Rewarding Learning

AS LEVEL Section D

FACT FILES

Technology & Design

For first teaching from September 2011

For first award in Summer 2013

Product Analysis and Improvement

tech nology and design

FACT FILE

1.33 Product Analysis and Improvement

Product investigation

Child Security Gate

The following content focuses on the product analysis and re-design proposal for a child's security gate.

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Learning Outcomes

Students should be able to: analyse, evaluate and produce re-design proposals for existing products

under the following headings:

- form;
- cost;
- manufacture;
- materials;
- function;
- performance;
- aesthetics;
- marketing constraints, target audience;
- ergonomics and anthropometrics;
- cultural, ethnic, moral and environmental issues;
- safety of the user.

Child Security Gate

Fig. 1

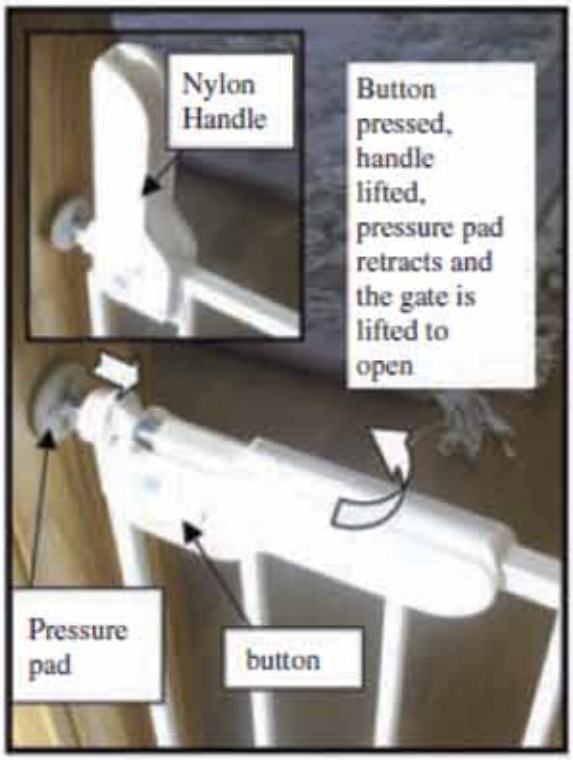


Fig. 2

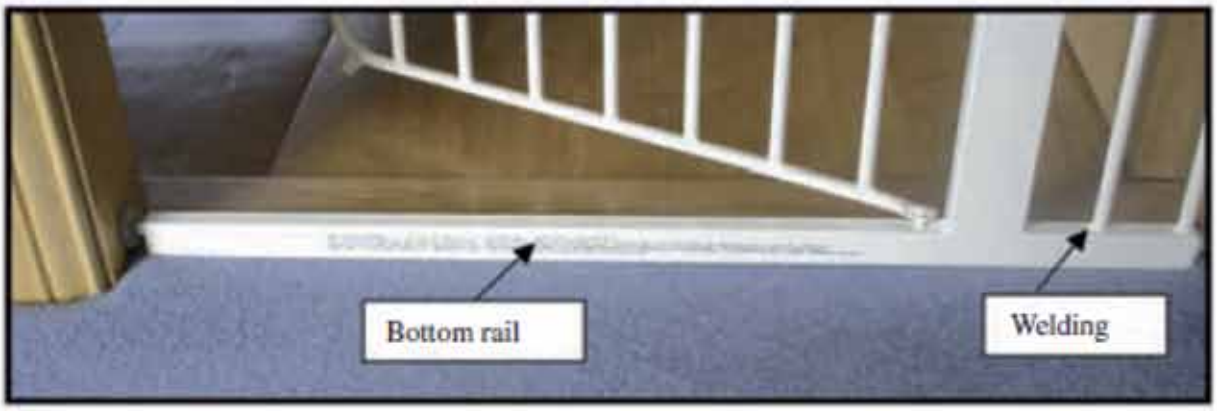
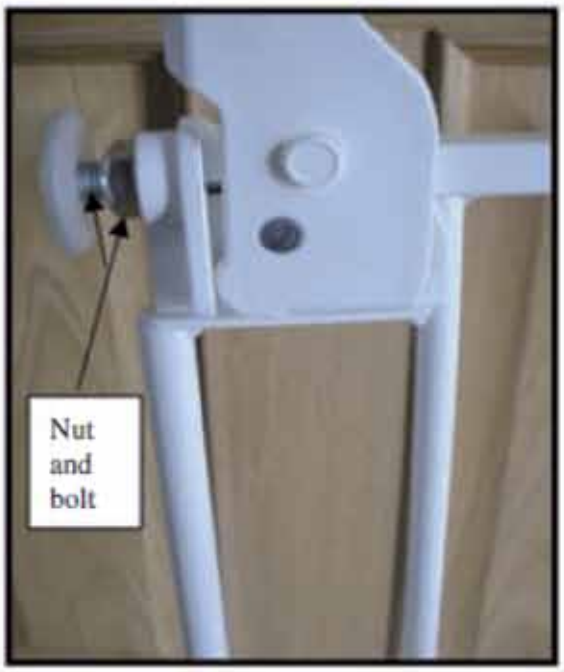


