

Fishscale Skin

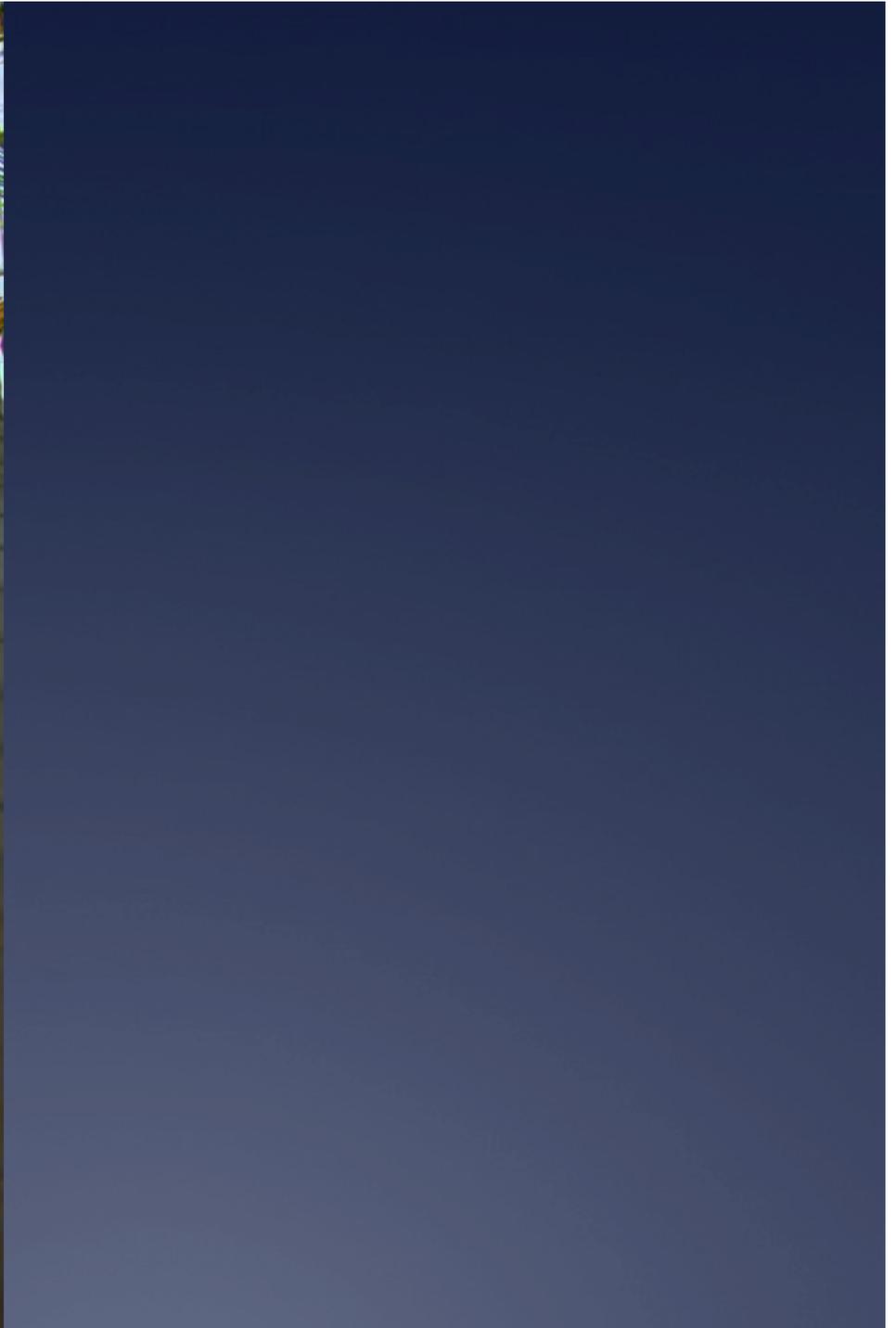
Experience Music
Project
Frank Gehry, Seattle



It all started with a fish

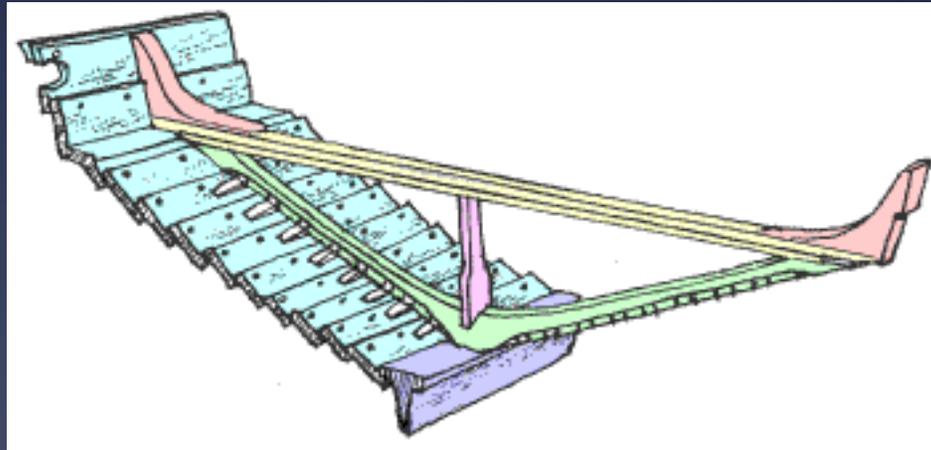
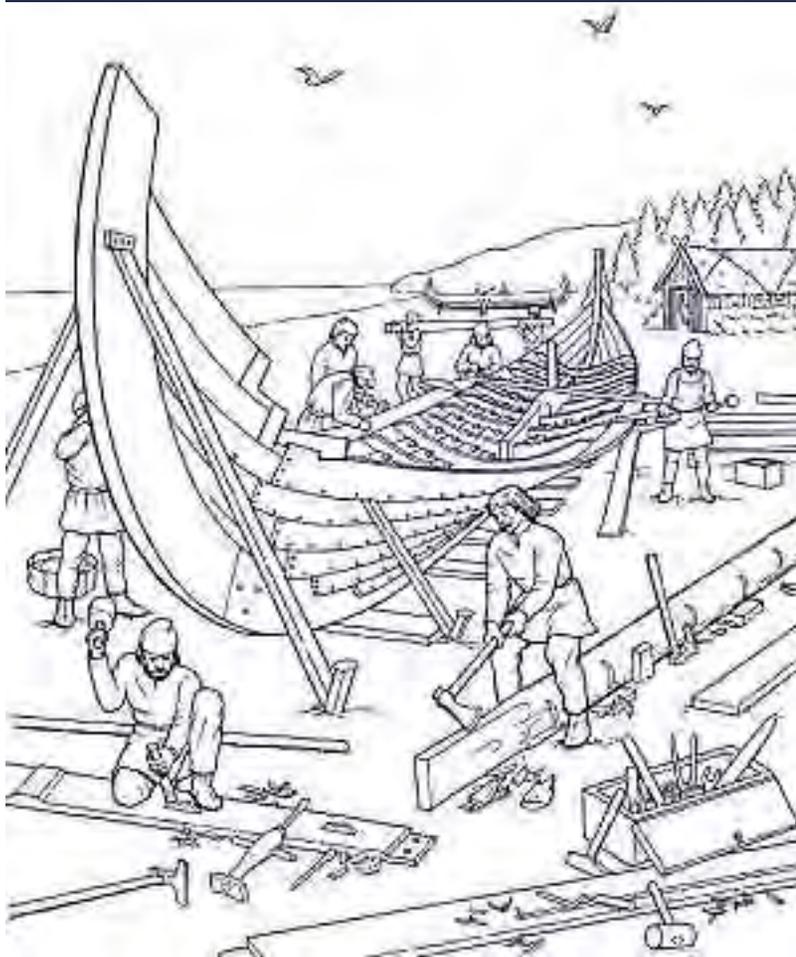


