

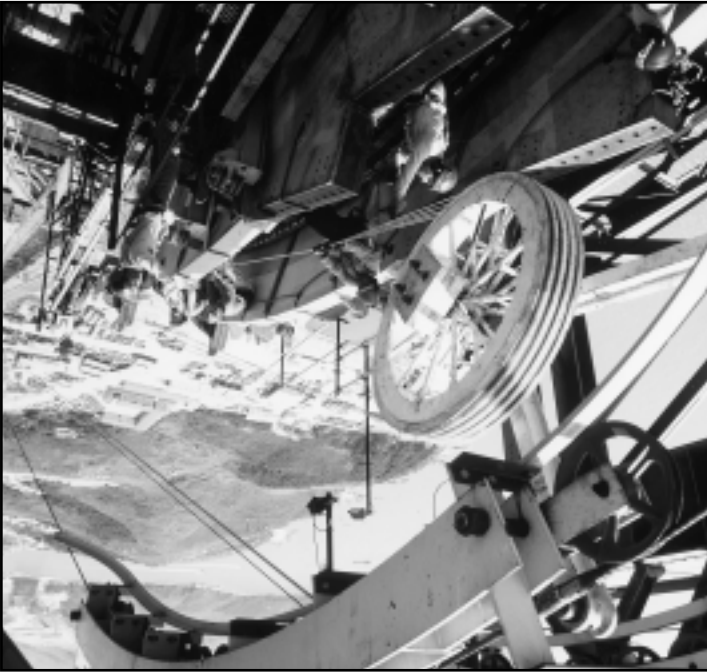
Find out about all the different people who might be involved in designing and building an extension to your school. List all the professions and trades. Discussion: Who is the 'client' in this case? How is the client involved in the design process? Can you think of other situations where bad designs result from the client or end-user not being involved?

research



Mott MacDonald formed a team with bridge engineers, safety experts, technical inspectors, surveyors, project programmers and controllers, environmental experts and quality managers. At its peak over 300 people were in the team. Design was carried out in Mott MacDonald's head office in Croydon. Site investigations, planning, contract management and site supervision were done by Mott MacDonald's Hong Kong office. Mott MacDonald showed their plans and designs to their client at regular intervals. This made sure the client was happy with everything the project team was doing as they went along – and avoided wasting time on ideas the client did not like.

3 success through collaboration



ds 10 designing the lantau link



The government of Hong Kong invited the British company Mott MacDonald to submit ideas for the Lantau Link because of their proven success elsewhere. For example, the Tamar bridge shown on the left and the Forth Road bridge below.

“We competed against other firms interested in the project. Mott MacDonald won because the client thought our proposals about how we would plan, design and run the project were the best. We had worked on the original plans for the new airport and the transport links it would need so we already knew a lot about what was needed.”



MILLENNIUM PRODUCTS

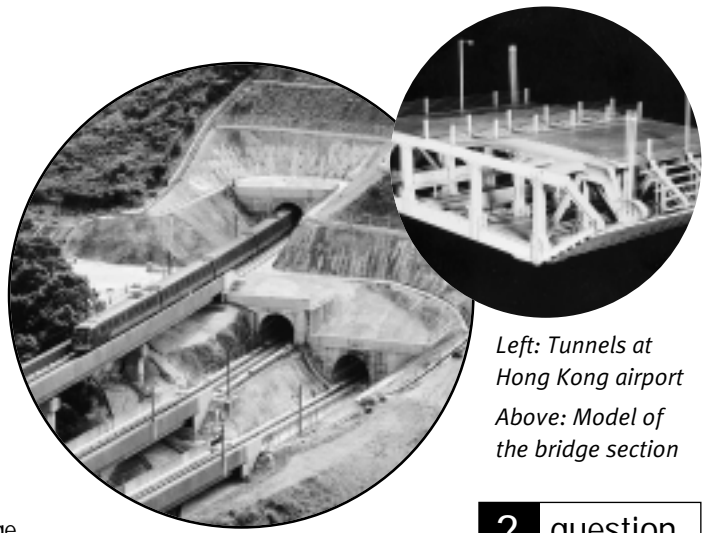
DESIGNING

1 the big idea

The brief for the bridge followed investigations into what would be the most economical and reliable - a tunnel or a bridge. Mott MacDonald looked at two types of tunnel. One was an immersed tube. This involves building the tunnel in sections on shore, floating them out to sea, sinking them onto the seabed into a trench, and then pumping out the water. The second was a bored tunnel, which is dug underneath the seabed, like the Channel Tunnel. Looking at what the link had to do, the cost of building and maintenance, the disruption that would be caused to shipping and the impact on the environment, they decided that building high level bridges would be the most economical and flexible solution.

“The basic concept came from the accumulated knowledge of Mott’s engineers who had been involved on the Severn and Forth suspension bridges. With the necessary experience and imagination these engineers were able to conceive of a suspension bridge that would be able to cope with the typhoon winds of the Far East and carry a road and railway safely.

“One has to have a feeling for structural behaviour and hence be aware of what is going to work. The process is very much the development from concept to preliminary design on to detailed design with investigative studies on such things as soil, aerodynamics, vibration etc being carried out in parallel. We worked in collaboration from early stages with an architect to ensure that the structural forms were developed with good aesthetic qualities.”



Left: Tunnels at Hong Kong airport
Above: Model of the bridge section

? question

Look back on something you have designed and made. How did you set about it? Did you work from concept to preliminary design to detailed design? How did your investigations help you to come to sound design decisions? Remember - not all designers work in the same way!

2 juggling with problems

The Lantau Link design team has to solve many problems.

“Our brief was to develop a detailed design for a high level bridge crossing of the two sea channels between the mainland and Lantau island where the airport was being built.”

The bridge had to meet a difficult performance specification. It had to:

- carry passengers and freight on a six-lane highway in normal conditions, and on a sheltered two-lane highway when the weather is extreme
- carry passengers comfortably in trains at speeds up to 135 km/hr on twin rail tracks
- withstand severe tropical storms - a typhoon there can produce three second gusts of up to 160 km/hr for the road and 180 km/hr on the railway
- withstand temperature changes of plus or minus 23°C
- withstand earthquakes
- withstand the impact of a large ship
- have at least 60m clearance below the bridges for ocean-going ships to pass beneath
- keep the overall height below 206m so that planes can take off from and land safely at the airport
- be durable to withstand the effects of rain and salt water AND
- look beautiful - this is a prestige project of international importance.

The final solution successfully meets all these requirements.



activity

Suppose you are asked to design either a back-pack for your own use or an educational toy for toddlers to help them develop hand-eye co-ordination. Draw up a performance specification for one of these products.