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A Motorbike for the 1980s

A team of fourth and fifth year students from The Henry Mellish School, Nottingham, wanted to build a motorbike which had power and appeal and which would give the thrill of speed. The B.P. Build a Bike competition gave us the incentive to create such a bike.

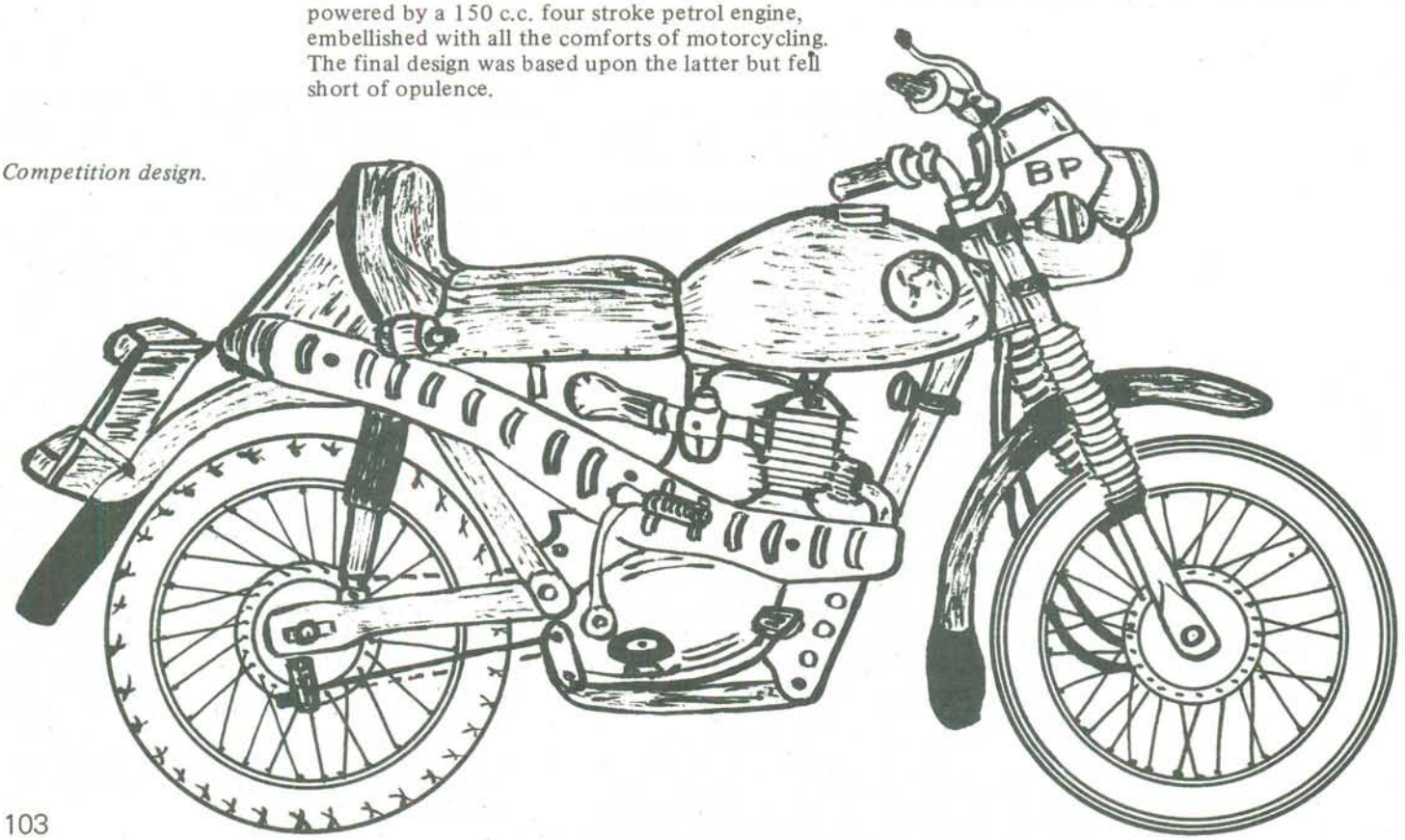
The project was within our resources and its size was just right for the workshop. We could work on it easily and most important, everyone could see it developing. The students in the lower forms were able to take an interest in its manufacture. It created a dialogue between the design team and all who were enthusiastic about the motorbike.

The apparent simplicity of a motorcycle hides many of its design problems. These were uncovered as we collected information, and formulated a number of preliminary designs. It soon became clear that we had to opt for a fairly conventional machine, if we were to meet the completion date. There was an element of risk involved if we became embroiled in a programme, using a revolutionary design. Although this decision was finally determined by economic factors.

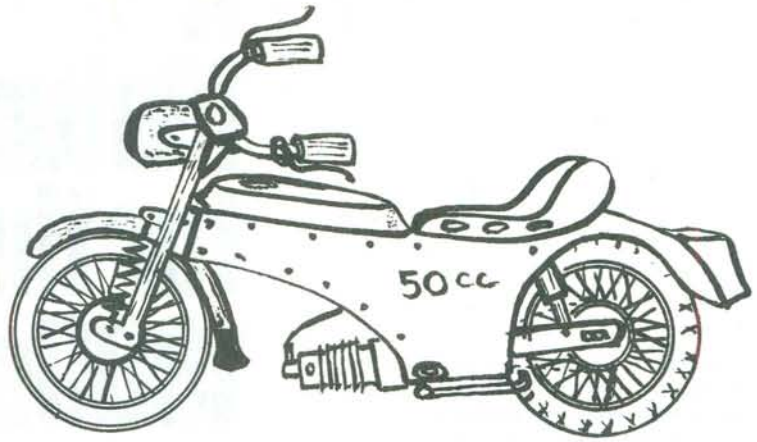
Initial designs for the machine were highly imaginative. One was an ultra lightweight machine powered by a 50 c.c. four stroke petrol engine to give phenomenal petrol economy, with a tractor styled seat to match its utility. Set against this, another design expressed the feeling of power and opulence. It consisted of a heavy tubular frame powered by a 150 c.c. four stroke petrol engine, embellished with all the comforts of motorcycling. The final design was based upon the latter but fell short of opulence.