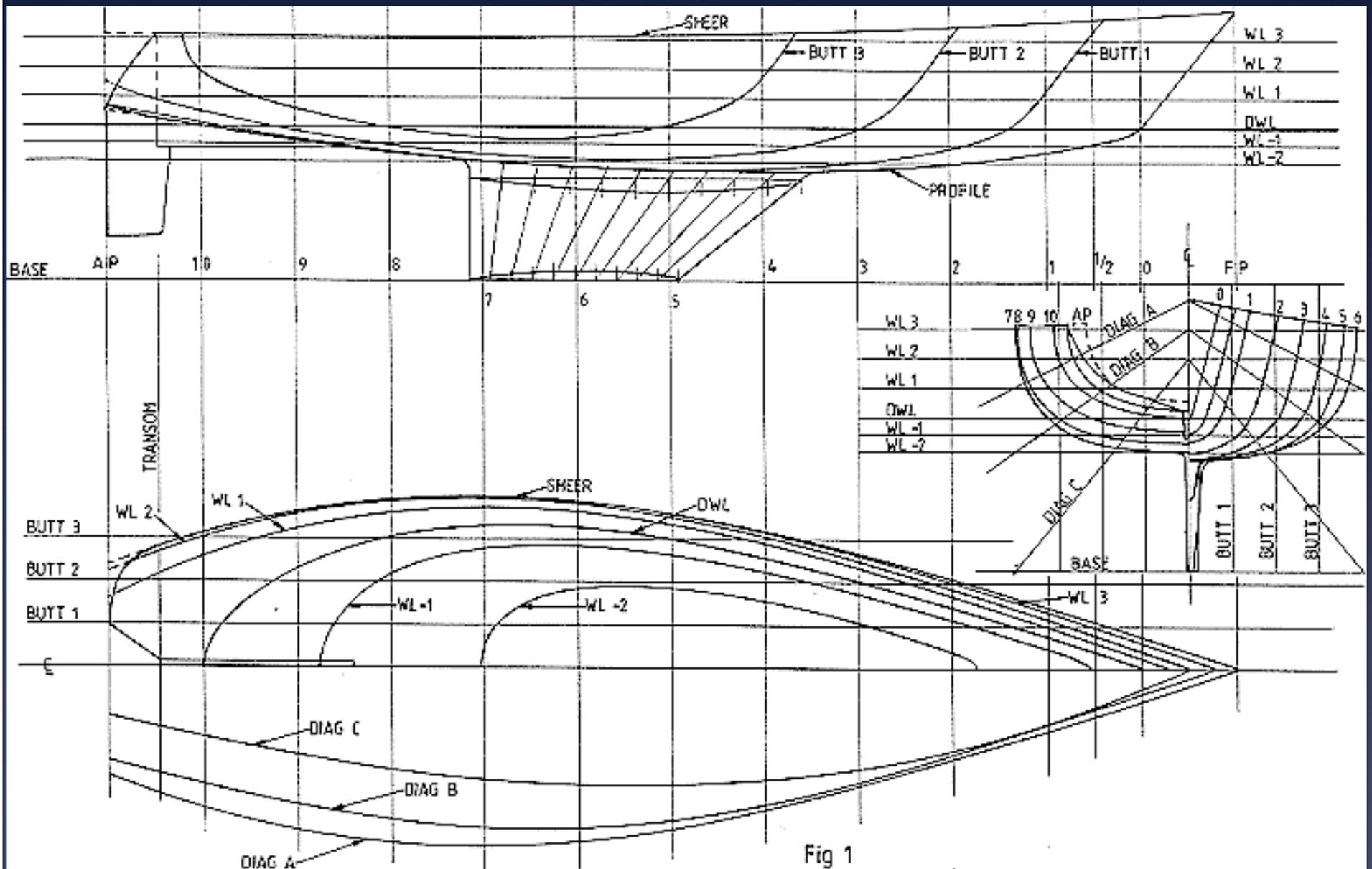
Before Bilbao, before Weismann, before Seattle, there was the fish, many fish really, in Barcelona, Minneapolis, Seattle, Kobe, and Venice each a study of scales, skin, structure...and here, silicone



