

# Improving Indian Beehives and Beekeeping



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TATA CENTER  
TECHNOLOGY + DESIGN

## CFD of Beehives and Color (Karnataka, India)

### Problem

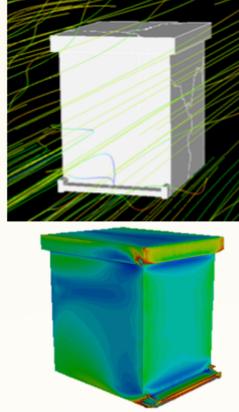
India is hot and hives are often painted dark colors that absorb more sunlight. This makes the bees have to work harder to cool the hive using water.

### Modeling

CFD showed the heat transfer coefficient was greatest on the corners and edges.

### Findings

Beekeepers can paint just the edges as heat on edges is quickly wicked away.



## Optimizing the Entrance (US + All India)

### Problem

There are many styles and sizes of entrances. What is best way to improve:

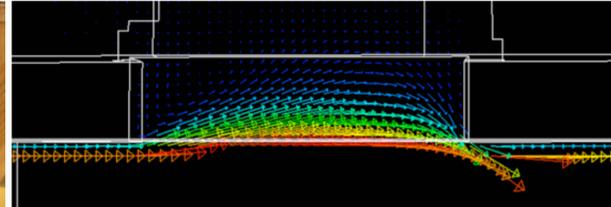
1. Ventilation
2. Defendability
3. Traffic Flow

### Modeling and Testing

CFD models and lots of tests are helping to distinguish best practices.

### Findings

Many insights, including decoupling techniques.



## Quality Control of Hives (Uttar Pradesh + All India)

### Problem

Indian hive manufacturing has low quality control and hive standardization is poor.

### Visiting Manufacturers

Visits to manufacturers help them to improve the quality of their hives while reducing costs and increasing output.

### Improving Standards

I am developing hive manufacturing and quality guides for Indian beekeepers as well as making suggestions for the Indian standard.



## Roof Design (Haryana + All India)

### Problem

Sometimes hives get placed in the sun during summer. The heat hurts the bees.

### Testing

6 weeks of testing with radiation barrier roof.

### Findings

Designed new cheap roof. Also found Indians use of iron not aluminum potentially absorbs 40% more sunlight. Paint it white!



## Hive Management (All India)

### Problem

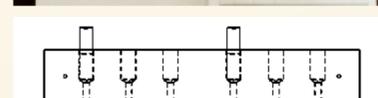
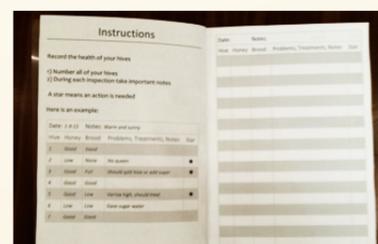
The biggest problem for Indian beekeepers is poor hive management.

### Design

After a number of iterations, I developed a simple, cheap-to-make hive management tool.

### Findings

Beekeepers are willing to pay 10 INR each. Manufacturers are excited to make this.



Green is good  
Yellow is ok/unknown (check later)  
Red is bad (action needed)