We finally decided to use a tubular frame with a swinging arm suspension at the rear damped by two shock absorbers taken from an old Honda 50 c.c. frame. The front forks were telescopic and came from a B.S.A. Bantum, along with the steering head and tube for the frame. Generally the machine we designed was conventional with a few unusual features. They were the engine mountings and the rear brake drum torque arm. The designs were incremental. This enabled us to see the problems as they arose, and proved a useful teaching device for design. The most useful part of the project was the feedback of information from the students to the design team on a particular design implementation. On the strength of this information numerous parts of the machine were redesigned many times, before they were considered to be safe or looked appealing. Perhaps the most exacting part of the design was the problem of aligning the engine drive sprocket with the rear wheel driven sprocket and in turn keeping both the front and rear wheels in alignment.

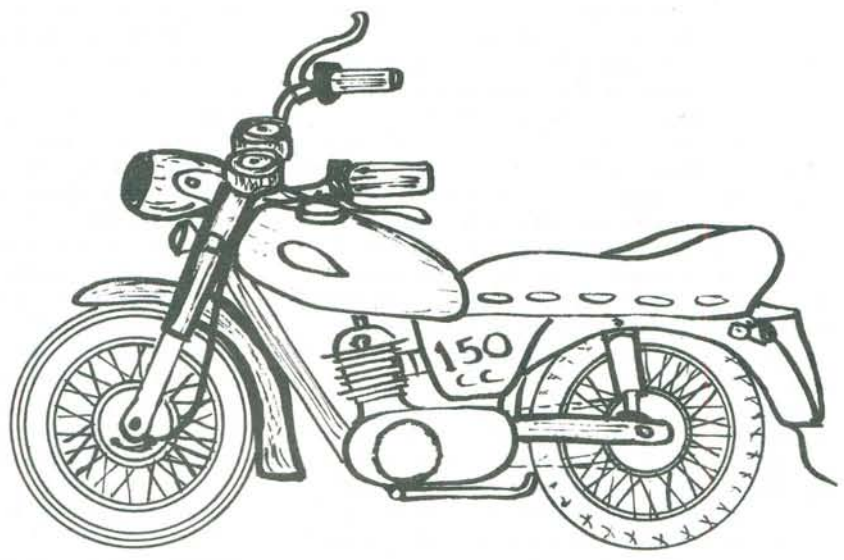
The electrical parts of the motorcycle were designed separately. Each circuit was bench tested before it was installed into the machine. We used the wiring and electrical parts from a Honda 125 c.c.



Competition design.



Economy model.



Opulent design.

The workshop manual for this machine proved invaluable. We simplified the electrical circuits to meet our needs. Therefore, it was with satisfaction that the machine met the requirements of a road motorbike. We had also learnt about the mysteries of charging circuits, ignition, lighting and trafficators.

Race against time was one of the most exciting features of the project. We set date-lines for certain parts of the bike to be completed. The tubular frame was to be completed by the end of September; the engine mounted and static tested by November. This encouraged lunch break and after school workshop activity. We were forced to maintain these dates if we hoped to complete the bike for road testing by the early spring.

One of the requirements of the competition was to submit a log on the progress of the bike, for sometime early in the New Year. We had kept a diary of our progress and also a few photographs were taken of the early manufacturing processes. The log was submitted and eventually we received a telegram informing us of our inclusion in the finals, at Crystal Palace. Jubilant we increased our efforts to make the motorbike more reliable and appealing. The competitive element was injected at this stage and the whole aspect of the project became more serious. Obstacles which had troubled us seemed to fall away. Press coverage increased and made us aware of our competitors. Our thoughts and aims were rationalised. Planning became more detailed to meet the extra demands of the competition. Fault charts were compiled, spare parts made. Maintenance schedules drawn-up and practiced.

We secured an aerodrome to road test the motorbike. A test programme was drawn-up to test, braking, fuel consumption, and road speeds. This gave us the opportunity to teach the team of five students the arts of motorcycle handling. A few faults were detected at this stage including a weak rear-brake drum torque arm. The speedometer failed to work and the rear wheel was out of line. Otherwise the machine performed well and the students soon learnt how to handle the bike. In fact the handling qualities of the machine were beyond our expectations, even with the slight rear wheel problem.

The final two months of the competition, local radio and press interviews became a feature of our lives. The interviews were an important part of the competition. The students were questioned on every aspect of the project. They had to stand alone against the barrage of questioning. It required a quick calm mind and an intimate knowledge of the motorbike. In fact, this was the most difficult part of the whole project. Our minds were enlightened by this sudden influx of exposure to the media. The Build a Bike competition was about people talking to people, communicating ideas through the press, radio and television.