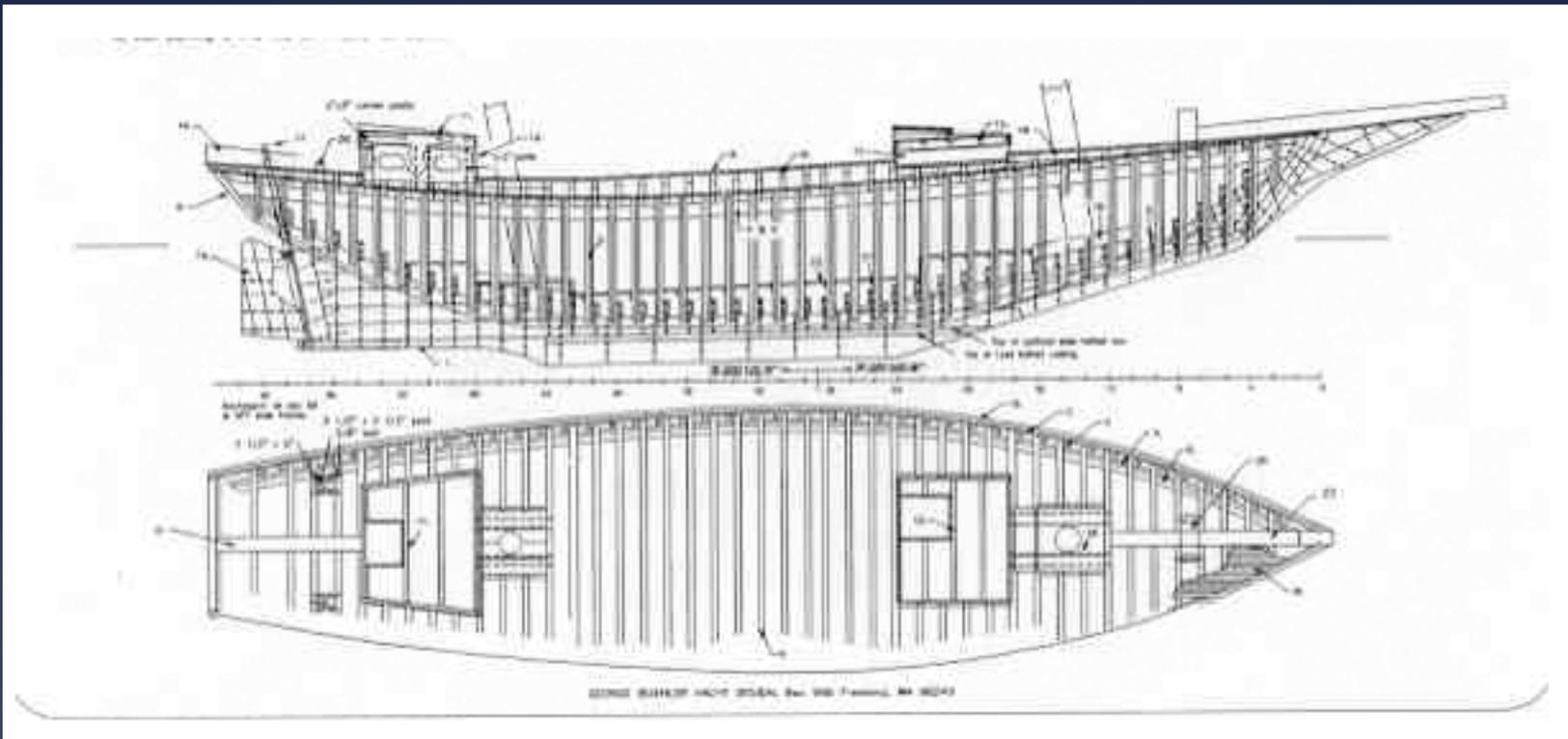
... a process used by boat
builders for over 5,000 years

Lofting





Form of the hull translated into lines with overlaid grid and contour lines



Forms translate to lines
Lines translate to structural ribs
Planking skins ribs making surface



... a process used by sculptors
for over 1,000 years



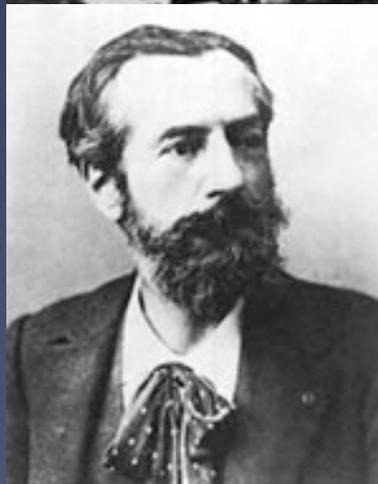
Adapting boat building for art:

Sculptor uses grid to scale up from model to monument

- 4 foot model
- 9.3 foot model
- 36 foot model (cut into parts to scale up 4 times) 151 feet tall

Formwork in process

Building a wood
armature to carry a
plaster model (full-
size) to form copper
over



