

TA201

PROJECT REPORT

MSE Lab

Section: M6 & M10

Group Number: 9

Name of Project: Burj-al-Arab

Group Members:

Shubham Gupta (Y9569, M6)

Shiv Prakash (Y9551, M6)

Gaurav Solanki (Y9231, M6)

Ashok Kumar Meena (Y9148, M10)

Shouvik Ganguly (Y9558, M6)

Acknowledgments:

A project can't be considered as finished until we say thanks to everyone who has contributed to our project. We would like to thank our instructor Dr. J. Ramkumar for giving us the opportunity of a project. We also express our gratitude to our tutor Dr. T. Maiti who helped us at every stage of the project with his valuable suggestions and support.

Last but not the least, we are very much thankful to all the staff and guides who not only helped us in the project but also trained us in various skills and supported us in various types of experiments. Without them, it would be impossible to complete the project.

Motivation:

Burj is the world's first seven-star hotel, having a unique and impressive architecture. We had planned on making a model of some famous building and immediately,

Burj came to our mind. We knew it wouldn't be easy to replicate the unparalleled architecture, but we decided to give it our best shot. Even while the work was going

on, we felt discouraged at times, thinking it wouldn't be possible to complete it in time. However, we persisted with it and finished the model.

Parts used:

- Metal Rectangular Bars

Length (mm)	Quantity
248	2
103	2
125	2
136	2
147	2
300	2
278	1

Material: Cast Iron

Weight: 0.92 kg (total)

- Truss

Height: 150 mm

Base: Triangular with side length = 27 mm

Quantity: 6x3

Weight: 0.3 kg (total)

- Helipad/Tennis Court

It is basically in the shape of a right circular cone placed on a cylinder.

Diameter of cylinder = 50 mm and that of the cone = 19 mm. Height of cylinder = 10 mm. Height of cone = 20 mm. The centres of their bases coincide.

Material: Cast Iron

Quantity: 1

Weight: 0.5 kg

- Front Arcs

These are metal sheets in the shape of sectors of circles of various radii with angle 60°.

Quantity: 6

Radii: 74, 86, 99, 111, 124, 138 mm.

Material: Metal sheets

- Cantilever

It is a metal sheet bent approximately in the shape of a half-ellipse.

Length = 100 mm

- Cast Iron Bars

Height: 200 mm

Width: 22 mm

Quantity: 2

Weight: 0.25 kg (total)

- Tree

It is made from sheet metal.

Processes:

- **Forging:** The metal rectangular bars were bent in the desired shape by forging.
- **Brazing:** The trusses were made by joining metal rods together by brazing. The cantilever was joined to the main structure by brazing.
- **Casting:** The helipad was made by casting.
- **Sheet Metal Working:** The cantilever was made by sheet metal working. The tree and front arcs were also made by sheet metal.
- **Welding:** The helipad was attached to the main structure by arc welding.

Cost Analysis:

Mild steel sheets

Area used for cantilever = (approx) $100 \times 40 = 4000 \text{ mm}^2$

Area used for a sector of radius $r = (1/2) \times (\pi/3) \times (r^2)$

Hence, total area used for the front arcs = $(\pi/6) \times (74^2 + 86^2 + 99^2 + 111^2 + 142^2 + 138^2)$
= 36345 mm^2

Approximate area of metal sheet used for the trunk of the tree = 4000 mm^2

Approximate area of metal sheet used for each leaf = 800 mm^2

Number of leaves = 8

So total area used for leaves = 6400 mm^2

Hence, total area of sheet metal used = $4000 + 36345 + 4000 + 6400 = 50745 \text{ mm}^2 = (50745 / (25.4 \times 12)^2) \text{ ft}^2 = 0.546 \text{ ft}^2$

Hence, total cost of sheet metal used = Rs $(16 \times 0.546) = \text{Rs } 8.70$

Mild Steel Rods

Total weight of mild steel rods used for the trusses = 0.3 kg

Hence, total cost of mild steel rods = Rs $(30 \times 0.3) = \text{Rs } 9.00$

Thermocol Sheet

Thickness used = 1"

Approx area used = 0.4 ft^2

Hence, total cost of thermocol sheet = Rs $(9 \times 0.4) = \text{Rs } 3.60$

Fevicol

Cost of fevicol used = Rs 5.00

Cast Iron

Total weight of cast iron used = $0.92 + 0.5 + 0.25 = 1.67 \text{ kg}$

Hence, total cost of cast iron = Rs (50 x 1.67) = Rs 83.50

Induction Furnace

Time for which Induction Furnace is turned on = 1 hour

Hence, energy consumed = 30 kW-hr = 30 units

Hence, cost of electricity = Rs (4.80 x 30) = Rs 144.00

Labour Cost

Time taken for completion = 3 x 6 = 18 hrs

Hence, labour cost = Rs (18 x 50) = Rs 900.00

Total cost

Total cost = Rs (8.7 + 9 + 3.6 + 5 + 83.5 + 144 + 900) = Rs 1153.80

Overhead Cost = Rs (1153.80/10) = Rs 115.38

Hence, total cost = Rs(1153.80 + 115.38) = Rs 1269.18

Problems and Challenges Faced:

- *It was difficult to braze the helipad to the metal sheets. So, it was later welded to the support rod.*
- *It was difficult to give the desired shape to the metal rectangular bars by cold forging.*
- *The front arcs had to be arranged exactly below one another, so care had to be exercised in attaching them.*
- *It was difficult to weld each front arc to the support rod at a single point*

Possible Improvements:

- *The building could have been made to correspond more closely to reality by using transparent plastic sheets to represent glass.*
- *More floors could have been added.*
- *The height of the tree could have been made less, and many trees could have been added to increase aesthetic value.*
- *A thermocol of better quality would have ensured a better finishing and better quality of the final product. The surface finish would also have been better.*

