Tip: Click on the BOOKMARKS TAB to show / hide navigation

NOTE:
This is an excerpt from a Major Design Project Portfolio

Project Proposal

Identification of the Needs to Develop the Design Project

An Explanation of the proposed Design Project:

- The proposed design project is to design, produce and evaluate an innovative, eye catching and unusual water feature which uses recycled coke bottles to transport water from A to B (using a pump and gravity) in an interesting manner.
- The design will also incorporate a moving wheel of coke bottles as a supplementary feature. It is intended to investigate alternatives for powering the wheel e.g. water under the influence of gravity or motorised?
- It is proposed that the design project will also include other eye catching features such as bubbles, lights, use of coloured water and jelly crystals.
- Some principles of the Chinese art of Feng Shui (art of placement) will also be investigated and applied to the water feature. It is that the water feature will act as a source of tranquil relaxation and reflection. Both are important components of the Feng Shui philosophy.

Motivation, Purpose and target market of the project:

Motivation

- A substantial source of motivation came from the vast quantities of empty coke bottles generated within the school on any given day, only to end up as landfill. I felt that a well as recycling the bottles back into new coke bottles, there was a distinct possibility of showing people how such a resource could be re-used in an innovative way which benefits mankind, a relaxing and entertaining water feature.
- Using some of the methods of lateral thinking learnt in year 11, I was sure I could generate some alternative ideas for re-using empty coke bottles.
- "Brainstorming" was used to restructure accepted ideas and provoke new ideas for the use of a coke bottles.
- Another source of motivation was to build a better and more interesting water feature than the more expensive types available on the market.

Purpose

- The water feature will provide a source of relaxation and entertainment within the family setting.

- It is hoped that it will be a conversation piece which can trigger debate about the virtues of recycling and re-using.
- To construct a dynamic (with movement) water feature.
- To construct a mesmerising through flowing water, bubbles, water sounds and interesting movement.

The Target Market

- Although it is not intended to market the finished product, it is designed to act as a good example of recycling of resources and show what is possible with some "lateral thinking".
- In this sense the target market is anyone that sees and experiences the qualities of the water feature.

Areas of Investigation

Parameters of design

The design should:

- Use recycled coke bottles.
- Fit into the intended space.
- Have some moving parts.
- Have flowing water.
- Incorporate bubbles.
- Be strong, durable and rigid.
- Be safe especially if electricity is incorporated.
- Have a mesmerising effect with all features combined as a whole.
- Use recycled materials where possible.

What has to be Investigated?

- Is there such a need for a product?
- Will the design work?
- What are the required sizes?
- What are appropriate materials, tools and processes.
- What is the availability of materials that can be re-used e.g. bottles, sinks, MDF, etc.
- How much will the entire project cost?
- How much can I afford?
- Ways of communicating sketches, working, drawings, pictorials and photographs.
- Is the anticipated project within my ability range?

How will these points be investigated?

- NEED-

There is an existing need to look at sustainability and recycling of resources.

- Function-
  Test various components and systems as the need arises.
  Use experimentation to come up with the best solution to a certain problem. Also to produce a small prototype to get an idea of inherent design features.
- Materials and Processes-
  The experimentation of alternatives and to choose the best solution.
- Cost-
  Getting quotes for various components, compare prices and quality.
- Devise a finance plan to help with the costs.
- Think of alternatives for reducing costs. (This is important as re-using, recycling resources a key concept of the project.)

Criteria established to evaluate success

Function:

- To have a consistent flow of water throughout the whole water feature.
- To be no higher than 2100 mm and no wider than 800 mm to fit adequately in the space intended.
- To generate conversation and have a mesmerising affect on people who view the water feature.

Aesthetics:

- To look innovative, eye catching and unusual.
- To be uniquely different to other water features on the market.
- To have a tranquil and relaxing effect to the water feature.

Life Cycle Analysis:

- Once obsolescent, the water feature must be easily recycled, or easily broken down with minimal harm to the environment.
- To last a minimum of five years fully functional.

Sustainability and recyclability:

- To have easily replicable due to endless supply of recycled resources.

Safety:

- Where possible have wires and cables away from water, if necessary

wires and cables to be waterproofed.
- Quality of product must be of high standard for safety reasons.

Quality and durability:
- Quality of finished product must be of a high standard to help create the tranquil and relaxing affect to it.
- The water feature must be strong, durable and rigid enough to withstand time and possible degradation by water or exposure to the elements.

Most important qualities to the least important:
1. The finished product must function safely giving due consideration to any electrical systems and the formalities of spilled water causing a slip hazard.
2. Aesthetics- the product must look good and appealing and produce An air of relaxation while entertaining at the same time.
3. Recyclability - use of recycled products.
4. Finished product must be strong and durable.

Methods used to determine the success of the project:
- Evaluation by teachers, parents, siblings, friends, etc.
- Actual testing of the product in action to see if it functions as designed.

Identification and Justification of the Use of other Resources

Resources	Justification of the use of this resource
Finance	To purchase materials, equipment necessary to complete and present the MDP.
Time	Must be allocated to each stage of the "design process". It must be carefully monitored as it is easy to mismanage.

Research	Of other peoples ides, materials, availability of tools, communication methods which includes: • Magazines • Books • Internet • Shopping centres
Other People	• Teachers and Parents to assist with funds, ideas and direction • Experts (Hardware house - for pumps, paints, etc) • Councils to investigate recycling • Office works personnel, to help with the presentation materials
Materials	• MDF (recycled waste softwood) • Empty coke bottles - main feature • Old wiper motor - drive mechanism • Old sink - water receptacle • Folio materials
Tools and equipment	• Camera (recording whole process) • Hand tools • Equipment NOTE: all these needed to complete • Machines project.

Project Management

Finance Plan

Item	Proj. Cost	Cost	Prog. Total	Budget/Bal
				$500.00
Assorted Stationery	$10.00	$25.00	$25.00	$475.00
1/A3 Folder	$16.95	$16.95	$41.95	$458.05
MDF	$50.00	$0.00	$41.95	$458.05
Bicycle Wheel	$0.00	$0.00	$41.95	$458.05
Shaft	$10.00	$0.00	$41.95	$458.05
Coke Bottles	$0.00	$0.00	$41.95	$458.05
Wiper Motor	$40.00	$0.00	$41.95	$458.05
Transformer	$60.00	$0.00	$41.95	$458.05
Wires	$5.00	$0.00	$41.95	$458.05
Sink	$50.00	$0.00	$41.95	$458.05
Pond Pump	$200.00	$180.40	$222.35	$277.65
Plastic Tubing	$15.00	$0.00	$222.35	$277.65
Cable Ties	$4.00	$6.00	$228.35	$271.65
Air Stone	$6.00	$9.95	$238.30	$261.70
Air Stone Tubing	$2.00	$2.00	$240.30	$259.70
Primer (paint)	$20.00	$0.00	$240.30	$259.70
Under Coat (paint)	$20.00	$0.00	$240.30	$259.70
Top Coat (paint)	$30.00	$18.95	$259.25	$240.75
Lights	$25.00	$19.95	$279.20	$220.80
Blue Water Dye	$2.50	$2.95	$282.15	$217.85
Water Crystals	$5.00	$6.95	$289.10	$210.90
Silicone	$15.00	$0.00	$289.10	$210.90
Photo Film	$20.00	$33.45	$322.55	$177.45
Film Development	$40.00	$55.75	$378.30	$121.17
TOTALS:	$619.50		$378.30	$121.17

Due to free stuff given I was able to afford a good pump.

Project Development

Research

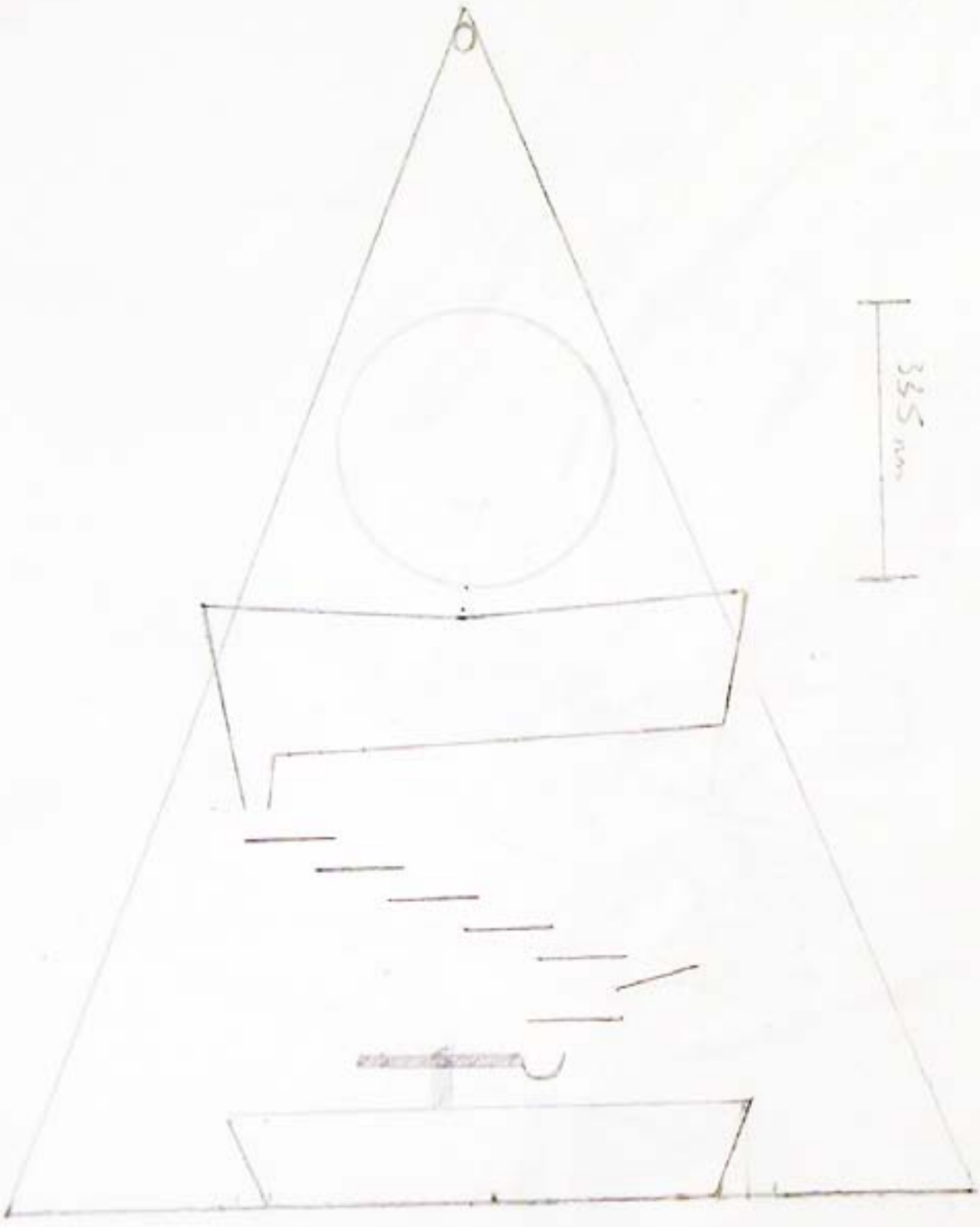
The following research has been carried out:-