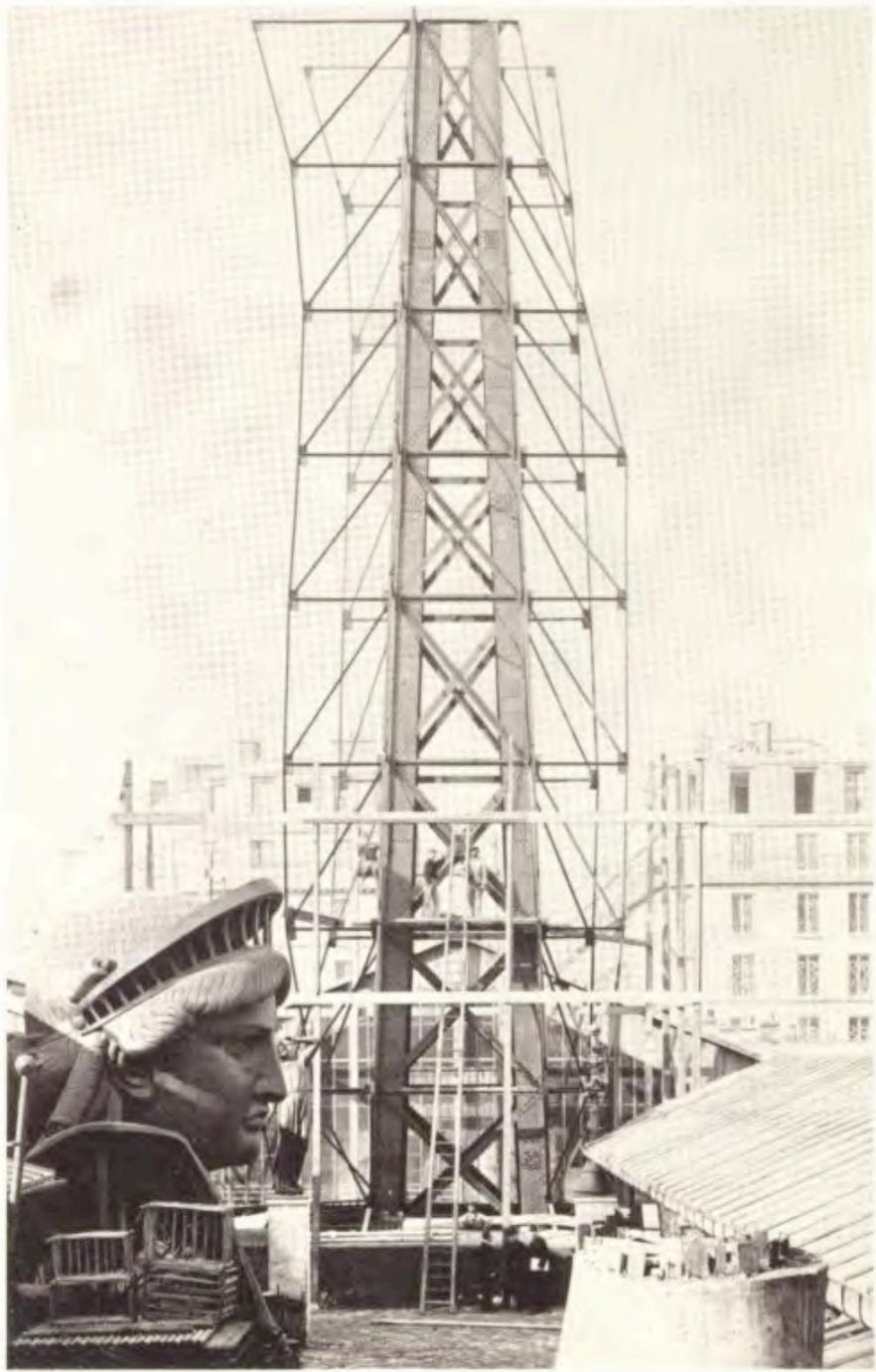
Frédéric Bartholdi

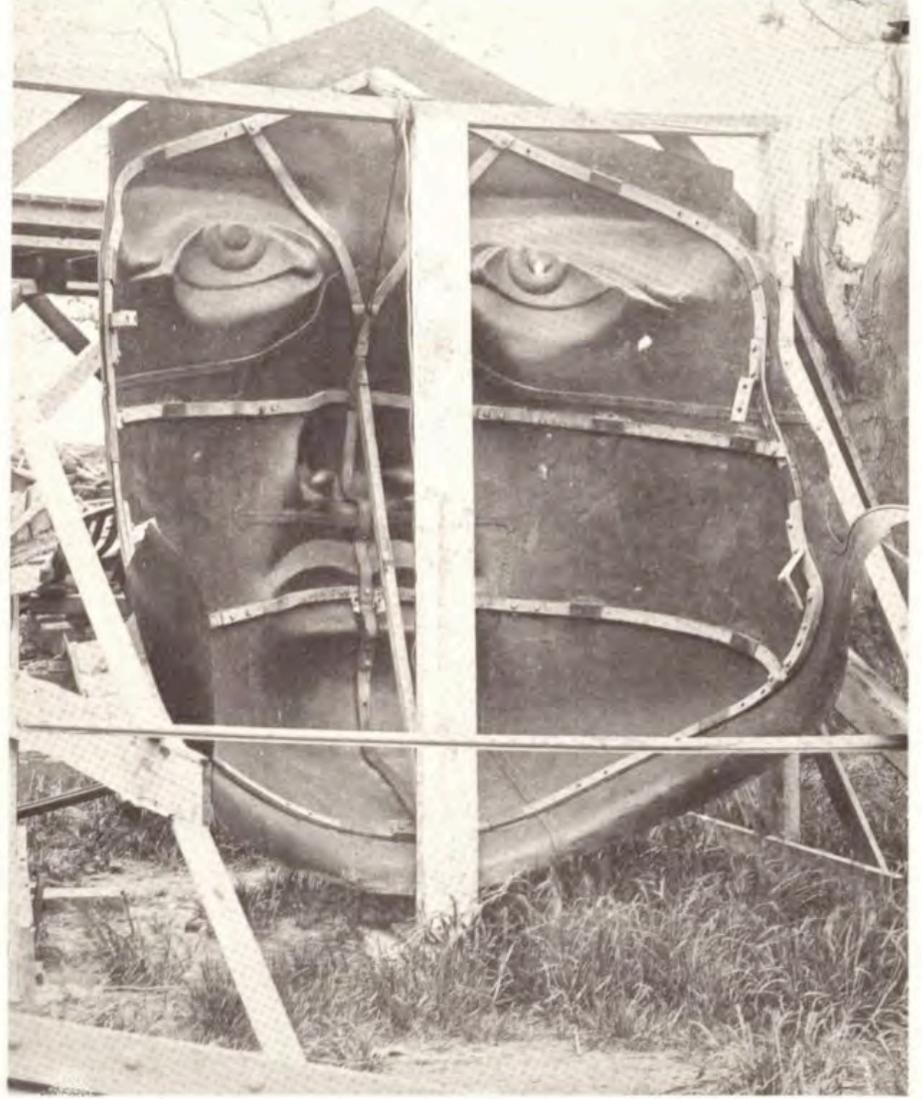
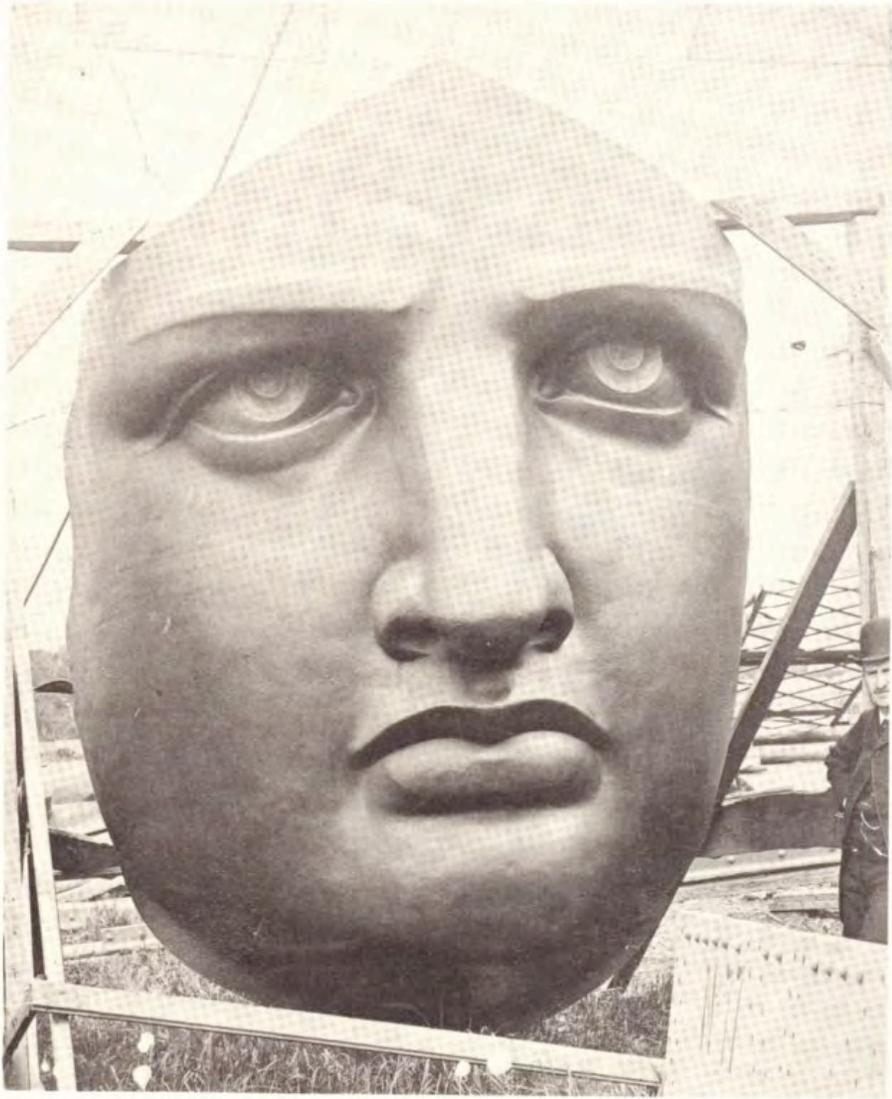