Fig. 3

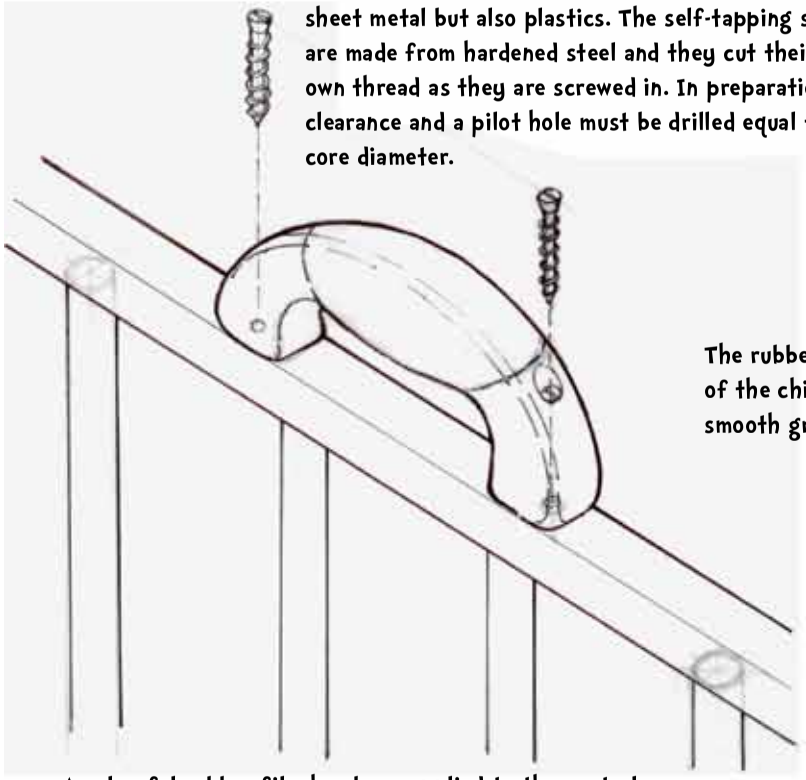


	Analysis	Evaluation	
		Pros	Cons
Form	The form of this product is very simple, consisting of a tubular steel gate supported on a t-shaped square section steel frame. The steel bars are spaced at approximately 70mm centres. It is designed to fit the width of a standard door opening or staircase but can be adjusted slightly.	The gate fits neatly into a standard door opening or staircase. The space between the bars and at either side is small enough to prevent a child from getting stuck.	Whilst some adjustment of the gate's width is possible it is not very flexible and would require extensions to fit larger or non-standard openings.
Cost	This is a fairly standard safety gate design and would be aimed at the lower end of the domestic market. As such I would not expect it to cost any more than £20.	The low cost means this is an affordable item that still provides a safer environment for young children. More than one could be purchased for use across several doorways or at both the top and bottom of a staircase.	Whilst the product is effective its low cost has come at the expense of its design. It is not particularly attractive and has been made from relatively cheap materials.
Manufacture	I think that this is a mass-produced item requiring a reasonable amount of hand-assembly and finishing. The gate would be manufactured from lengths of tubular steel cut to length and welded together. Once constructed the gate would be sprayed with a suitable paint finish.	Mass-production makes items like this more affordable. Welding the joints between the steel sections produces a sturdy product.	There are quite a number of small parts which would require hand-assembly and therefore additional cost to produce. Welding is a time-intensive process requiring a degree of hand-finishing around the joints.
Materials	The main components, such as the opening gate and supporting frame are made of mild steel. The smaller components, such as the handle, pressure pads and top hinge would be made from nylon.	Mild steel is a very strong material that can withstand significant force. The applied paint finish would make it easy to keep the product clean, which is important given that young children would be in close contact with it. Nylon is used for the pressure pads and top hinge because it is durable.	The steel components are heavy and require a paint finish to be applied. They could rust if the product is stored in a damp environment or if the paint finish becomes chipped or damaged. Steel is hard and heavy so could easily injure a child if they fell against the gate or if the gate was left open and they closed it on themselves.
Function	This product is designed to create a semi-permanent barrier between two spaces in the home, usually in situations where parents wish to control the movement of young children, particularly in areas that could prove potentially hazardous, such as the kitchen or staircases.	The product is simple to assemble and put in place as all the fixings are semi-permanent. This means that no damage is done to the doorway or staircase and the product can be removed quickly when required.	The lack or permanent fixings necessitates the use of the bottom rail which means that access through the opening is never completely free and could pose a tripping hazard. The opening is relatively narrow and would restrict access even when the gate is open.

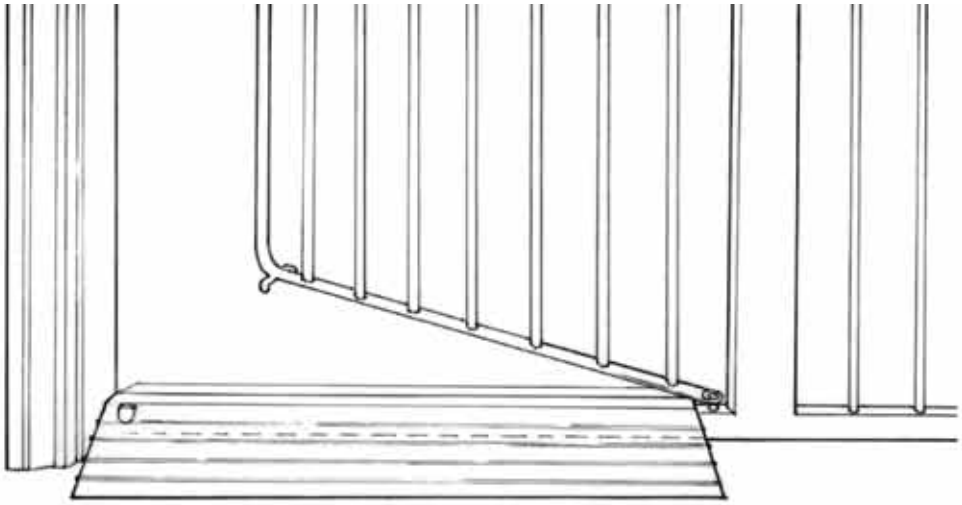
	Analysis	Evaluation	
		Pros	Cons