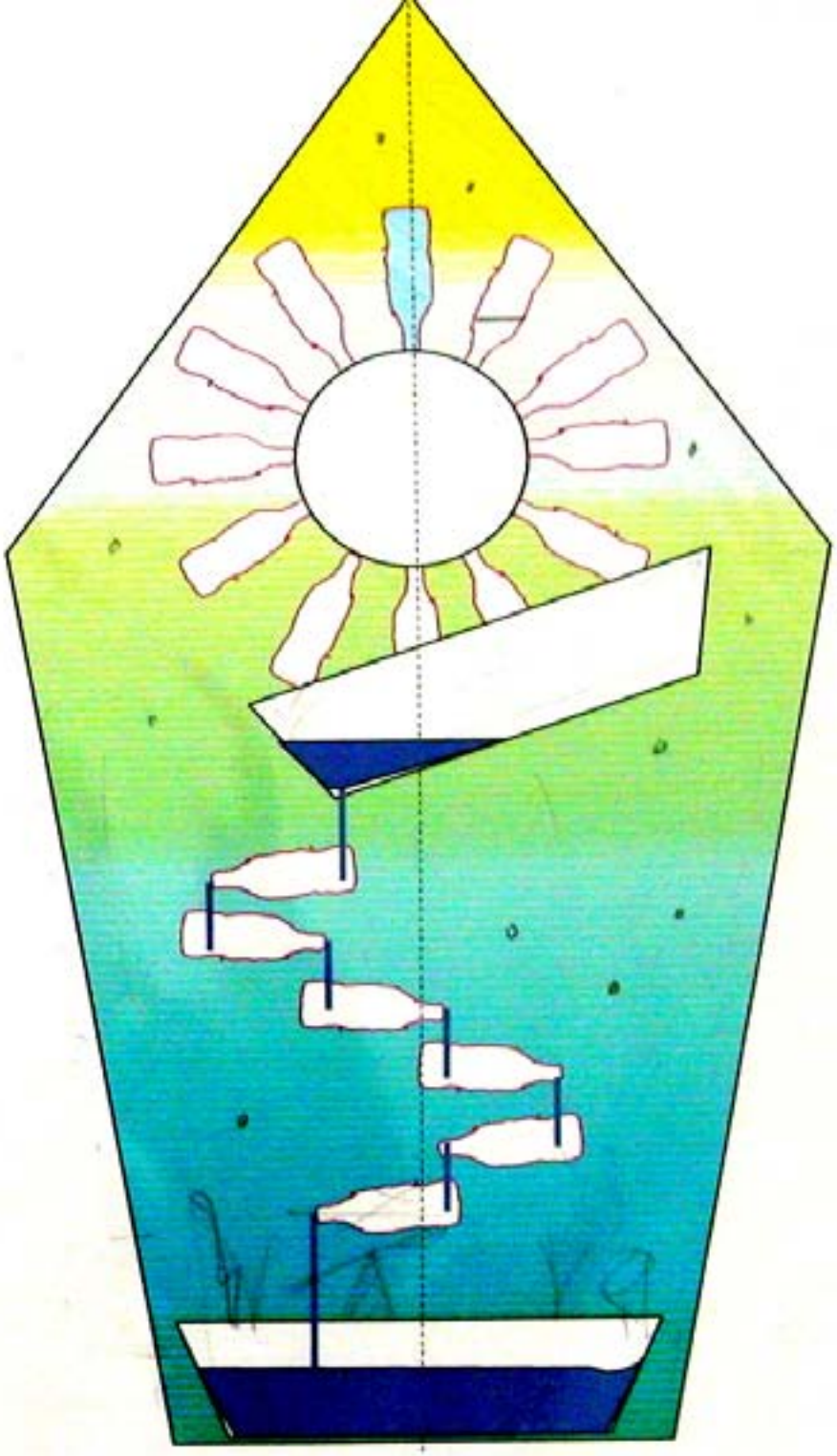
1. **Research of literature:**
   Reference has been made to as many water feature website and Hardware house pamphlets to check whether the proposed design of the water feature has been done before. Also to help inspire aesthetic design and gain ideas about the water feature and the types of pumps need for an indoor water feature. Reference has also been made to a number of plastic and chemical industries websites to investigate the different types of plastics in bottles (especially coke bottles), recycling and recovery stats of PET bottles (coke bottles) and PVC bottles nationally over the last two years, ways in which coke bottles are recycled and where the recycled plastics are going to and to which industries they are going. These points were investigates to help the designer to gain knowledge about chemical properties and the dynamics of a coke bottle to help with testing and experimentation.

2. **Testing and experimentation of materials, tools, techniques and other resources:**

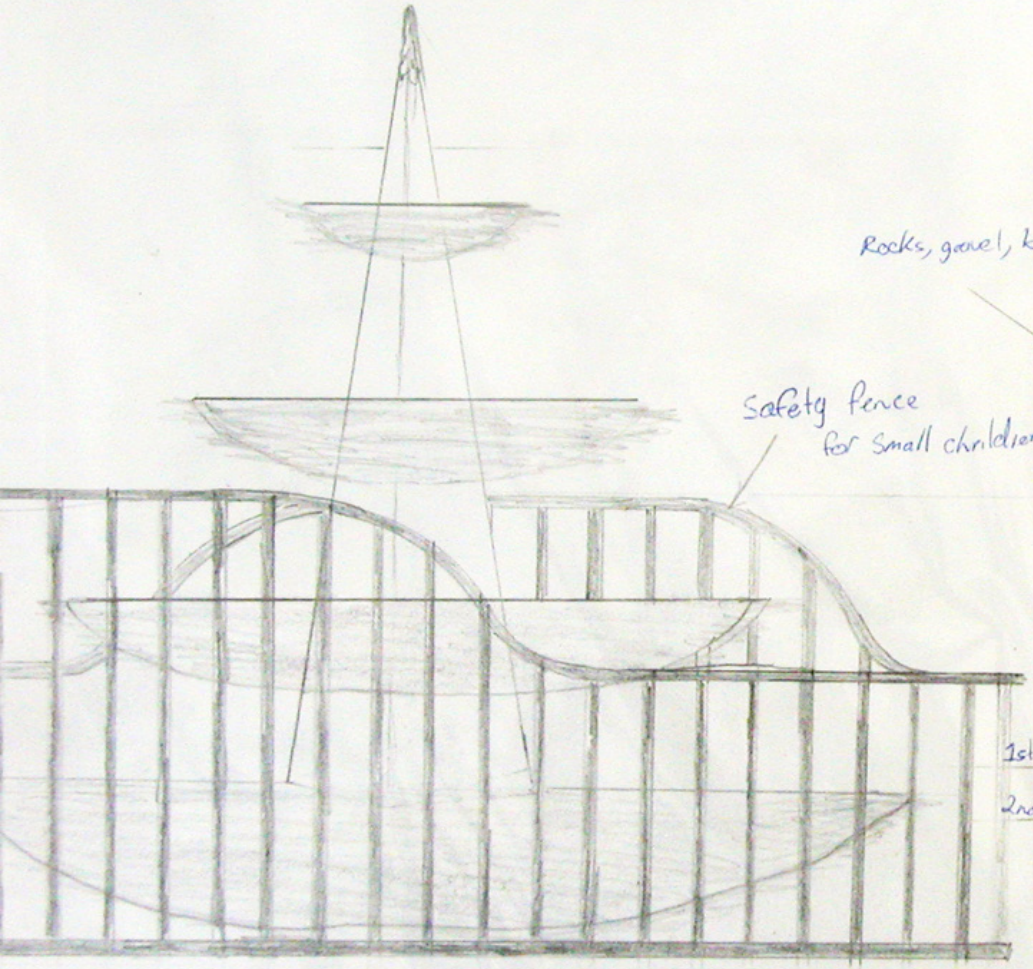
- Layouts were designed and tested on a computer for suitability for use in this portfolio.
- The decision to have a spinning wheel as one of the main features of the water feature has resulted in the necessity to research and test different designs proposed for the wheel, different materials for the proposed designs and different techniques used to construct the proposed designs and means on propelling the wheel.

- Testing of visual features such as; different coloured water, different cut designs in the coke bottles, what materials complemented the coke bottles e.g.

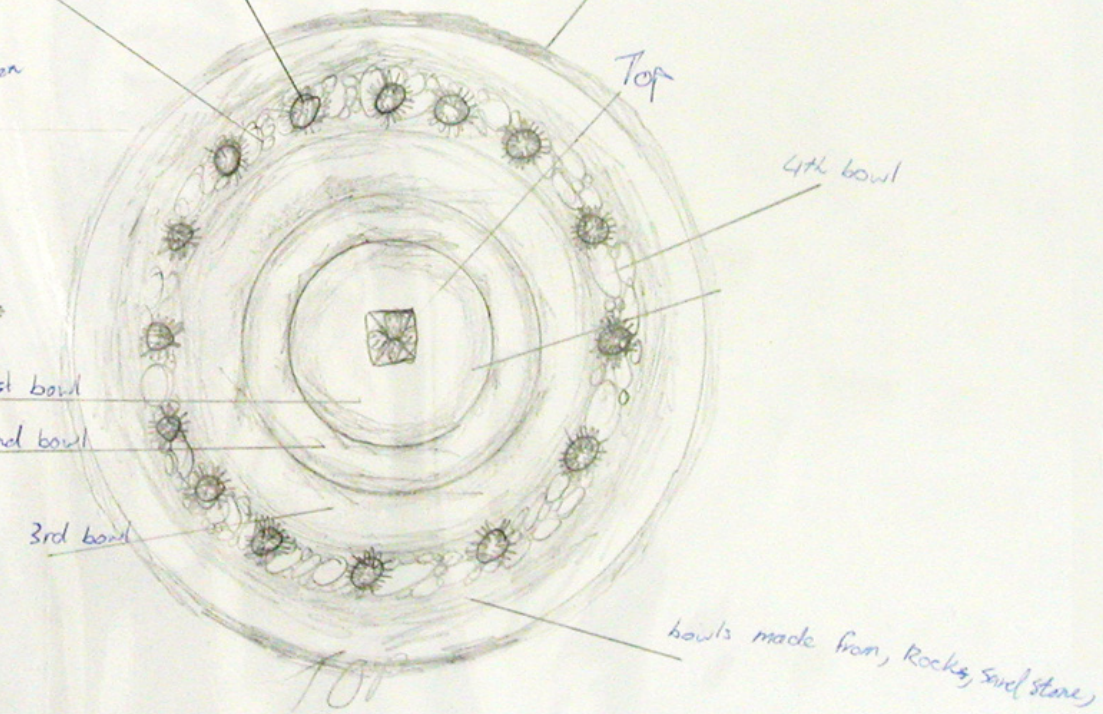

335



DESIGN #2



SIDE VIEW



TOP VIEW

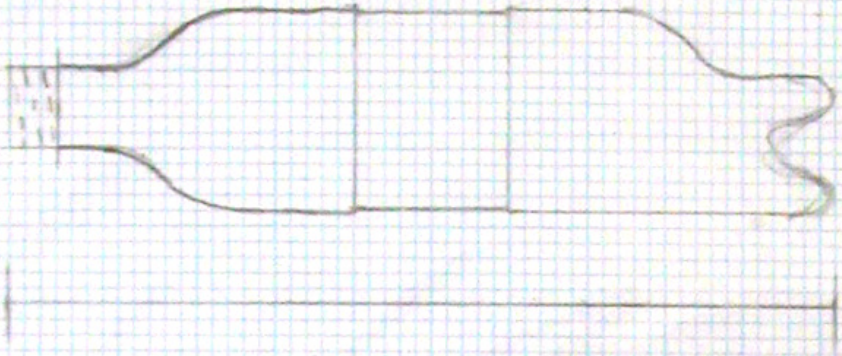
How final design of water feature was selected

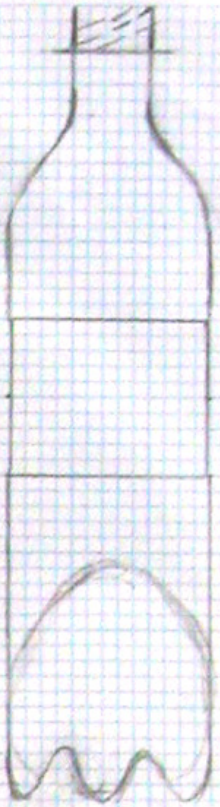
- Final design of the water feature was selected due all research, testing and results done. All results from tests and design solutions were considered in final design and applied or were not applied.

- The major design factor that helped select the final design for the water was the testing and results of test # 5, because of these results it was decided to split the water around the wheel while keeping the movement of the wheel as a main feature instead of having the water going through the wheel which was the original plan.

- Weeks and weeks of brainstorming also went into the final selection of the design.

COKE BOTTLE DESIGN





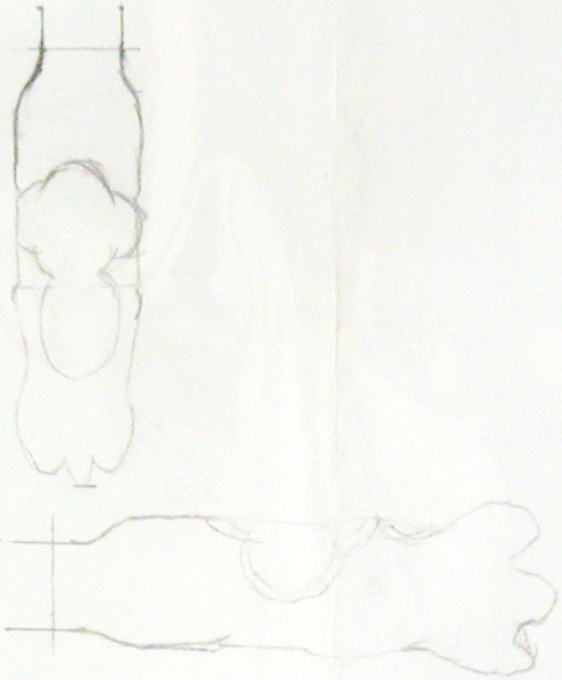
NOTE: This design is to be use in/on the water wheel. It has had the bottom cut out into a cup shape to help cater the water that drops onto it. It can also be used on its or incorporated with others to create an eye catching water effect which you will see in other drawings/sketches.