Gustave Eiffel

Bartholdi & Eiffel,
partners in the art
and science of
Liberty







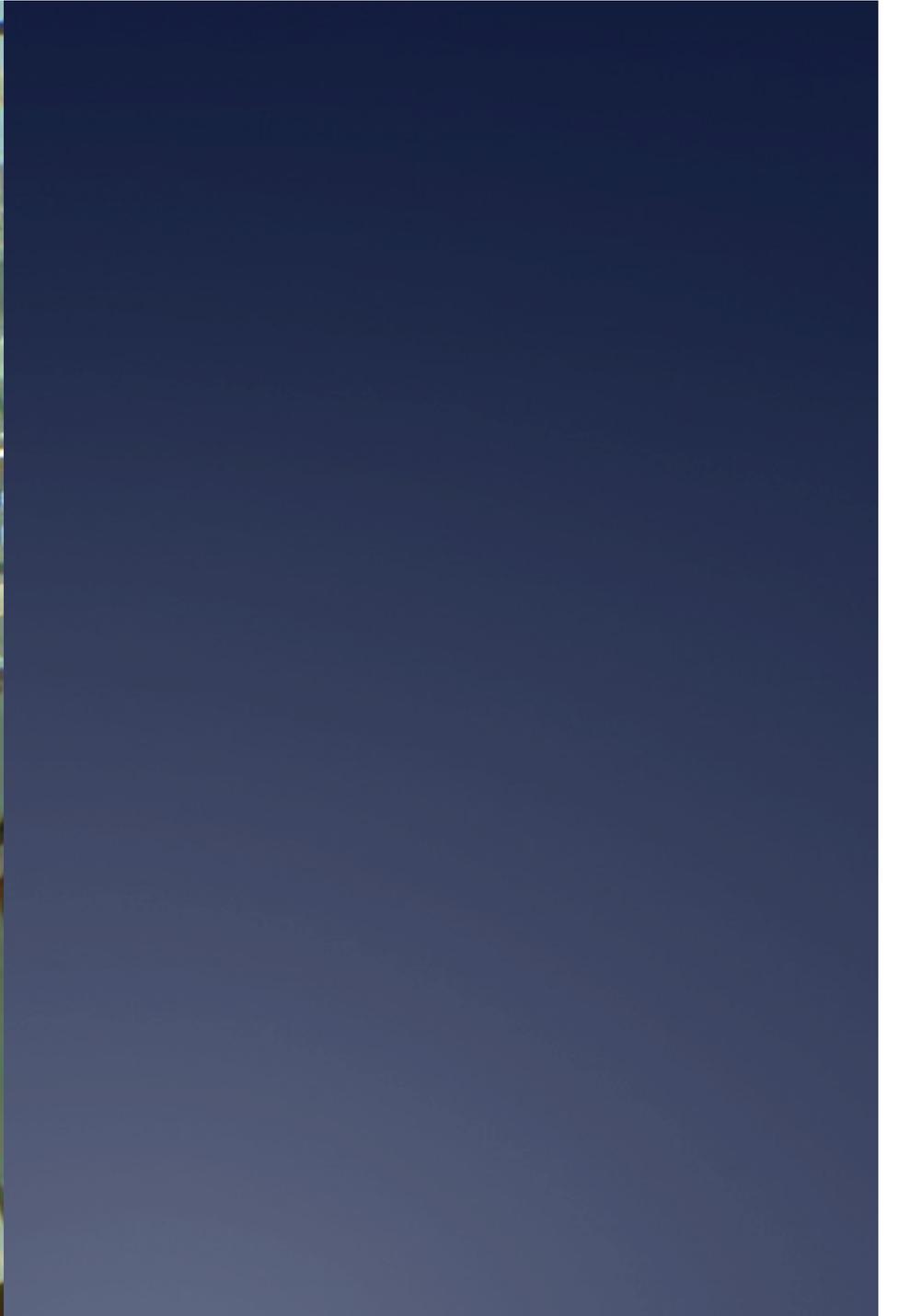
Between the expressive skin and
rational structure...a space of
adjustment

