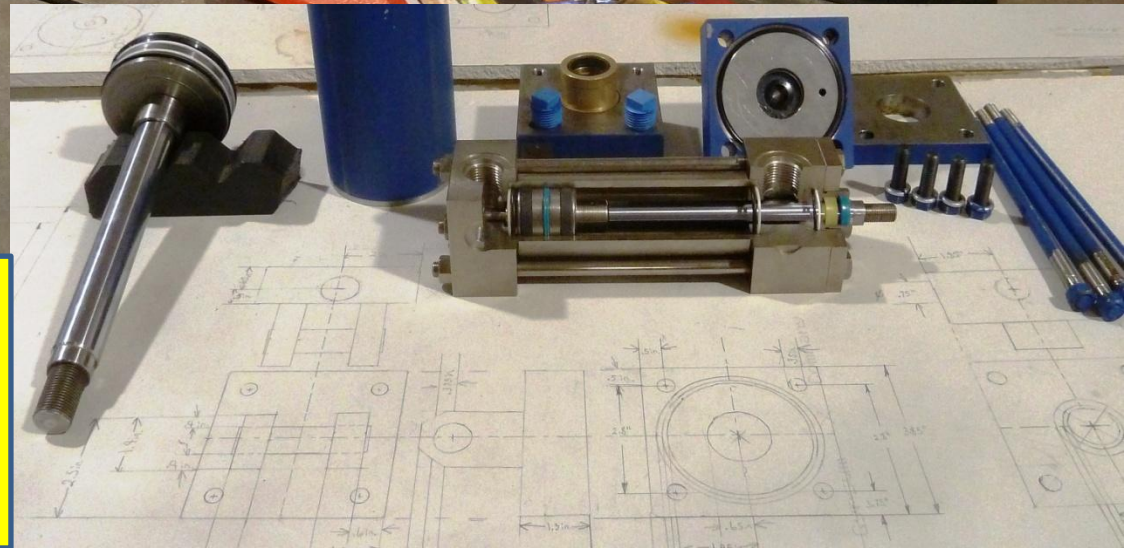


News from Manufacturing Workshop



While students disassemble and design the parts of a hydraulic cylinder they ask questions and find/get answers. The next step is design in AutoCAD.

Project hydraulic cylinder, what's in it, what can we learn from? Questions and answers during a student brain storming session:

What for do we need hydraulic cylinders? How are the cylinder tube, piston, rod and the other parts manufactured? Beginning with the material: where is the material, metal, steel coming from? How is the raw material made for the cylinder tube and all the other parts? What machines are used to make/machine the parts? How can we make such a super fine surface at the cylinder inside and at the rod outside diameter? Why is at the cylinder and rod so a superfine surface necessary? How can we measure the surface roughness/finishing? How do we specify/mention all this super fine information in a drawing/blueprint? What measurement tools are used to measure all this different geometries and sizes? Why is there a bearing/bushing made out of brass or bronze? Why are used parts made from rubber and plastic? How do we use physics in a hydraulic cylinder? What oil pressure is used for hydraulic cylinders? What creates the oil pressure in a hydraulic cylinder? How is the oil pressure measured? How is the cylinder size and force calculated? How does the cylinder diameter affect the force of a hydraulic cylinder? How are the piston and rod manufactured? Why is the rod surface so fine and how is it made? Why are spring rings used?

Measurements with caliper and micrometer where used to make the drawing/blueprint.

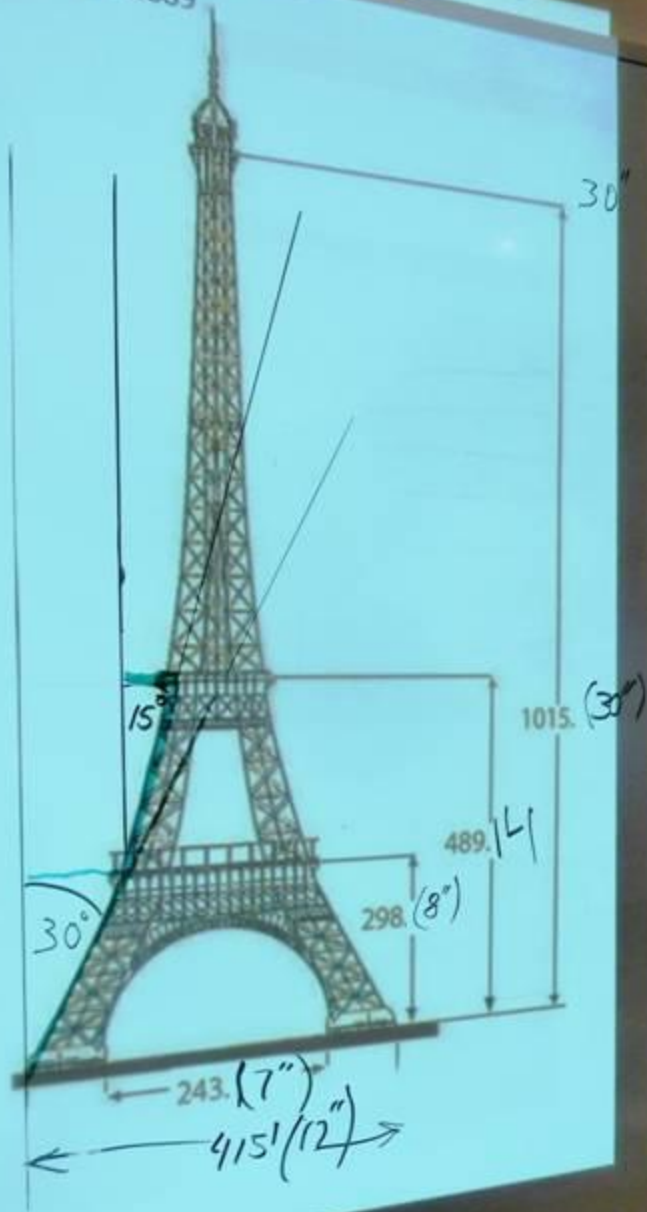


Students are helping each other and working as a team.