Good design
Just don't know how well it will work in water

Bottle Designs

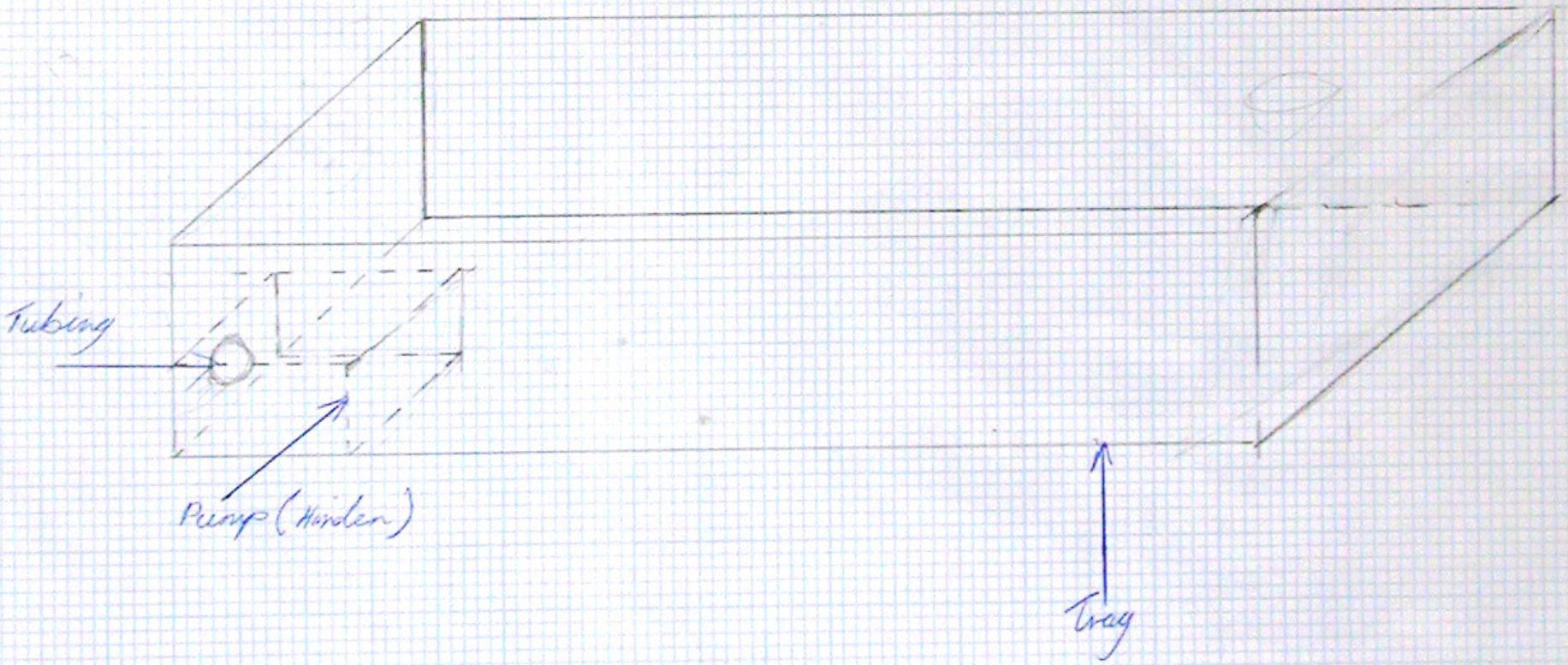
1.

2.

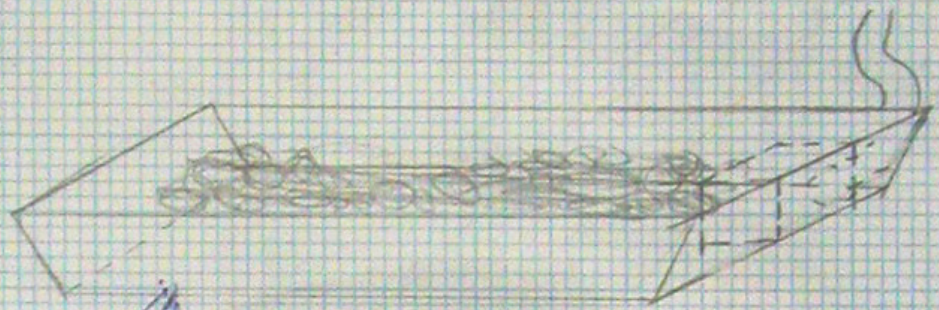


Good designs need to be tested

Tray 1



NOTE: This diagram shows an idea to hide the pump. In most water features the pump is hidden in or away from the water feature because it is unsightly & detracts from the water feature itself. I am intending to hide the pump under/with river rocks or glass bead or whatever is decide to put in the tray. The tubing will come out from the side of the tray.



This second tray i think will be the tray to go on my water feature because of its Aesthically design which fits in with the design of the water feature.

How final design for reservoir was selected

- Final design was selected due to the testing and results of test #2 (refer back to test 2)
- Brainstorming also helped come up with the sink idea, because it would be keeping in with the recycled materials stated in the project proposal.
- The sink was an obvious chose because it is designed to hold water, able to hid such things as tubing, power cords in the drainage system and will last for long with out showing signs of ware and tare.

PORTFOLIO

Why oil based paints were selected for use on Backboard

- Oil based paints were selected to help protect the backboard from water damage, which may be cause by constart water being splashed up against and to protect it against the elements of nature if keep outside in an entertainment area.

- The backboard is made from MDF, if water is allowed to seep into the MDF it could potentially cause a danger if the MDF becomes unstable and falls, it could start electrical fires, cause damage to property or even cause injury to persons in the vicinity of the water feature.

- To give the backboard extra protection and to give it a better finish a coat of primer will be painted on, a coat of undercoat will be painted of and two coats of top coat will be painted on.

- To save time, money and paint a cheap sponge roller set will be purchased, this will also give a better finish to the product as there will be no visible brush lines you tend get when painting with brushes.

Decide on this colour to help contrast with

PORTFOLIO

Experimentation and testing

Test # 1

(I) **Aim:**

To conduct a visual test to see how different coloured water and different liquids look and react in a coke bottle.

(II) Method: (please refer to the testing apparatus provided)

- The bottle will be half filled with water mixed with blue food dye and water crystals to allow for free movement of the liquid in the coke bottle.
- The coke bottle will be left for ten minutes to allow the water crystals time to absorb some of the water and to give the water a more chunky look to it.
- The bottle will the be rotated slowly by hand and laid on it side to see the visual affect the of the blue water and the water crystals combined, a visual observation will be taken.
- A picture of the bottle with the liquid in it is shown below.

(III) Results:

When bottle was slowly rotated: moved slowly up and down bottle, had a very sloppy look to it, blue colouring complements the coke bottle well, noise of the liquid creates a relaxing feeling

When the bottle was laid on it side: could almost imagine blue water pouring out of it and onto another coke bottle, still has relaxing effect about it

(IV) Conclusion:

- The test has proved to me that using the colour blue in the water would enhance the visual appeal of the water feature a lot more that normal clear water would.

Experimentation and testing(con't)

Test # 2

Good in helping to pick colour

(I) Aim:

To conduct a rust test on several different metals to determine which metal would be best suited for use in a water reservoir at the bottom of the water feature.

(II) Method:

- The various metals (Copper, Brass, Sheet metal, Alimunium and Stainless steel) will be placed in small separate containers.
- These containers will be half filled with water, each day the water will be changed to immitate how the pump filters and cleans the water as it passes through the pump.
- The metals will be left in the water over a period of about a month and observations will be made weekly.

(III) Results:

Metals	Week 1	Week 2	Week 3	Week 4
Copper	No signs of rust.	No signs yet.	Small spots of rust appearing.	Only small spots of rust visible.
Sheet metal	No signs of rust.	No sings of rust yet.	Visible spots of rust.	Small areas of rust very visible.
Aluminium	No signs of rust.	Small spots of rust.	Small spots of rust.	Visible areas of rust.
Brass	Small sings of rust.	Small areas of rust.	Small areas of rust.	Large areas of rust.
Stainless steel	No signs of rust.	No signs yet.	No signs yet	Almost no spots of rust.

(IV) Conclusion:

- The test showed conclusively that stainless steel would be the best suited material to use for the reservoir.

Experimentation and testing(con't)

Test # 3

(I) Aim:

To conduct a technique test to see which techniques would be suited best for make holes in the coke bottles. The three technique are
(A) Melting holes
(B) Cutting holes with Stanley knife
(C) Frozen bottle technique

(II) Method:

(A) Melting holes

- Several pieces of steel rods are to be heated up to high temperatures.
- The rods are to be gently pushed in and out of the coke bottle to create the hole.

(B) Cutting holes with Stanley knife

- A desired pattern is to be marked on the coke bottle.
- Using a drill press four small hole are drilled at various points of the pattern to help in the cutting process.
- pattern is cut out with Stanley knife.
- (C) Frozen coke bottle technique
- Fill coke bottle up with water, place in freezer leave over night.
- Secure frozen coke bottle, using electric drill and hole saw bit, drill into coke bottle, cut desired pattern.
- leave frozen bottle to thaw.
- Observations to be made on all tests

(III) Results:

- Melting holes:
  Left burnt bubble marks around edge of holes but could be easily cleaned up with file, timing is essential only get a few seconds to push metal rods through before they cool to much and if let in to long desired affect my not happen.
- Cutting with Stanley knife
  Leaves clean cut, easy mistakes can be made, very easy to cut self with knife.
- Frozen coke bottle
  Leaves clean cuts, very time consuming, some patterns may not be able to be achieved.

(IV) Conclusion:

- Results prove that both meting and cutting with Stanley knife are good methods of making holes in coke bottles.

Experimentation and testing(con't)

(Spinning test 1)

Test # 4

(I) Aim:

to conduct a test on the bicyle wheel to figure out a means of spinning the wheel.

(II) Method:

- Coke bottle with bottoms cut off to be screwed into bolted on caps.
- The wheel will be secured onto a chair via a piece of metal which had been attached to the wheel itself.
- Running water will immmitake the flow of water from a pump this will be done with a hose various speeds of water flow will be tested
- Observation will be made

(Please refre to pictures & schematic drawing on the next page)

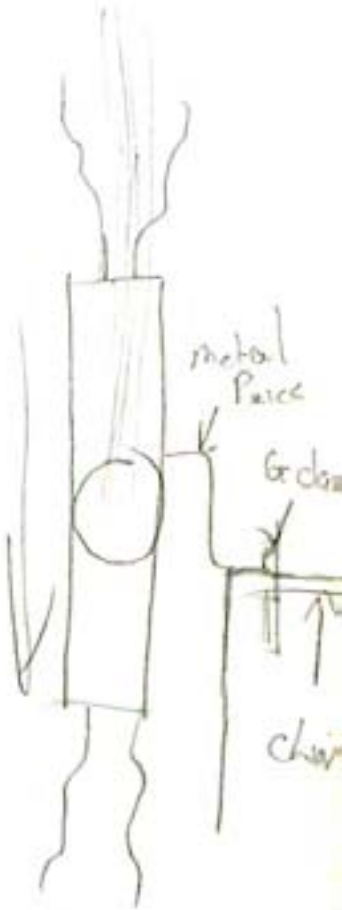
(III) Results:

Speed	Designing observations
Slow Speed	Water splashing everywhere, wheel going nowhere, bottles slowly filling up
Medium Speed	Splashing everywhere, going wheel going too fast bottles, not filling up
Fast Speed	Splashing everywhere, no water going into bottles at all, going way too fast

N/A * Picture of Test 4

Schematic Drawing

Front view



Side view

(IV) Conclusion:

- Test show conclusively that water is not the best way in which to spin the wheel
- Another way to spin the wheel has to be tested

Experimentation and testing(con't)

(Spinning test 2)

Test # 5

(I) Aim:

to conduct a test on the bicycle wheel to figure out a means of spinning the wheel.