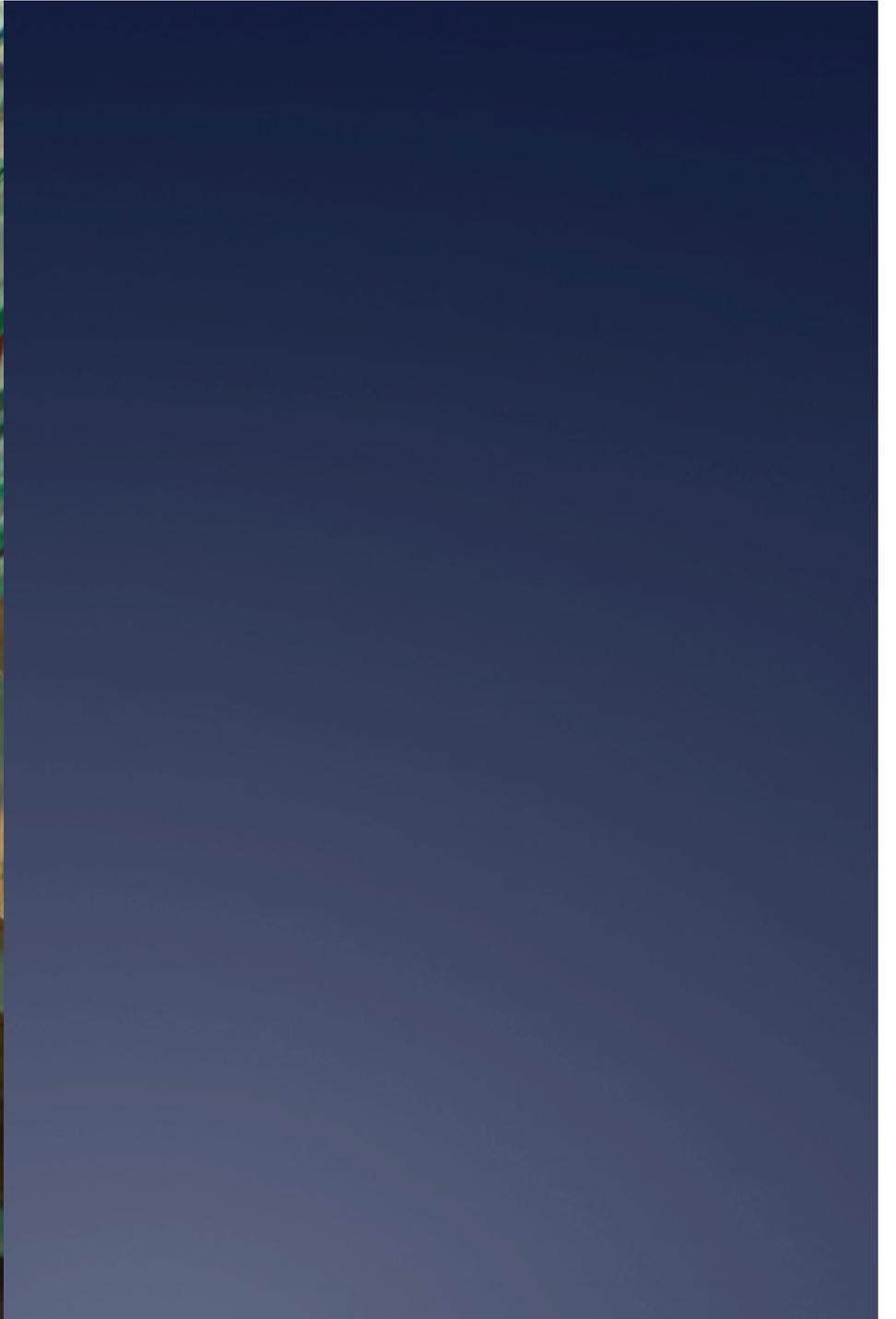


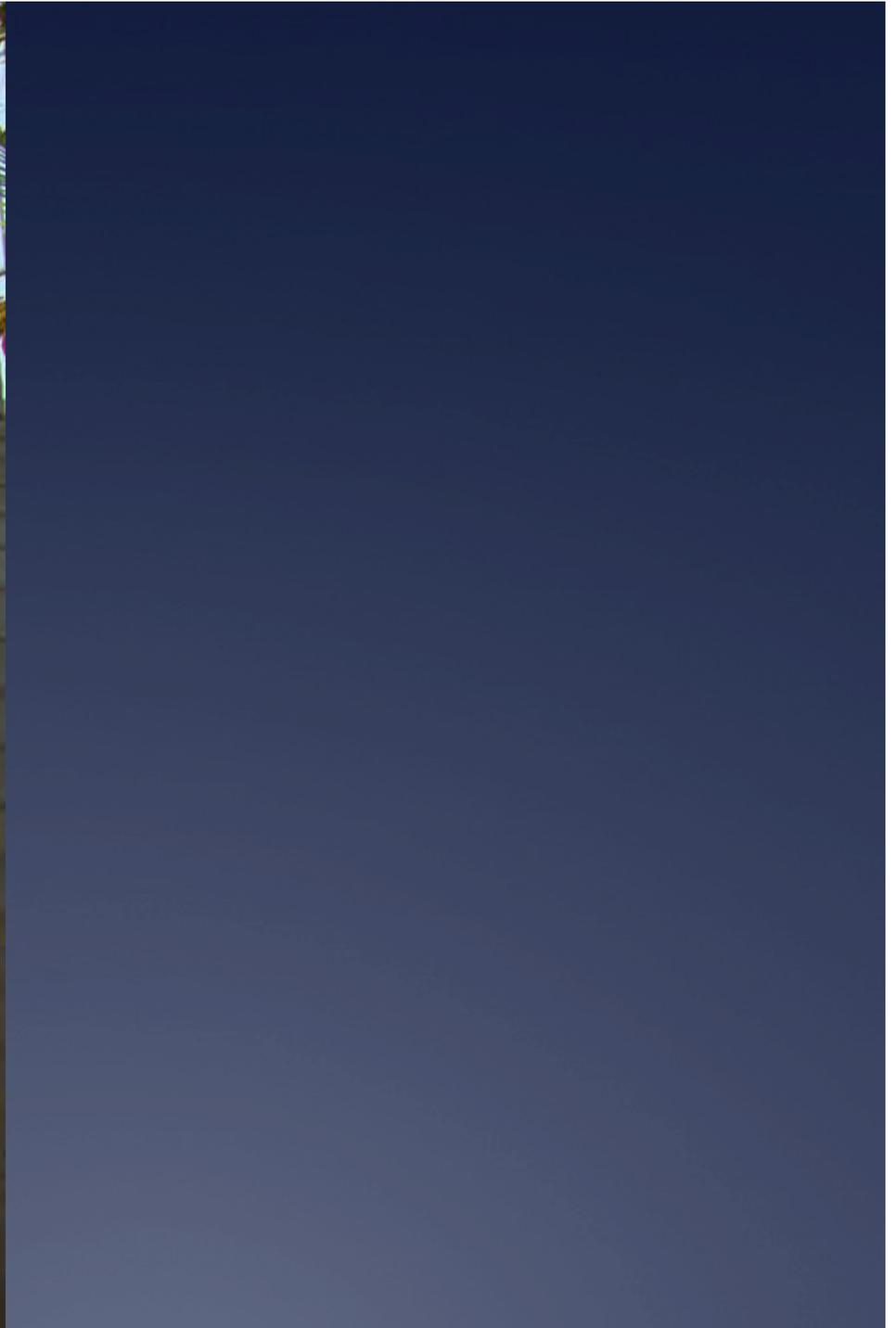


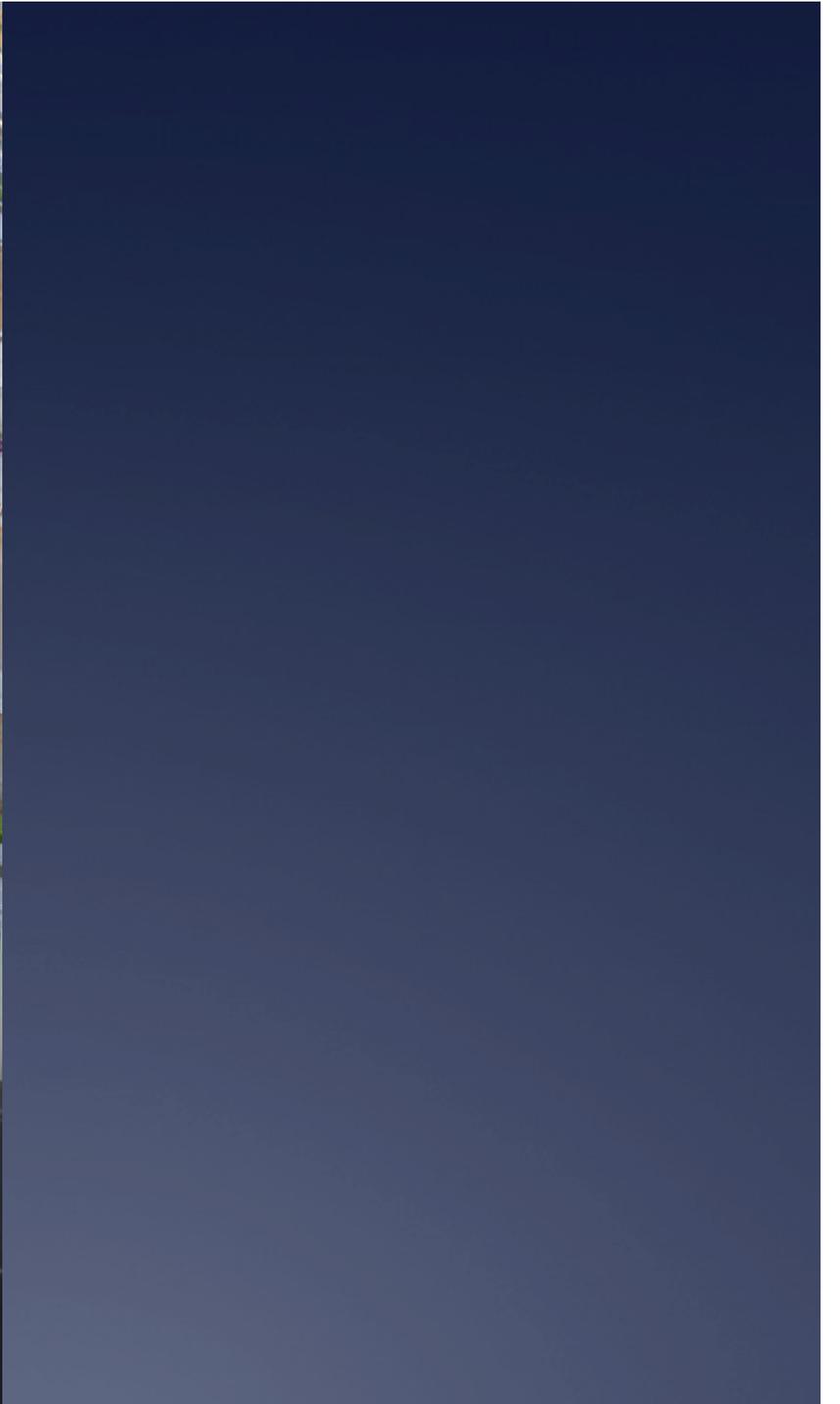


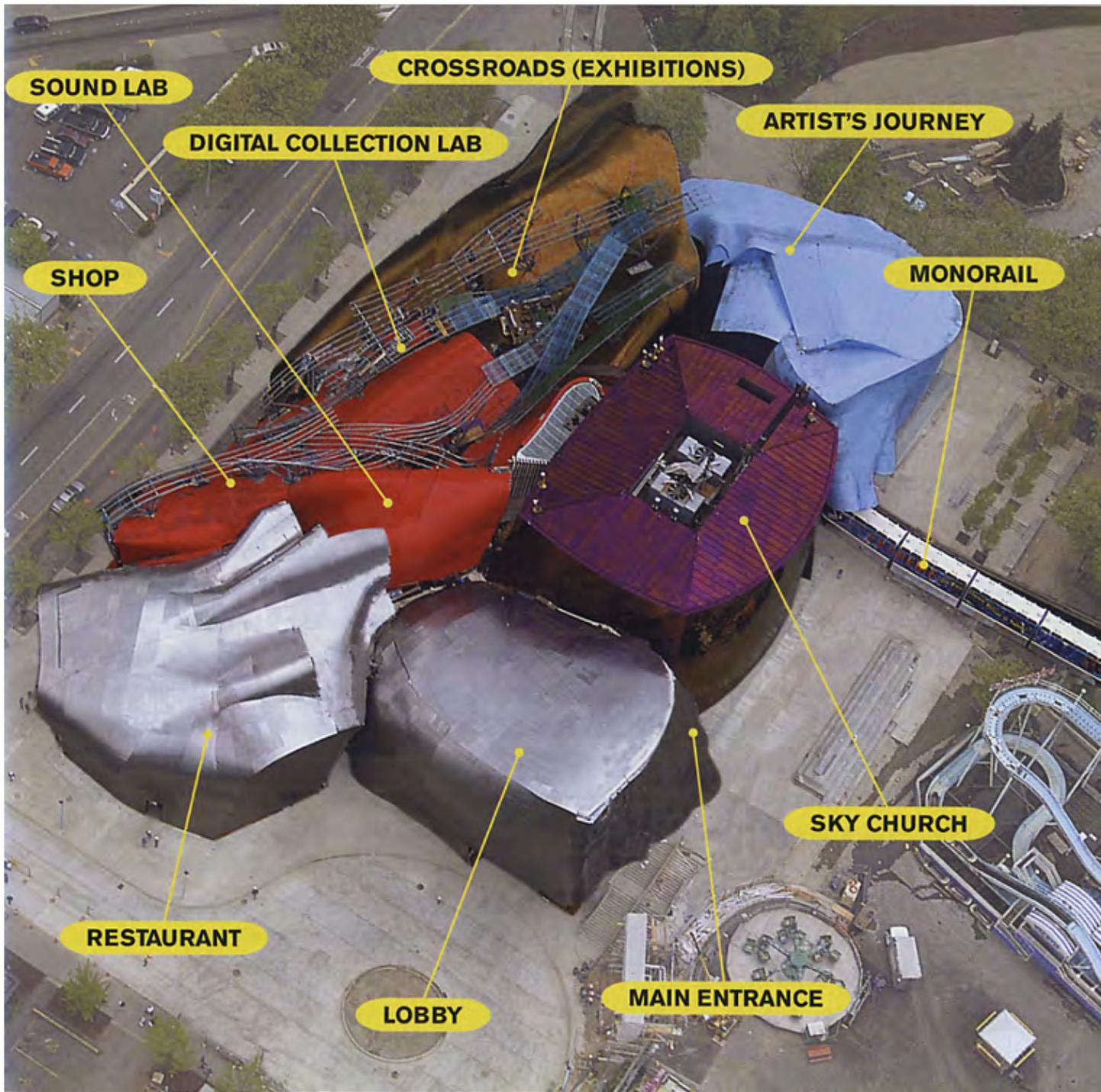
Separation of skin and structure initiated by Eiffel and Bartoldi for the Statue of Liberty, rendered in wood, steel, glass and silicone sealant by Gehry.











