, components, tools and equipment (ACTDEK034)

**Design and Technologies Processes and Production Skills**
Critique needs or opportunities for designing and investigate, analyse and select from a range of materials, components, tools, equipment and processes to develop design ideas (ACTDEP035)

Generate, develop, test and communicate design ideas, plans and processes for various audiences using appropriate technical terms and technologies including graphical representation techniques (ACTDEP036)

Independently develop criteria for success to assess design ideas, processes and solutions and their sustainability (ACTDEP038)

Use project management processes when working individually and collaboratively to coordinate production of designed solutions (ACTDEP039)

**Year 9 & Year 10**
**Design and Technologies Knowledge and Understanding**
Critically analyse factors, including social, ethical and sustainability considerations, that impact on designed solutions for global preferred futures and the complex design and production processes involved (ACTDEK040)

Investigate and make judgments on how the characteristics and properties of materials are combined with force, motion and energy to create engineered solutions (ACTDEK043)

**Design and Technologies Processes and Production Skills**
Apply design thinking, creativity, innovation and enterprise skills to develop, modify and communicate design ideas of increasing sophistication (ACTDEP049)

Work flexibly to safely test, select, justify and use appropriate technologies and processes to make designed solutions (ACTDEP050)

Evaluate design ideas, processes and solutions against comprehensive criteria for success recognising the need for sustainability (ACTDEP051)