(II) Method:

- As in previouse tests coke bottles witht the bottom cut off are to be used.
- This time air will be the emthod used to spin the wheel
- A hair dryer will be used to spin the wheel by placing the hair dryer and two different angles, & different speed will be tested
- Wheel will be placed in bench vice which is connected via a piece of metal which is bolted into the wheel.
- Observations will be made

(Please refer to the schamtic drawings on the next page)

(III) Results:

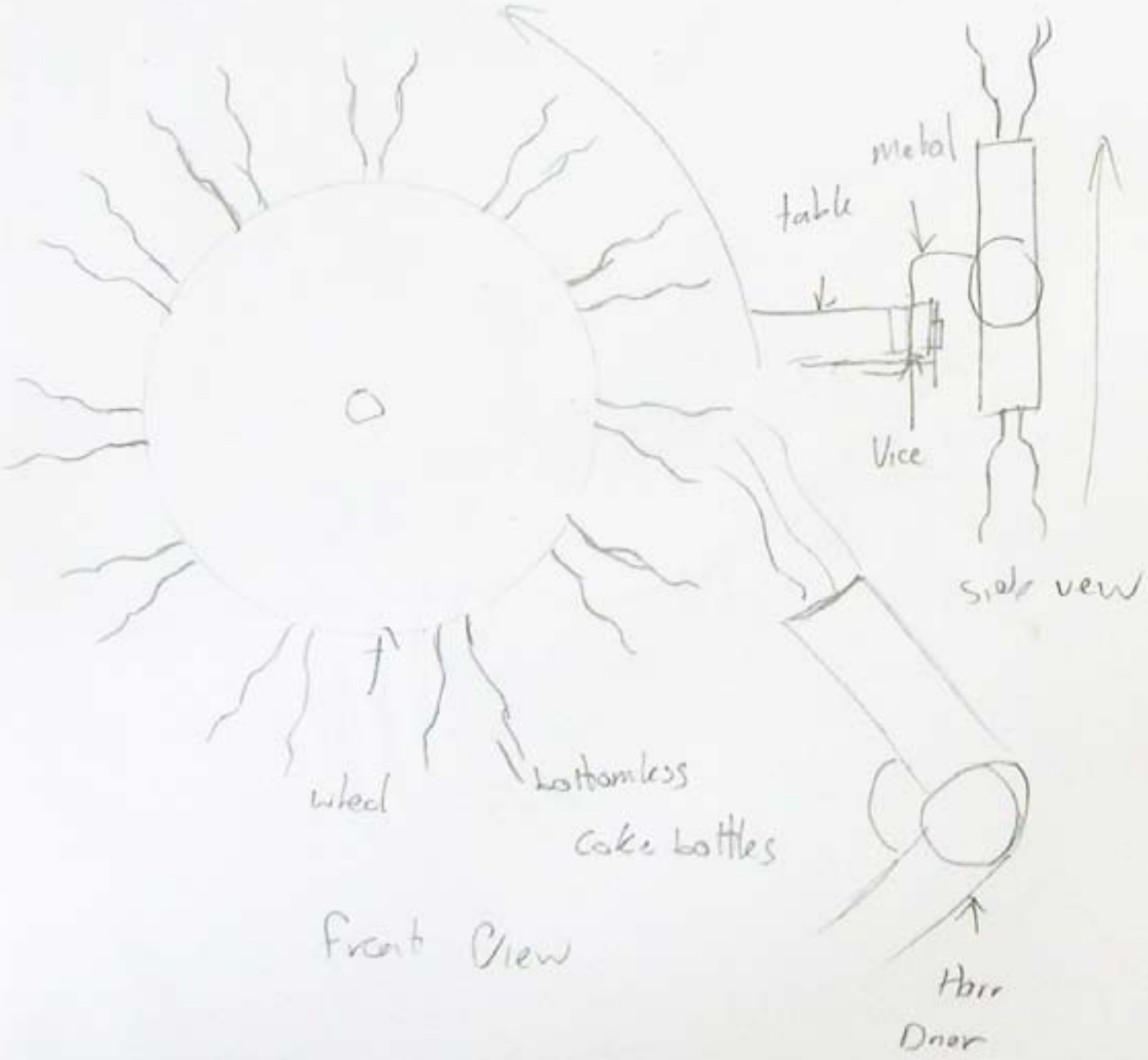
Speed	Designing observations
Slow Speed	No movement of wheel
Medium Speed	No movement of wheel
Fast Speed	Very, very slow movement of wheel

(IV) Conclusion:

- Test show once again that another way to spin the wheel has to be found.

Test 5

Schematic drawing of
Spinning test 2.



Helped in testing Pilot.

Experimentation and testing(con't)

Test # 6

(I) Aim:

to conduct a colour test on the bubble feature to see which colour would enhance the feature.

(II) Method:

- Bubble feature will be set up & turned on for test.
- Four different food colourings will be used there are: blue, yellow, red and green.
- 5 drops of a colour will be placed in the bubble feature & left for 30 minutes to let the colour go through the feature.
- This process will be repeated for each colour
- Observations will be made

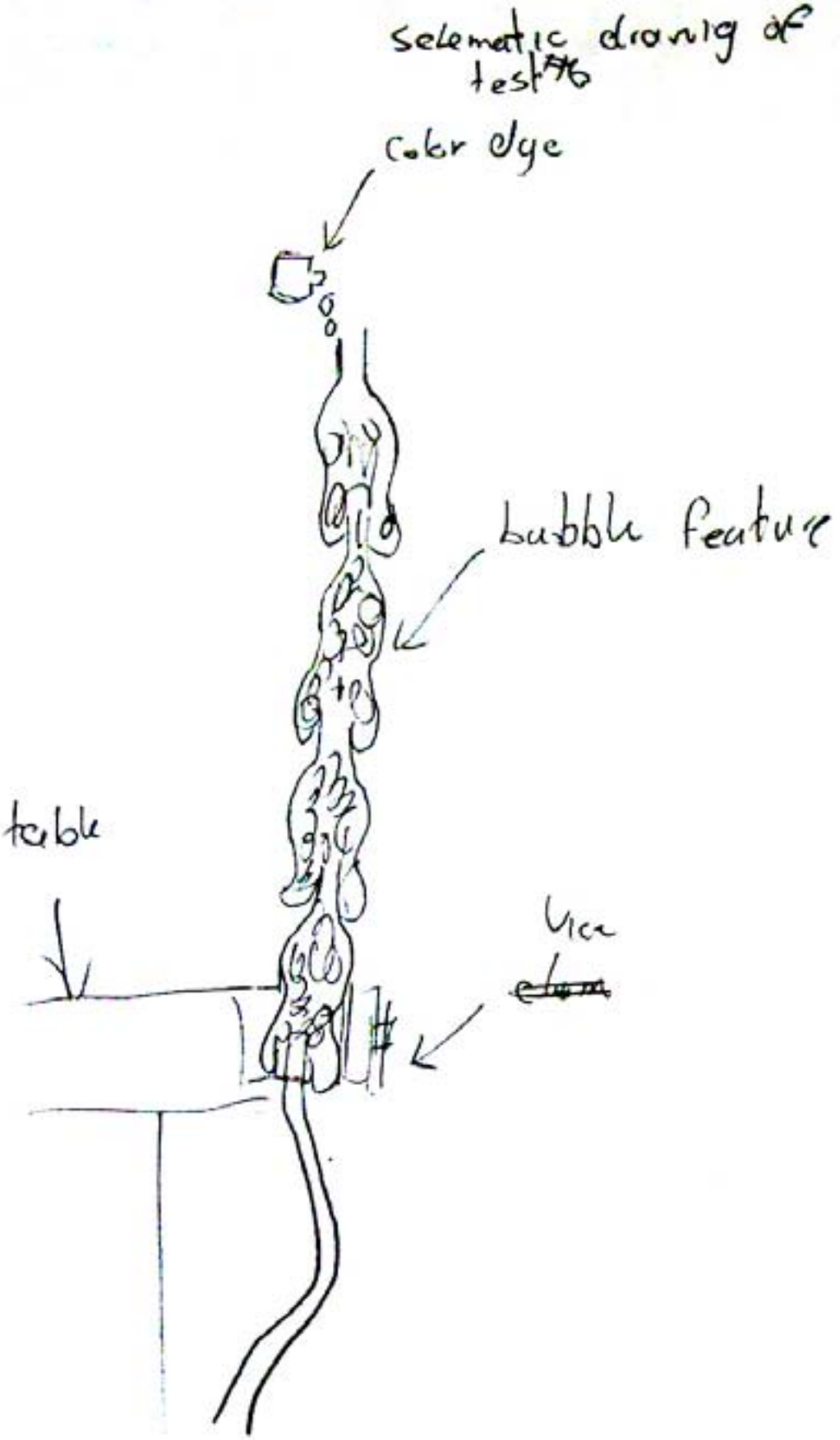
(Please refer to the schematic drawings on the next page)

(III) Results:

Colour	Designing observations
Blue	Like the colour, but with blue water flowing thought the water feature already, looking for contrasting colour
Yellow	Wont look good with greens and blue, which are main colour of the feature
Red	Looks good. Contrast well with the blue water and green background.
Green	Like the colour but not enough contrasting, which is what I want

(IV) Conclusion:

- Test has proven to designer that red is the best colour to use in the bubble feature because it contrasts well & complements the blue water & green background of the water feature.


schematic drawing of test #6
color dye
bubble feature
table
Vice

PORTFOLIO

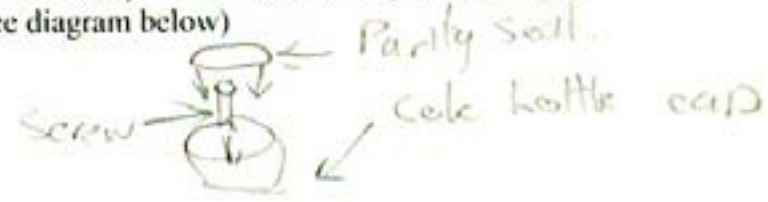
EVIDENCE OF CREATIVE SOLUTIONS

1. Problem encounted : how to make bottle caps on bicycle wheel watertight.

Creative solution:

By removing the purity seal then bolting the bottle cap into to the bicycle wheel the and then putting the purity seal over the top of the bolt. The purity seal then reseals the bottle cap. Thus the bottle cap is water tight.

(see diagram below)



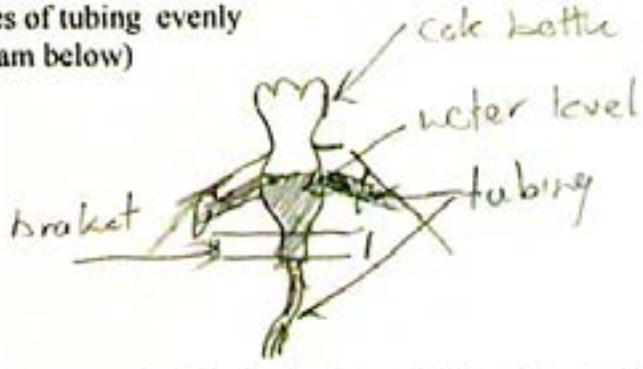
2. Problem encounted: water only pumping to one side at T section in tubing at top of water feature.

Creative solution:

We used a coke bottle as a holding well to evenly distrubute the water down both side of tubing.

The water fills up in the bottle to where both pieces of tubing are and then splits down both pieces of tubing evenly

(see diagram below)



Problem encountered : Coke bottles keep falling off water feature when being glued on.

Creative solution: Screwing coke bottle into water feautre just above water line with small screw.

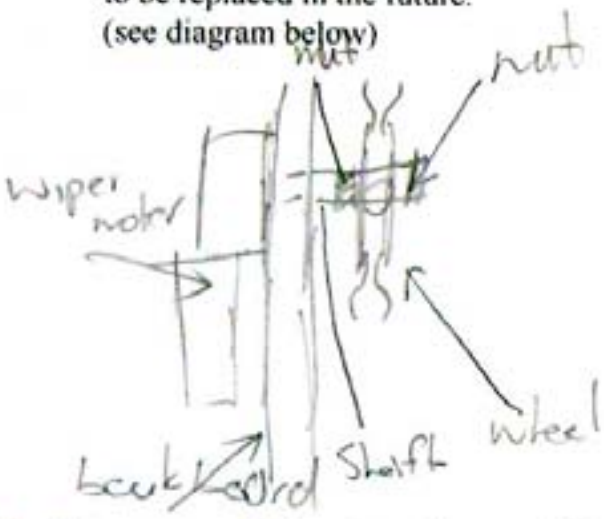
(see diagram below)

Great idea to Builder

Problem encountered: How to motorise bicycle wheel.

Creative solution: Use a small motor.