Seattle Music Experience: Microsoft founder Paul Allens homage to J. Hendrix...and now a Sci-Fi

MoPOP
MUSEUM OF POP CULTURE

ARCHITECTURE
TOUR | 4 of 5

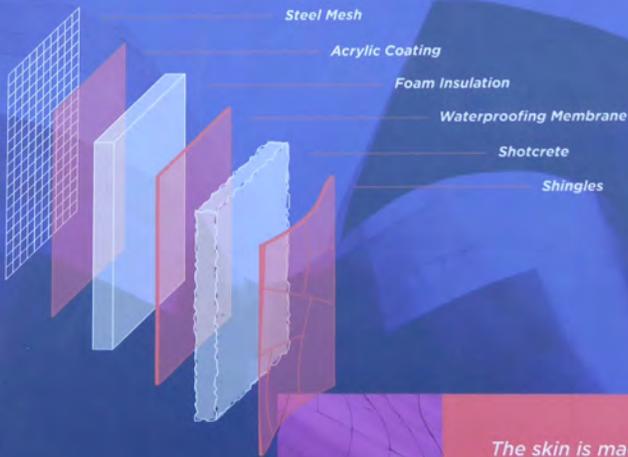
NOT EXACTLY WATERPROOF

This building leaks on purpose. The colorful outer "skin" is not a wall, but a shell carefully shaped to express architect Frank Gehry's artistic intent.



A METAL PUZZLE