Performance	The product would provide an effective barrier to prevent young children from venturing into areas that they should not. The opening mechanism requires two simultaneous actions of different types, pushing the button and lifting the handle, which would prevent a young child from opening the gate themselves.	The gate is secure when locked in place and it would be very difficult for a young child to operate the opening mechanism. The use of pressure fixings and the relatively compact design would make it easy to remove and store when required.	The gate needs to be closed manually each time it is opened and there is no visual indicator to show that it has been closed properly. This could mean that the gate gets left open accidentally.
Aesthetics	The overall appearance of the product is purely functional and it looks very clinical. It is made from white painted mild steel with additional white plastic components.	The white colour and smooth, shiny finish suggests that the product is hygienic and therefore easy to clean.	This product, though designed with children in mind, does not appear particularly child-friendly. With wear-and-tear the surface of the white metal and plastic could become scratched and chipped, leaving it looking grubby and dirty.
Marketing constraints/ Target Audience	This product is aimed at the lower to mid-end of the domestic market.	This is a functional, 'no frills' product and would appeal to a very wide market sector. It could also be used in other situations, such as stopping dogs entering certain rooms in a house.	Its basic design means that it would not stand out from other products on the market, such as those that are designed to suit modern interiors, and would have to be marketed purely on its affordable price.
Ergonomics/ Anthropometrics	The height of the gate is approximately 75cm which is similar to the height of a young child. It is opened using a handle located on its top rail. To release the locking mechanism a button on the handle must be pressed before the handle can be lifted upwards through 90 degrees.	The height of the gate is chosen to prevent small children climbing over it. The bars are spaced so that the minimum amount can be used, thus saving weight, whilst being close enough to prevent a child getting trapped between them.	The handle is not shaped to fit comfortably in the hand and the opening mechanism could prove difficult to operate with just one hand. The presence of the bottom rail creates an obstruction for wheelchair users.
Cultural, Ethnic, Moral, Environmental issues	This type of product allows parents to restrict the movement of their youngest children around the house. The main components are made from mild steel and nylon.	This product is less confining than the alternatives, such as play pens, and gives the child a greater sense of freedom, whilst allowing the parents to get on with household chores or other tasks.	Some people may regard this product as potentially detrimental to the child's development as it provides a convenient way to leave a child alone for a period of time. Nylon is not considered to be biodegradable because it takes centuries to break down.
Safety of user	All of the exposed surfaces are rounded and smooth. It only requires the minimal amount of force to operate.	The two-stage release mechanism would prevent a child from opening the gate themselves.	The bottom rail creates a tripping hazard when the gate is open. If the user does not keep their fingers away from the bottom of the handle they could trap them when locking the gate in place.