1. the idea of using a car windscreen wiper motor.
2. By welding a melt shaft cut to size the wheel can be slid.
3. into the shaft and tightened up with a nut.
4. The motor is screwed into a small piece of scrap wood and the screwed into position. This is so it would be easily to remove if the motor needs to be replaced in the future.
   (see diagram below)



Evidence of the testing of design solution & application of conclusion

Wheel test 1 (round wheel)

Test # 1

(I) Aim:

to conduct a test of the first wheel designed to see if coke bottles can be attached.

(II) Method:

- Wooden wheel is to be cut out of large square of scrap timber.
- 24 positions for coke bottles are to be marked on the wheel.
- 2 separate techniques of attachment are to chosen and done on the wheel.
- 1ST technique is using a spade bit cutting a hole the same width as a coke bottle cap into the wood down to a depth where coke bottle cap is flush to end grain.

- coke bottle cap will then be glue into position. (see apparatus provided)
- 2nd technique is to have coke bottle cap screwed onto wheel
  (note both will be observed)

(please refer to the schematic free hand drawing on the next page)

(III) Results:

- 1st technique: Had problems drilling into end grain, spade bit kept slipping in hole so was not able to glue cap into wood.
- 2nd technique: Bottle cap screwed in well no problems, once coke bottle was screwed onto the cap it move around to much on screw, added liquid to bottle, found that bottle moved around far to much for designers liking.

(IV) Conclusions:

- This test show the two techniques didn't work well at all.
- This test also provided a great research tool to help in the problems of attaching the coke bottles.

Evidence of the testing of design solution & application of conclusion (con't)

Wheel test 2 (octagonal wheel)

Test # 2

(I) Aim:

Same test previous test, but this time wheel had been designed from results derived from previous test & conclusion.

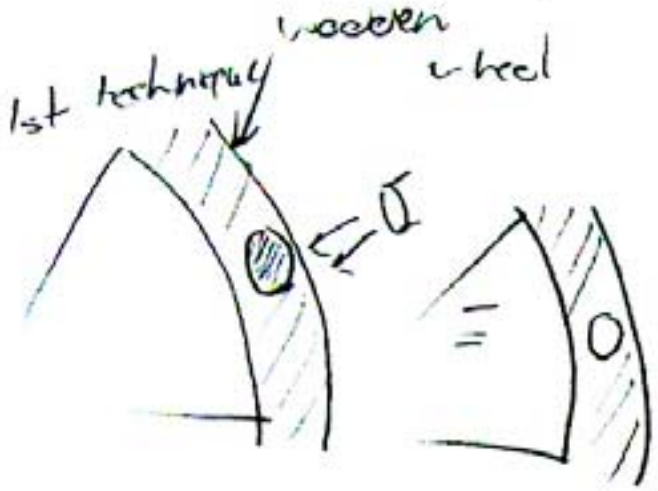
(II) Method:

- Octagon wheel will be cut from scrap timber.
- Octagon design is table chose in the hope to reduce the amount of movement of the bottle once the bottle cap has been screwed into place which was a major problem in test due to the round surface of previous wheel.
- eight sides to be sanded flat on the disc sander to help prevent movement.

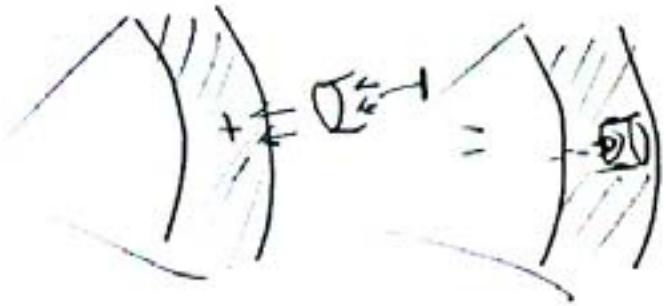
(please refer to the schematic free hand drawing on the next page)

Free hand Sketch

of wheel test 1

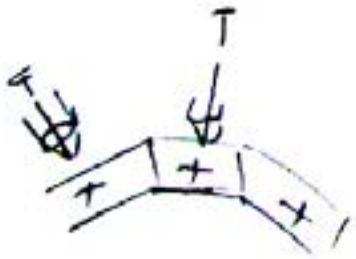


2nd technique



---

wheel test 2



(III) results:

- Screwed in well initially no movement of coke bottles at all
- During course of a week with constant movement & bumps, bottles became loose and some even fell out.

(IV) Conclusions:

- Test prove that wood is not the most suitable for wheel.

(V) Conclusion of test 1& 2

- Both test have proven that wood is not suitable for the constitution the wheel because of the contact steed of the rotating wheel the screws & wood, the wood cannot hold the screw of long periods of time.
- as a result another material must be looked at for the wheel.

Evidence of the testing of design solution & application of conclusion (con't)

Wheel test 3 (bicycle wheel)

Test # 3

(I) Aim:

Same as previous two tests, this time a metal bicycle wheel is being used. (NOTE: this bicycle wheel is being used because (a) it is metal, (b) is keeping with recycle theme and (c) it is unlikely to deteriorate like other wheel from previous tests.)

(II) Method:

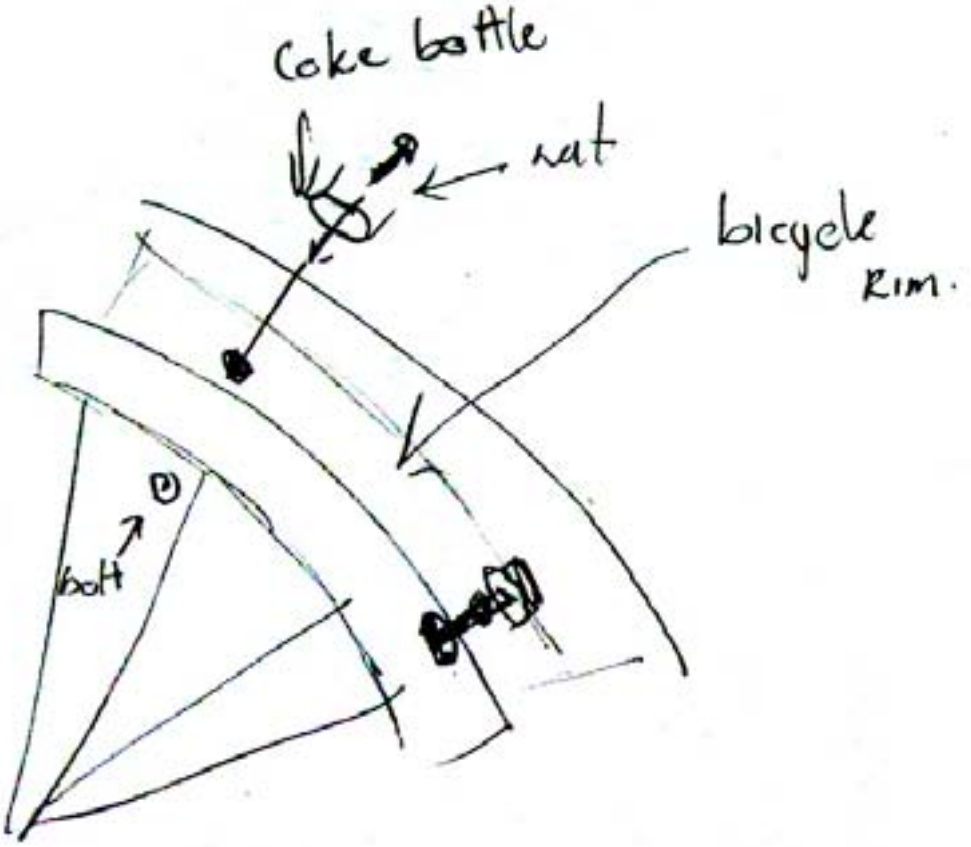
- Ten points are marked on the rim of the bicycle wheel for drilling.
- Once drilled, using same drill ten bottle caps are to have holes drilled into them as well.
- The bottle caps are to be bolted on tight to the rim of the bicycle wheel and coke bottles screwed into them.
- Wheel is to be rotated at a consistent speed and observed.

(please refer to free hand drawings on next page)

(III) Results:

helped alot

Free hand drawing
bicycle wheel.



- Caps bolted on well, no signs of ware or looseness, over period of two weeks no ware and tare appeared.

(IV) Conclusions:

- Test prove conclusively the bicycle wheel is ideal for use as the wheel.

(V) Application of Conclusions:

- This wheel is to be used as the wheel for the final product as direct result of testing of the previous designed wheels.

Application of Conclusions

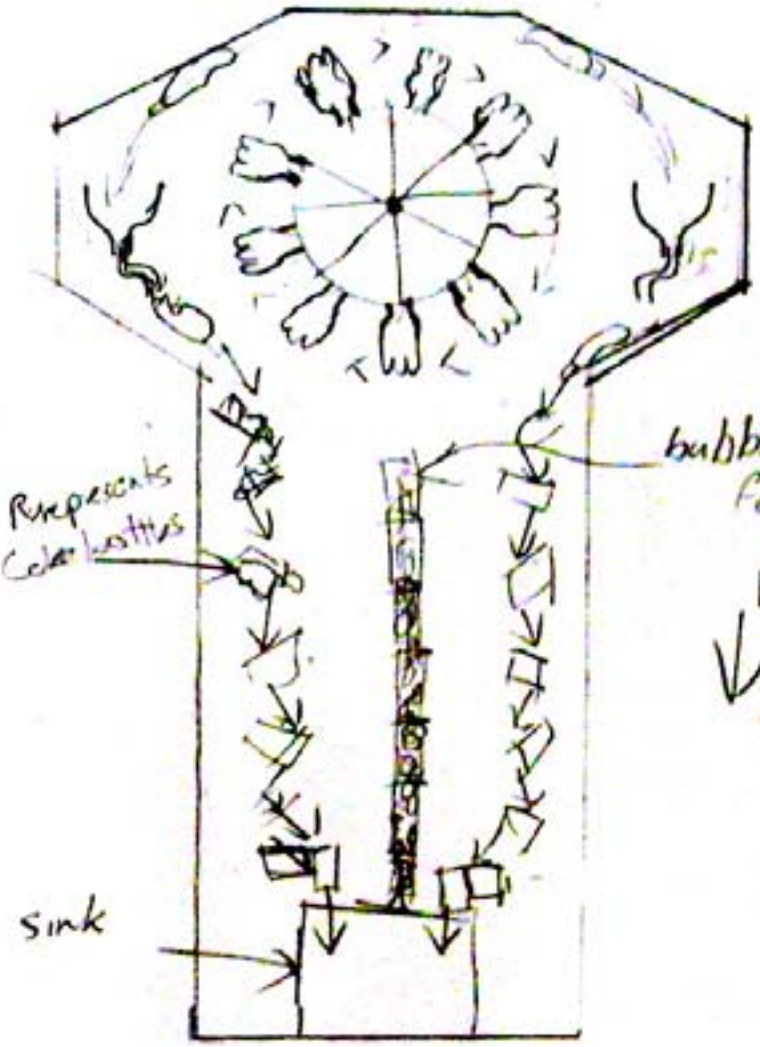
Application of conclusions on the water feature can be seen:

- The blue water which flow throughout the entire water feature. This has come about from the testing and results of test # 1.
- The stainless steel sink which is being used as a water reservoir. This has come about from the testing and results of test # 2.
- The cut design of the coke bottles on the water feature. This has come about from the testing and results of test # 3.
- The spinning bicycle wheel feature at the top of the water feature. This has come about from the testing and results of tests both 4 and 5 and also in the design, research and testing of 1, 2 and 3 in evidence of testing of design solutions and application of conclusions.
- The contrasting colour of red in the bubble feature. This has come about from the testing and results of test # 6.