News from the Manufacturing Workshop

Eiffel - Tower, build 1887-1889



Eiffel-t
Delivery 11-20

$$\frac{1015}{30} \times \frac{489}{X}$$

$f = \frac{\text{former dimension (30)}}{\text{former dimension (12)}} \times \frac{\text{Variable (new dimension)}}{\text{former dimension (8)}} = \frac{\text{former dimension (30)} \times \text{Variable}}{\text{new number (146)}} = \text{The answer to your v}$

Eiffel-Tower-Project:

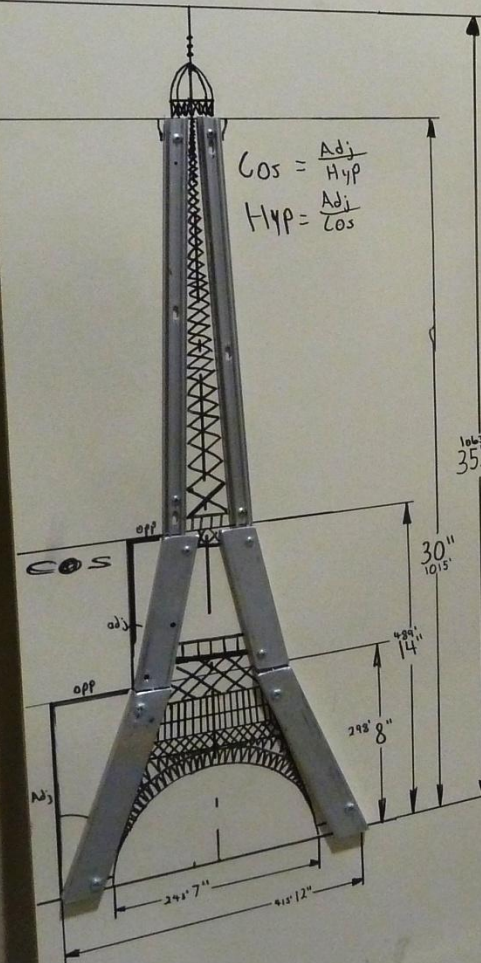
The students have to apply calculations to a reduced scale and sinus, cosines and tangent to manufacture the parts for their small Eiffel-Tower.

The next step is to design the project in AutoCAD.

Eiffel Tower

1887-1889

- 132 workers assembled 18,000 parts on site.
- 2.5 Million rivets connected all the iron pieces.
- Construction time: 2 years, 2 months, 59 days
- World's tallest structure for 40 years, until 1929.
- Original height: 1029 ft.
- Today has 120 antennas
- Weighs 7000 tons
- More than 5 Mill people visit it a year.



$$\cos = \frac{\text{Adj}}{\text{Hyp}}$$

$$\text{Hyp} = \frac{\text{Adj}}{\cos}$$

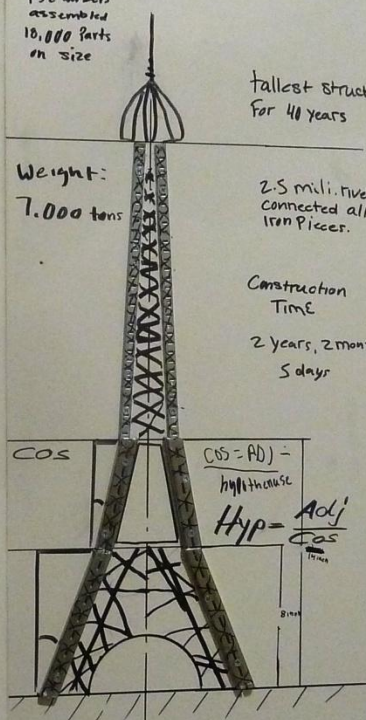
Jahkeon

Eiffel Tower

1887-1889

height: 1023 ft TOWER

132 workers assembled 18,000 parts on site



Weight: 7,000 tons

tallest structure for 40 years

2.5 milli. rivets connected all iron pieces.

Construction Time

2 years, 2 months 5 days

cos

$$\cos = \frac{\text{adj}}{\text{hyp}}$$

$$\text{Hyp} = \frac{\text{adj}}{\cos}$$

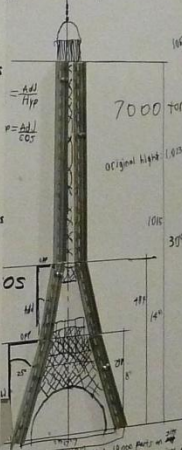


Eiffel Tower

1887-1889

the world's tallest structure for 40 years, until 1929

was designed by Gustave Eiffel, who also designed the Statue of Liberty

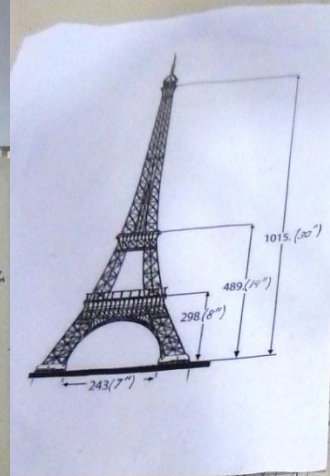


132 workers assembled 18,000 parts on site

2.5 Million rivets connected all the iron pieces

construction time: 2 years, 2 months, 5 days

more than 5 Mill people visit it a year



The next project will be a 8' 3D-Modle.



5E
30
30

