# Safe products, systems and environments:
## Engineering structures and mechanisms: Industrial Technology

In this activity you will learn about government legislation regarding OH&S issues and the range of potential hazards found in the work environment.

This material addresses aspects of the following syllabus outcome:

5.1.1 The student identifies, assesses and manages the risks and OH&S issues associated with the use of a range of materials, hand tools, machine tools and processes.

*Extract from: Stage 4–5 Industrial Technology Syllabus © Board of Studies NSW 2003.*

### Safe products, systems and environments

The commitment of engineers to developing safe engineered products and their role in the development of safe systems and environments is not new. While the effects of engineering failures today may be catastrophic, in many instances ethics and laws relating to safe engineering practice can be traced back four thousand years ago to ancient Babylon. The First Code of Hammurabi, the sixth ruler of the First Dynasty of Babylon, related directly to the construction of dwellings as well as the responsibility for their safety. The Code stated:

> If a builder build a house for a man and do not make its construction firm, and the house which he has built collapse and cause the death of the owner of the house, that builder shall be put to death.
>
> If it cause the death of the son of the owner of the house, they shall put to death a son of that builder.
>
> If it cause the death of a slave of the owner of the house, he shall give it to the owner of the house a slave of equal value.
>
> If it destroy property, he shall restore whatever it destroyed, and because he did not make the house which he built firm and it collapsed, he shall rebuild the house which collapsed from his own property.
>
> If a builder build a house for a man and do not make its construction meet the requirements and a wall fall in, that builder shall strengthen the wall at his own expense.
>
> *Extract from Petroski, H. (1985) To Engineer is Human, St Martins Press, New York.*

***Activity 1***

Visit the web site <http://www.washington.historylink.org/output.cfm?file_id=5048> and locate answers to the following questions about the failure of the Tacoma Narrows Bridge in the United States in 1940.

1. What was the basic cause of the classic failure of the Tacoma Narrows Bridge in the USA in 1940?

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2. As suspension bridges became progressively lighter and more slender and graceful during the first 30 years of the 20th century, what sort of unexpected behaviour did they show?

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3. What nickname was the Tacoma Narrows Bridge given and why?

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4. Identify and describe the conditions under which the Tacoma Bridge failed.

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**The role of engineers in the development of safe systems and environments**

While engineers don't necessarily always *get it right*, they are renowned for finding the causes of engineering failures and then developing a solution to create a safe system and environment.

A very well known example of this is the detective work a group of engineers did in finding out why the first jet airliner, the De Havilland *Comet*, suffered a series of catastrophic crashes in the early 1950s.

***Activity 2***

Visit the web sites below and complete the following questions.

http://www.kidscastle.si.edu/channels/air-space/articles/air-spacearticle13.html

http://www.smithsonianmag.si.edu/smithsonian/issues02/jun02/comet.html

1. What was the main lesson which engineers learned from the Comet a year after its first flight?

   _____

   _____

   _____

2. How many Comet aircraft crashed before the British Ministry of Civil Aviation went looking for answers?

   _____

   _____

   _____

3. What did their engineers do to find out the reasons for the crashes?

   _____

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4. What conclusion did the engineers come to?

   _____

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