Use of communication and presentation techniques

[redacted]

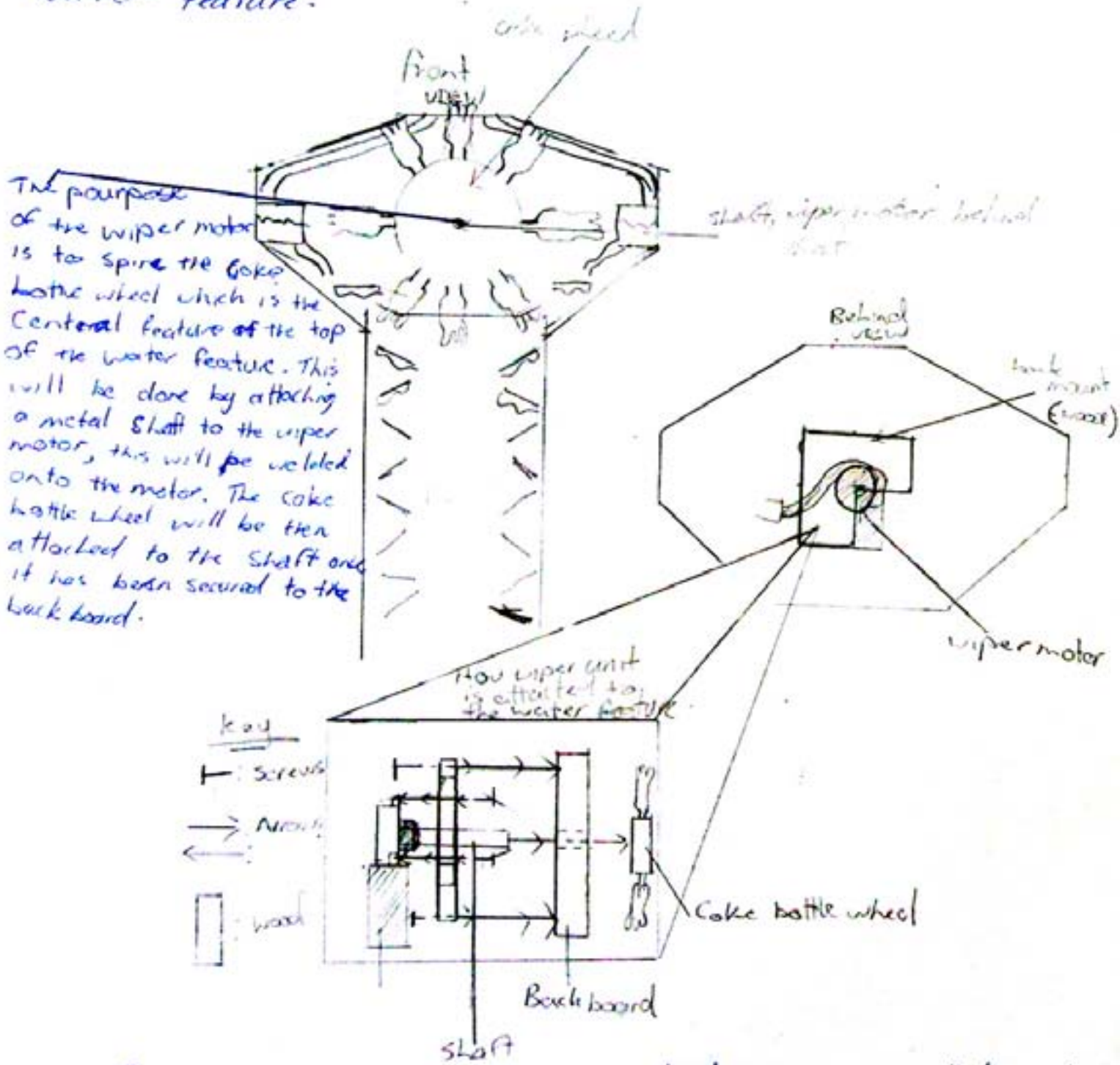
Concept
sketch



Represent water
flow.

Wiper motor
Explanatory Sketches

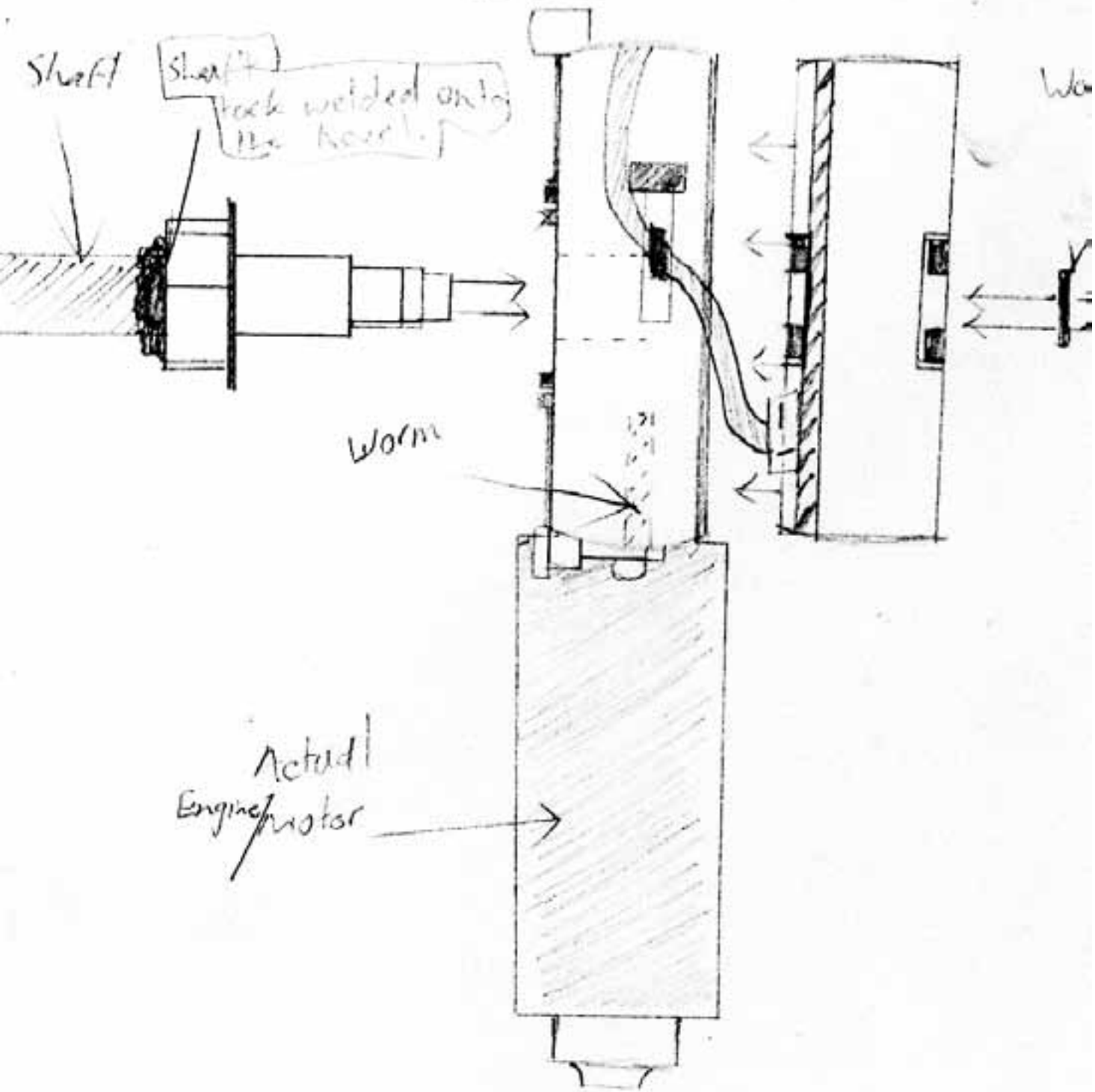
The wiper motor will be used on my MDP to spin the coke bottle wheel at the top of the water feature.

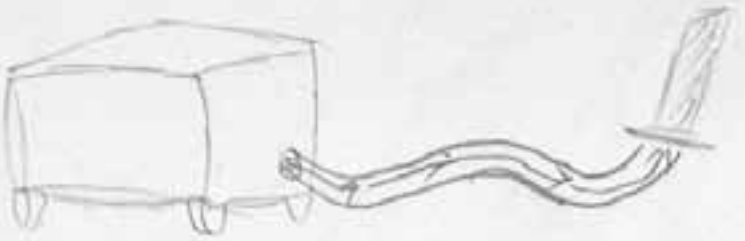


The wiper motor idea came about after the waterwheel test. Due to the fact that the water wheel was a failure & the lessening time I had, I could not afford to try to fix the waterwheel so I came up with the idea to make it the centered feature up the top of the water feature.

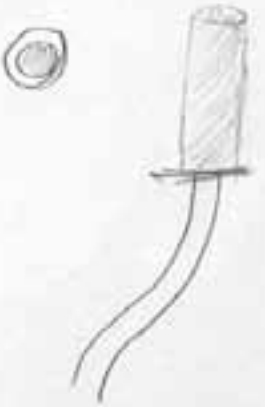
Dimentioned or Hogonal

Drawing of wiper motor & axel.





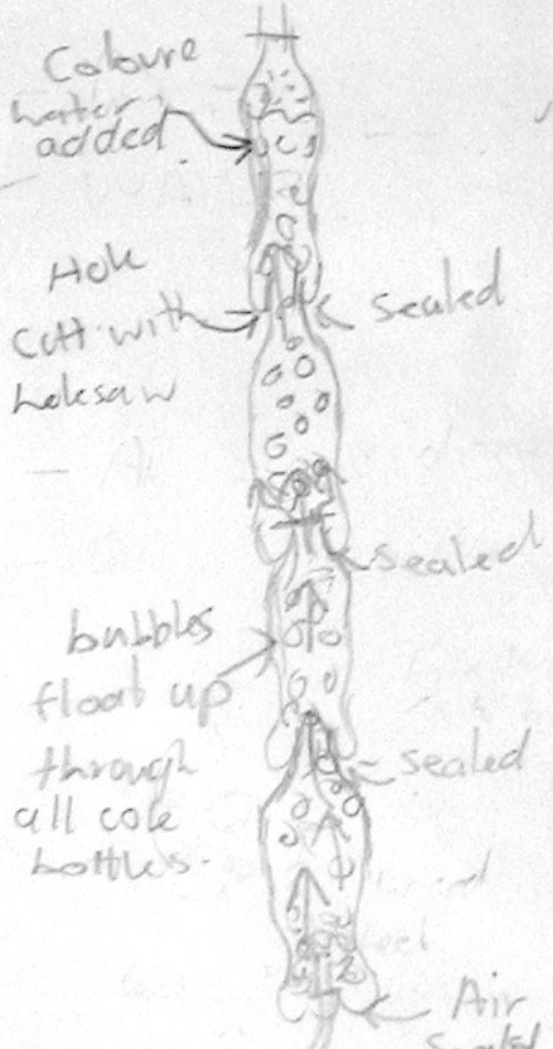
Air stone.

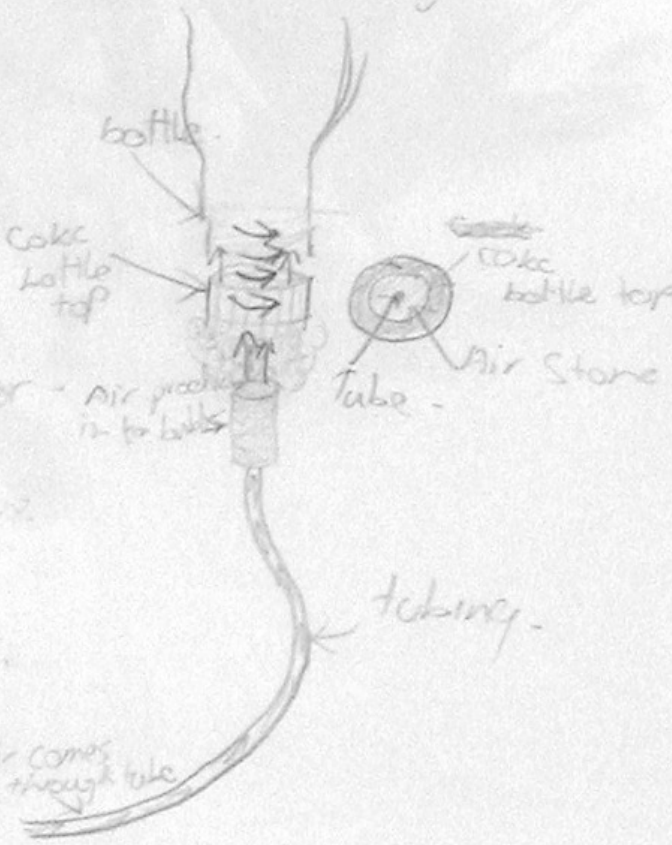


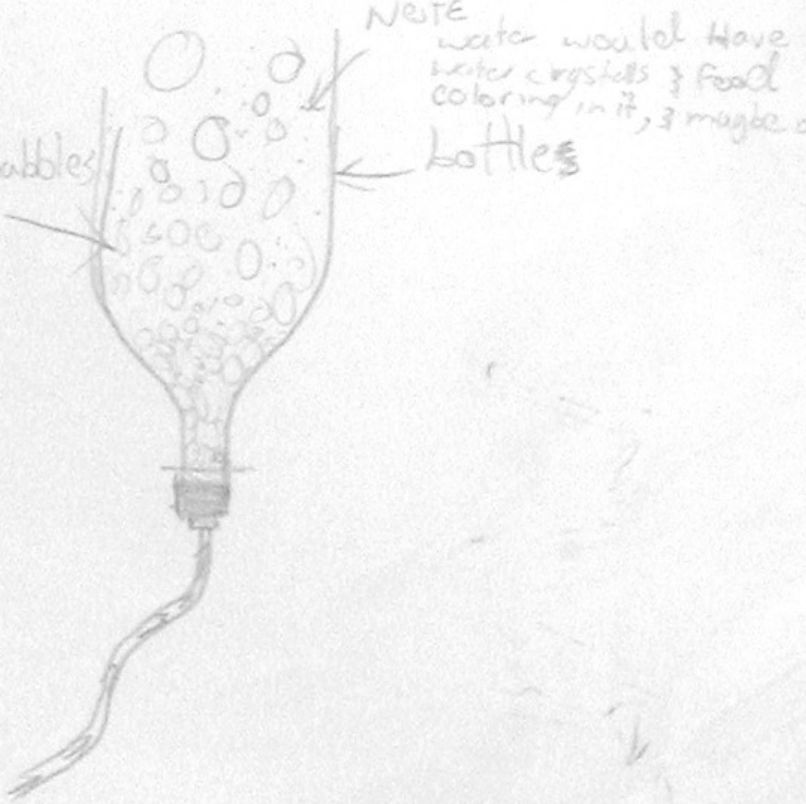
Air Stone pump.