The handle to aid the lifting of the child safety gate is made from infection moulded HDPE. It has a smooth ergonomic shape and is sturdy enough to lift the gate.

The handle is attached using countersunk head self-tapping screws which are suitable not only for a thin sheet metal but also plastics. The self-tapping screws are made from hardened steel and they cut their own thread as they are screwed in. In preparation a clearance and a pilot hole must be drilled equal to the core diameter.



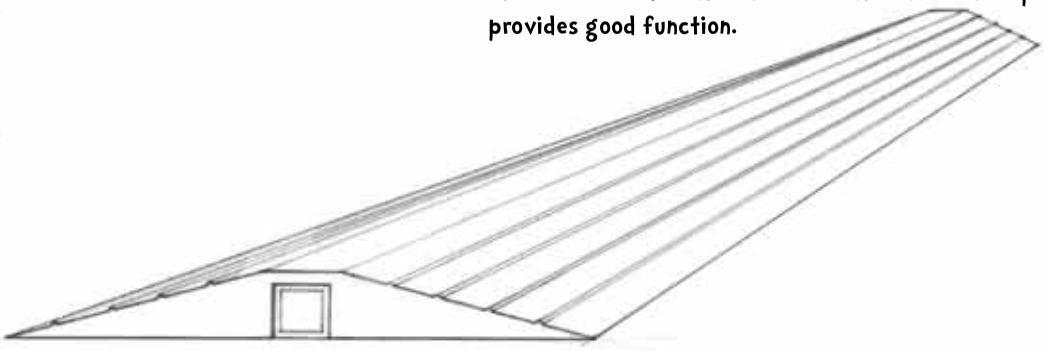
A colourful rubber film has been applied to the central section of the handle to aid the grip of the product, and make the product look more child friendly.



The rubber ramp is placed on top of the bottom bar of the child safety gate and provides a safe and smooth ground-to-sill transition.

The rubber of the ramp could be recycled rubber making it a more environmentally friendly option. Rubber is slip-resistant and prevents slippage on the mild steel hollow section but also prevents the wheels of the wheelchair from slipping or someone walking over it.

The ribs framed on the surface of the rubber tramp provides good function.



The square hollow section tube fits securely into the square 'trough' in the rubber ramp.

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