my bike- design of an adolescent bike

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Aims and Objectives

To understand a bicycle.

To understand the user(s) psychology.

To explore the new possibilities of extending usability by value addition to the existing product.

To evolve a form that may incorporate the function and emotion.
Users

Primary user - adolescents (primarily boys) of age group 9-14 yrs

Secondary user - indirect user - parents (decision makers)

Tertiary user - cycle repairers
Data Collection

Library search

The focus of the search was to understand bicycle, the principle of bicycling and to get the history & technical details about the product

Visits to HERO cycle and ATLAS cycles

Interaction with industry people

Regular interaction with cycle repair shops and users
Critical considerations
Trends ...

Futuristic bikes
Trends ...

Performance bikes
Trends ...

Experimental bikes
Trends ...

Concept bikes
Experimental (adjustable) bikes
Indian market bikes
User study

Formal and informal interviews

Image boards and interpretation

Regular interaction with the users
User study

Most of the teenagers like ACTION movies.
Most of them like RED and BLACK colours.
Teenagers of std. 10th and above tend to lose their interest in bicycles. Bicycle using group is from std. 5th to std. 10th.
No one among the teenagers knew about MTB, ATB, BMX features.
Most of them liked Hi-Tech things like SHOCKERS, SUSPENDED SADDLES etc.
Teenagers have a great urge to possess things.
Bikes and Cars are the dream objects for this age group.
Teenagers have a strong urge to become independent.
Most of the teenagers associate them with ANGER and INTELLIGENCE.
Parents are the final decision makers, so their interest should be considered.
Parents use bicycle to tempt teenagers to perform well in academics.
The Relatives and Friends of the parents, the advertisements and cycle repairers play an important role in the opinion making.
Image boards
Image boards
The Key Observations

1. Many users (children) rode a bike that was actually big for them; they could hardly reach their paddle.

2. The new generation bikes like HERO SWING, AVON OSCAR and other bikes (the one with a diagonal suspension) was very popular among youngsters as it offers hi-tech features and can be ridden by users of small height.

3. These so-called Y generation bikes like HERO BUZZ, HERO SIREN; AVON ALTON etc. are also appreciated by the parents as they are more or less unisex.

4. Parents and users are becoming health conscious.

5. Parents are ready to spend for the welfare of the child provided they get value of their money.
Insights

1. Extending usability if used intelligently can be a USP of the product. It can be used to thrill the user and parents at the same time.

2. The product needs to have some element of pleasant surprise, user delight and some uniqueness that may distinguish it from the rest.

3. As the psyche of the people is changing and they are becoming more and more open, it's the right time to introduce the new materials into the Indian market and use it as an USP the product.
Conclusions

Parent's perspective
Parents main motive is the welfare of the child and value for the money. They want a product that is good for their child and have an extended usability i.e. the product may be used by more than one user occasionally or periodically. Parents will prefer to have a bicycle that is safe, lightweight, long lasting. These are the minimum expectations.

Users perspective
Child's perspective is radically different than that of the parents. From the adolescent's perspective the world has different colours. They go by love at the first sight phenomenon. For them bicycle is a prized possession, its an object to boast about, an object to show off. They often fail to realize the long term and welfare objectives of parents.

The cycle repairer expectations are that the cycle should not be complex for him to operate, yet it should appear complex to user and thus require his aid for maintenance.
Approach

The idea was to create a form that should able serves the physical and psychological expectations of the adolescent as he grows.

The problem was broke into two parts

1. Mechanism design for the extended usability and value addition.

2. Form incorporating this mechanism that could convey the change as the evolution, respecting the expectations of the direct user, the adolescent.
The decision was made on the following parameters.

1. The mechanism should have horizontal as well vertical adjustability, i.e. the wheelbase as well as the height of the bike should adjustable.

2. The mechanism should have an element of pleasant surprise. it should look sophisticated and Hi-Tech.

3. The complete frame should be adjusted with minimum possible adjustments.
Mechanism design

Why wheel base extension?
Mechanism design

Stages of evolution
Mechanism design

Stages of evolution
Mechanism design

Stages of evolution
Mechanism design

1. The seat height adjusting mechanism (that leads to the wheelbase expansion also).

2. The maintenance of rake angle.
Mechanism design

The seat height adjusting mechanism
Mechanism design

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The maintenance of rake angle

A unique linkage that could relate the two motions i.e. the seat height adjustment and the rake angle adjustment.
Mechanism design

The maintenance of rake angle
Mechanism design

The maintenance of rake angle
Mechanism design

The maintenance of rake angle
Mechanism design

Assumptions and facts

The mechanism theoretically has a single movement, to set everything in place but all the linkages will have to be tightened after the adjustment, to make the structure act like a rigid structure in normal dynamic loading conditions.

The need to adjust the bike has been assumed to be once in six months.

The mechanism offers wheelbase extension of up to 100-125mm and same amount for the height.

The form of the bike shall change every time the adjustment is done as the complete frame unfolds due to the adjustment.
Form exploration

Fresh, futuristic, sporty, young, vibrant, jazzy, Hi-Tech, anger, intelligence, dynamic, impulsive were some core adjectives.

Anger, Intelligence and Hi-tech

Image boards were made and analyzed to derive the desired formal expression from these.
Form exploration

Image boards - anger
Form exploration

Image boards - intelligence
Form exploration

Image boards- Hi- Tech
Form exploration

Further explorations
Design concepts

1. Design concepts having a mild or conventional visual vocabulary

2. Design concepts with futuristic and unconventional visual vocabulary

3. Design concepts with in existing image with a futuristic or unconventional visual vocabulary
Design concepts having a mild or conventional visual vocabulary
Design concepts having a mild or conventional visual vocabulary
Design concepts with futuristic and unconventional visual vocabulary
Design concepts with futuristic and unconventional visual vocabulary
Design concepts with futuristic and unconventional visual vocabulary
Design concepts with futuristic and unconventional visual vocabulary
Design concepts with futuristic and unconventional visual vocabulary
Design concepts within existing image with a futuristic or unconventional visual vocabulary
Design concepts with in existing image with a futuristic or unconventional visual vocabulary
Final Design concept
Materials and manufacturing

**Stiffness to Weight (Modulus ÷ Density)**

- Steel Alloys: 105.6
- Aluminum Alloys: 103.1
- Titanium: 92.6
- Carbon Fiber: 673.2
- Boron Fiber: 651.7

**Strength to Weight (Strength ÷ Density)**

- Chrome-Moly Steel (and equivalents): 42
- Reynolds 753 Steel: 53
- Aluminum Alloys: 52
- Titanium: 46
- Carbon Fiber: 366
- Boron Fiber: 562
Materials and manufacturing

Examples of bike frame with metal joineries
Materials and manufacturing

air pressure

cavity

Gutters for taking out sized resin (200ml x)

ballyon Core top process
Materials and manufacturing

Frame adjustment mechanism
Materials and manufacturing

Front fork detail
Thank s