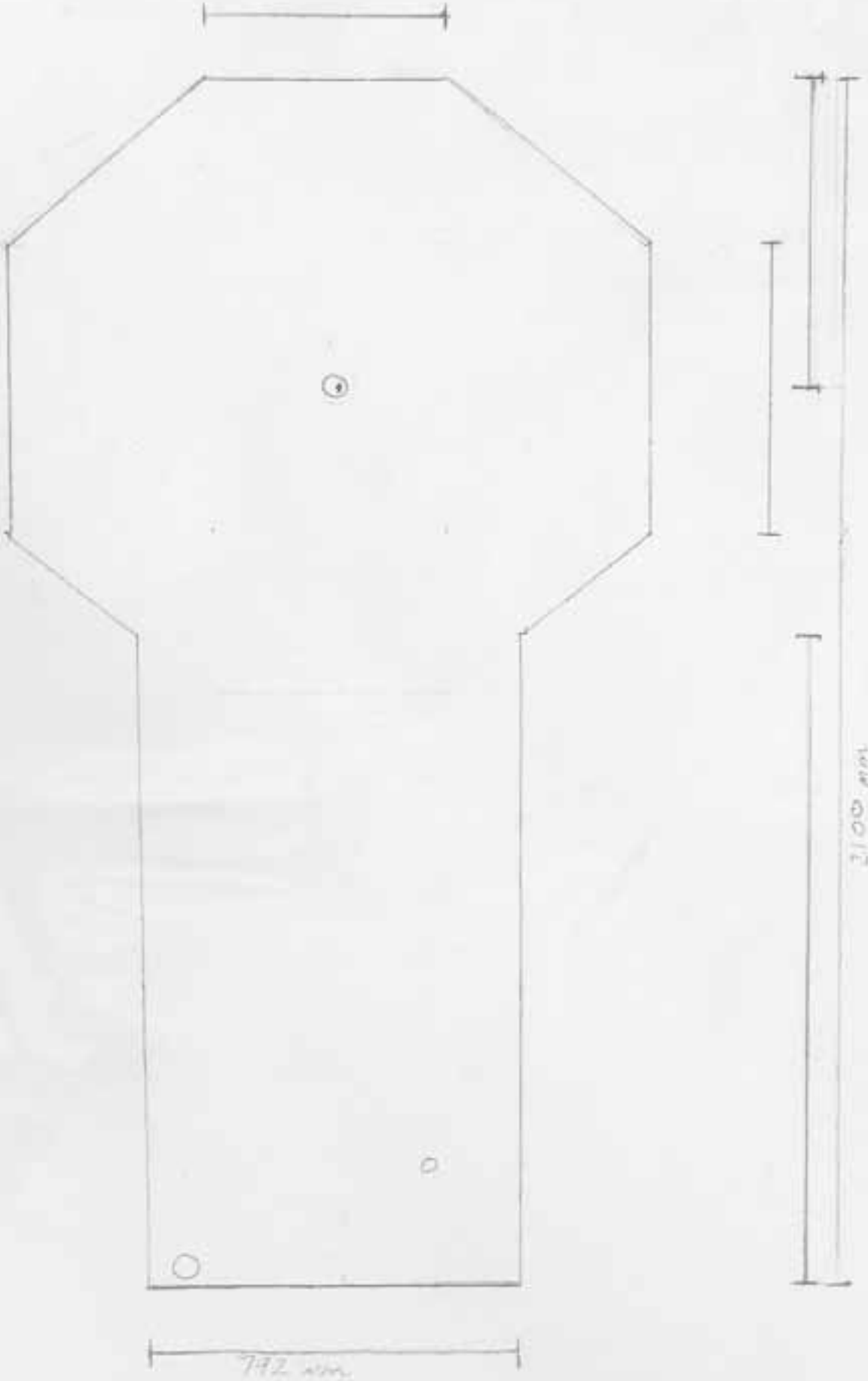
Design ideas

for bulbs feature









1/32 SCALE DRAWING OF BACKBOARD

Project Realisation

PORTFOLIO

Evidence of Practical Skills

Making of the Backboard

- Design for backboard was marked onto large sheet of MDF.
- Design was cut out with jig saw.
- All edges planed down straight and accurate to measurements with jack plane. (smaller harder to get at areas like corners were either file down or a spoke shave was used.)
- Holes for tubing, shaft for wheel and power cord to pump were accurately marked out and drilled to appropriate sizes with various spade bits.

Drilling holes into Bicycle wheel

- Ten points were accurately marked on the rim of the bicycle wheel.
- Using drill press, ten holes were drilled into bicycle wheel.
- bicycle was held by friend while I drilled the holes.

Drilling holes into coke bottle caps and bolting them onto bicycle wheel

- Using drill press, I drilled into ten coke bottle caps.
- After placing in vice I bolted all ten caps onto corresponding holes which were drilled into the bicycle rim earlier.
- All bottle caps were bolted on with small screw and nut and tightened with screwdriver and small shifter.

- All bottles caps were resealed using seal trick. (refer back to evidence of creativity)

Making of wooden Chock for wiper Motor

- Marked measurements accurately of wiper motor onto wooden chock.
- Cut wooden chock to size on band saw.

Drilling and countersinking holes for screws for wiper motor and shaft

- First screw holes were marked accurately from wiper motor to chock.

- These marks where then drilled through and countersunk on one side for the screw heads to sit flush underneath the wood so they don't touch the backboard once choc has been screwed onto backboard.
- Hole for shaft was drilled.

Attaching chock to wiper motor

- Slid chock into position
- Screw chock into position with screws from wiper motor.

Painting of Backboard

- Backboard coated with one coat of primer, left to dry for 1 day.
- Backboard then coated with coated with one coat of undercoat, left to dry of 1 day
- Backboard then coated with two coats of top coat, each coat painted on separate days to allow to dry

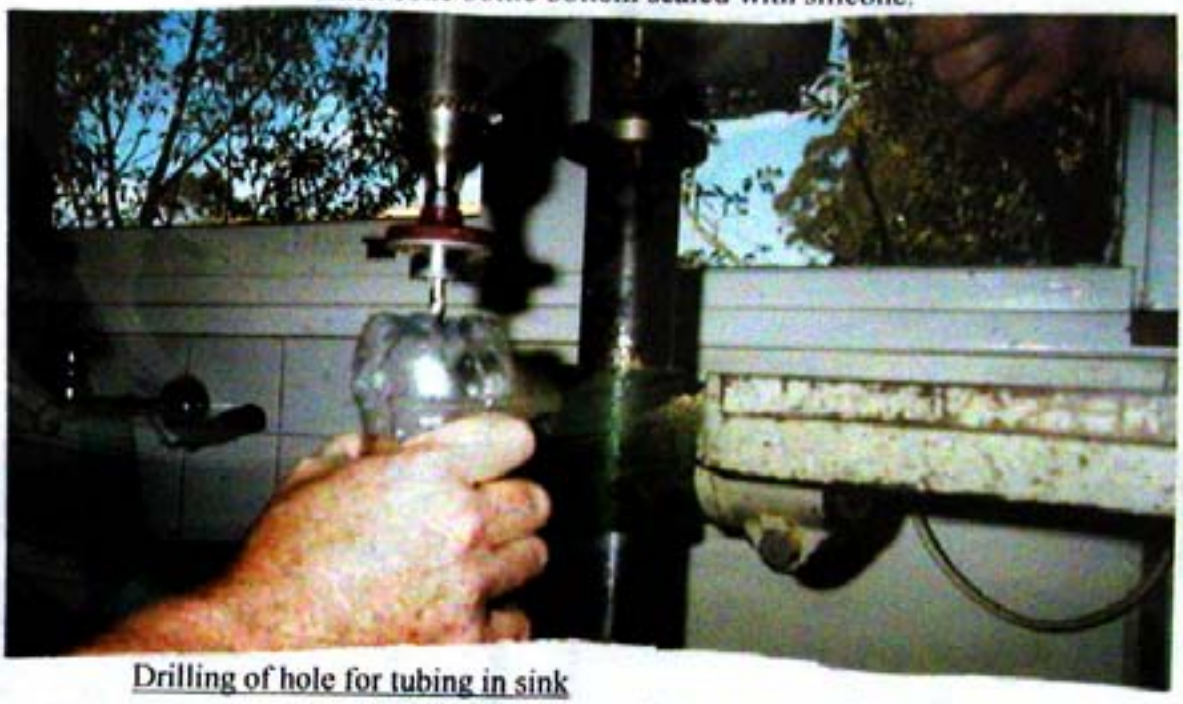
Attachment of wooden choc to backboard and attachment of wheel to shaft

- With wiper motor already screwed to wooden choc, pilot holes are screwed into each corner of the choc.
- Chock is placed onto back of backboard and accurately marked for its position.
- Chock is then place into marked position and then screwed in at each corner with screws.
- Using two nuts and washers, the first nut and washer were threaded onto shaft.
- Bicycle wheel then slid into position on shaft.
- Remaining nut and washer threaded onto shaft.
- Both nuts where then tightened with shifters to secure bicycle wheel to shaft

(NOTE: metal shaft was already welded onto wiper motor when bought. Shaft was accurately measured and cut to size using hack saw.)

Making of Bubble Feature

- Four coke bottle bottoms drilled out with hole saw.
- Each coke bottle then stacked on top of one another (refer to sketches of bubble feature design in project development)
- Small hole drilled through bottom of coke bottle for air stone and air stone tubing to be fitted through.
- Each coke bottle bottom sealed with silicone.



Drilling of hole for tubing in sink

- Marked where tubing will come out of sink from onto outside of sink.
- Marked width of tubing on mark where tubing is to come out of sink.
- With cordless drill, I drilled eight small holes to crate small circle same width as tubing.
- Knocked hole through with hammer.
- Using rats tail file cleaned and rounded and sharp edges on the hole.

Cutting hole for power cord to pump

- Marked out hole size for size of power plug on drain.
- Using oxy touch heated drain up to very high temperatures.
- Using hammer I knocked hole through drain, while drain was still hot.
- After letting cool down for tem minutes I rounded any sharp edges and cleaned up hole for power plug to fit through.

Attachment of sink to backboard

- (refer to sketch below to see how cover of sink was made)
- On back of backboard, marked accurately where cover of sink was to be screwed into position.

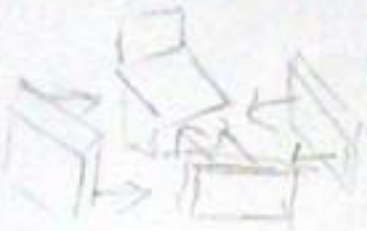
made a good Progress Holiday

- Marked and drilled two pilot holes on either side of cover for screws.
- Cover of sink screwed into position.
- Sink slipped onto cover and screwed to backboard

(NOTE: cover of sink was also painted, but only has two coats of top coat on because of the unavailability of time to paint coats of primer and undercoat onto it)

Attachment of coke bottles to water feature

- Marked accurately where each coke bottle was to go.
- Glued small wood chock onto each coke bottle to elevate bottles off backboard.
- Screwed each coke bottle onto marked position on backboard



front side screwed to sides.

Placement of pump, attachment of tubing and sealing of drain

- Pump placed in sink.
- Using original plug from sink, a hole was drilled into the centre of the plug big enough for the power cord to fit through.
- Plug of power cord was gently pulled apart to detach the cord, once cord was off it was threaded through the plug for the sink.
- The cord was reattached to the power cord plug of the pump, plug then put back together and rest of cord pulled through and into predrilled hole in backboard.
- Sink plug placed into drain then sealed up with silicon.
- Tubing attached to pump, then pulled through pre drilled holes in both the sink and backboard.
- Hole in sink then also sealed up with silicon.

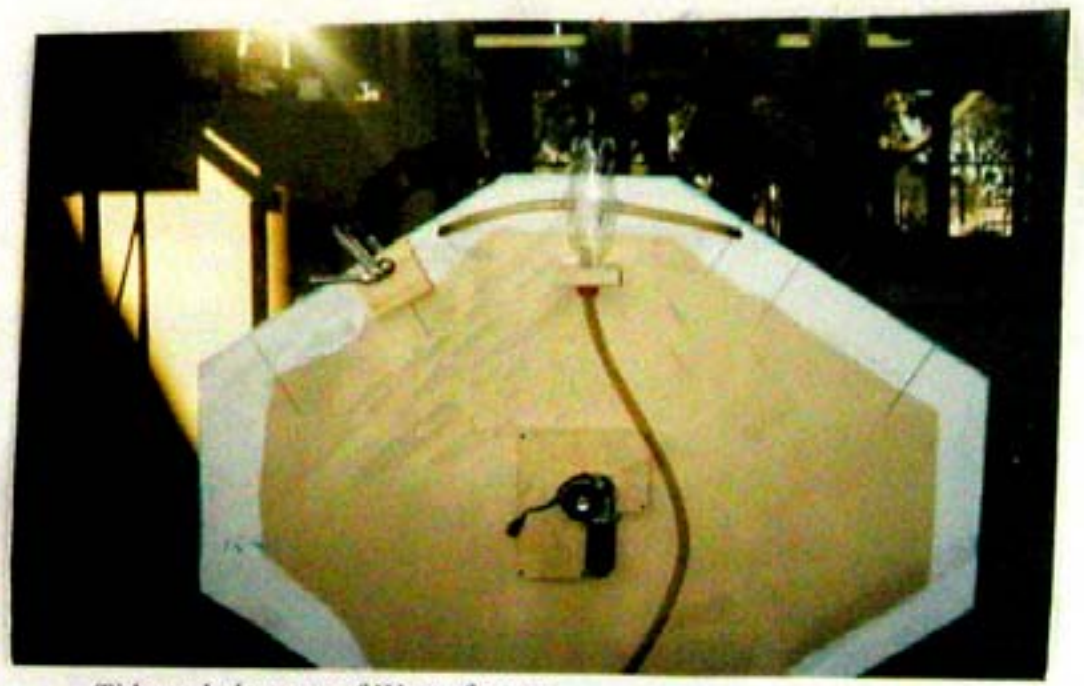
Attachment of Bubble feature to Backboard

- marked four accurate positions down the centre for drilling.
- Four small holes drilled with cordless drill.
- Whilst friend holds bubble feature in position, I attach bubble feature to backboard using cable ties which a raped around the necks of the four coke bottle which make the bubble feature.
- Cable ties are then threaded through each hole, connected and pulled tight to secure the bubble feature.

PORTFOLIO

Attachment of coke bottle well to backboard and attachment of tubing to coke bottle well

- Bracket made for coke bottle, using scrap bit of timber a large hole was drilled through the centre of the timber using a large spade bit.
- Scrap timber was then cut straight down the middle twice (second cut took about a millimetre off right side of the timber) on the band saw. This was done to help clamp the coke bottle better once bracket was put together.
- Bracket was nailed with coke bottle together and then screwed onto the backboard.
- Three holes were drilled all large enough to fit the three pieces of tubing, 1st hole was drilled into coke bottle cap to fit the piece of tubing coming directly from the pump, the 2nd and 3rd holes were drilled half way up the coke bottle and are to fit the pieces of tubing coming from both sides of the water feature.
- All three pieces of tubing were fitted into the holes and sealed up with silicon.



Tidy and clean up of Water feature

- All white board pen marks were wiped off with a chucks dabbed in turpentine.
- Edges of backboard were painted blue just to break up the green colour of the backboard and to give it that little extra touch.
- Touch up paint was applied where needed.

Excellent story solution really solved

Evaluation

Record of evaluation procedures through the project

- Continues evaluation has been done throughout the entire project.

- This has been shown via red dot points throughout the entire folio. (please refer back to these dot points for record of evaluation)

- continuous evaluation
- continuous evaluation
- continuous evaluation

Analysis of function and aesthetic Aspects of the Design

1. Function: According to the "criteria to establish success" functionally the project must:

(a) Have a consistent flow of water throughout the entire water feature.
(b) Be no higher than 2100mm and no wider than 800mm to fit into intended space.
(c) Generate conversation and have a mesmerising affect on people who view the water feature.

(a) Having fully tested and viewed the complete water feature, I have come to the conclusion that the water flow is sufficient to what was required in the criteria. The water flow was important to get right because a good consistent water flow helps add to a tranquil and relaxing effect, which is one of the things I had set out to achieve when I was designing this water feature. The creative solution of using a coke bottle as a sort of "well" to help evenly distribute the water down both sides of the water feature has worked better than expected.

(b) The hight and length factors were established not just to make sure that the water feature fits comfortably into the intended area, but to also make sure that water feature does not look out of place in the intended area.
Going by these factors I have come to the conclusion that the water feature more that meets these factors well.

(c) Generating conversation I would say would have to be one of the best features of this design. I have come to the conclusion that this water feature does this quiet well. I say this because over the last three days I have had the water feature outside I have noticed people have been stopping to look at and either ask questions about it or give there own thoughts about it. I also think it creates a mesmerising affect because of all the features it involves, sound, movement, visual and even mental excitement .I think this is why people stop and gaze at it.

2. Aesthetics:
According to the "criteria to establish success" aesthetically the water feature should:
(a) to look unique, different to other water features on the market.
(b) look innovative, eye catching and unusual
(c) Have tranquil and relaxing affect to it.

(a) There is no doubt that aesthetically the water feature excels. Its certainly looks

some plastic really are!

The Environment:

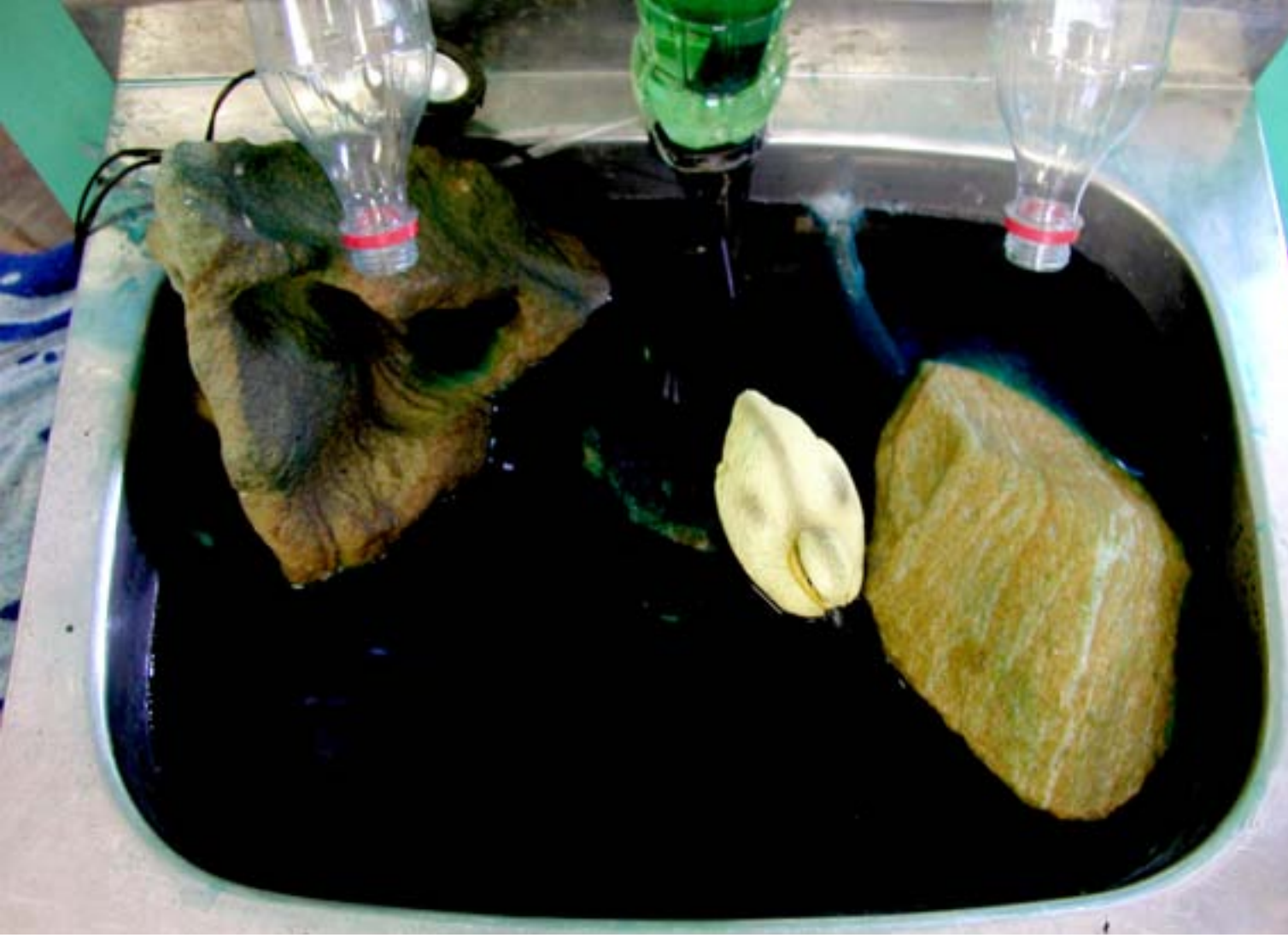
Less landfill and more recycling of plastics, less cost for manufactures:
As a result of using nearly 100% recycle materials (exception of course being pump because a good quality pump is needed to ensure functional success) on this project, I have spent less money on the product, which could be a good thing if this went into production, because I have used a number of coke bottles the end result will be that lees coke bottles will be scattered over the streets and on landfills, because I have use MDF for the backboard which is made out of recycled timbers , depletion of natural resources is lessened.

Pollution created by the raw materials:
Pollution has unfortunately been produced by some raw materials used in this project, these include:

- Cutting of MDF usually MDF has treated chemicals in it there fore when being cut up these chemicals become air borne and become hazardous.
- Cutting of coke bottles, treaded chemicals in the plastic when cut into can become air borne and hazardous.

Use of Fossil Fuels:
Use of fossil fuels are varied in the making of this project. On one hand the MDF is recycle timbers so therefore used less fossil fuels. But on the other hand the stainless steel sink was made in factories which rely heavily on the use of fossil fuels.

Use of energy:
A significant amount of electrical energy was during the manufacturing of this project. The bulk came from the use of machine and hand held tool which were to do the necessary tasks in this project. All the electrical tool and machines consume great amounts of energy. This manifests into the loos of fossil fuels in the form of coal.



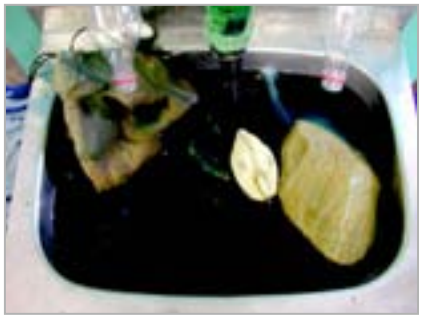
HSC 2002 – Design and Technology

Major Design Project

Band 4/5
Sample 1

PRODUCT

DETAIL 1



DETAIL 2

DETAIL 3

DETAIL 4

Coke bottle water wheel

- good communication of design concepts. CLICK TO VIEW (P26, 27 & 28)
- good justification of final design in terms of functions and aesthetics. CLICK TO VIEW (P31)
- materials and techniques used are based on experimental results. CLICK TO VIEW (P42)
- testing uses a range of research methodologies. Results are clearly communicated and provide direction for the project. Conclusions are applied according to the results of testing. CLICK TO VIEW (P51)