To achieve the complex shape, the skin is raised off the building's inner walls like a tent propped up on poles. Imagine taking the siding of a house, pushing it out from the walls, and making it wavy—that's what you see here, using steel and aluminum plates. But don't worry about the leaks—the inner walls are waterproof.



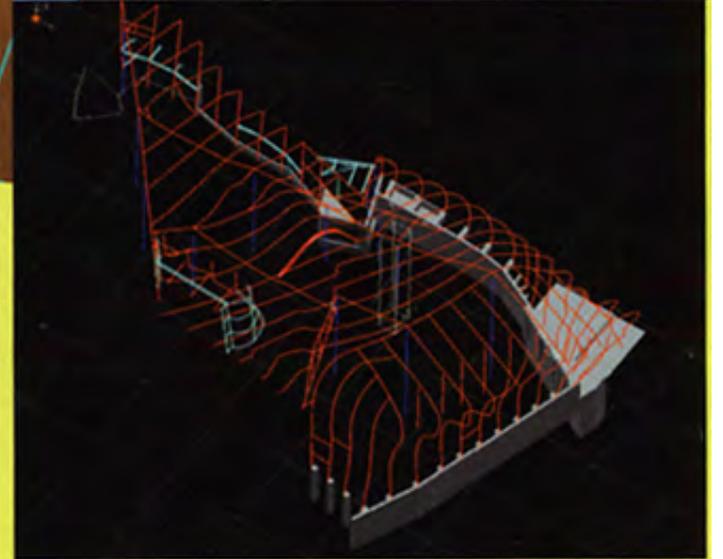
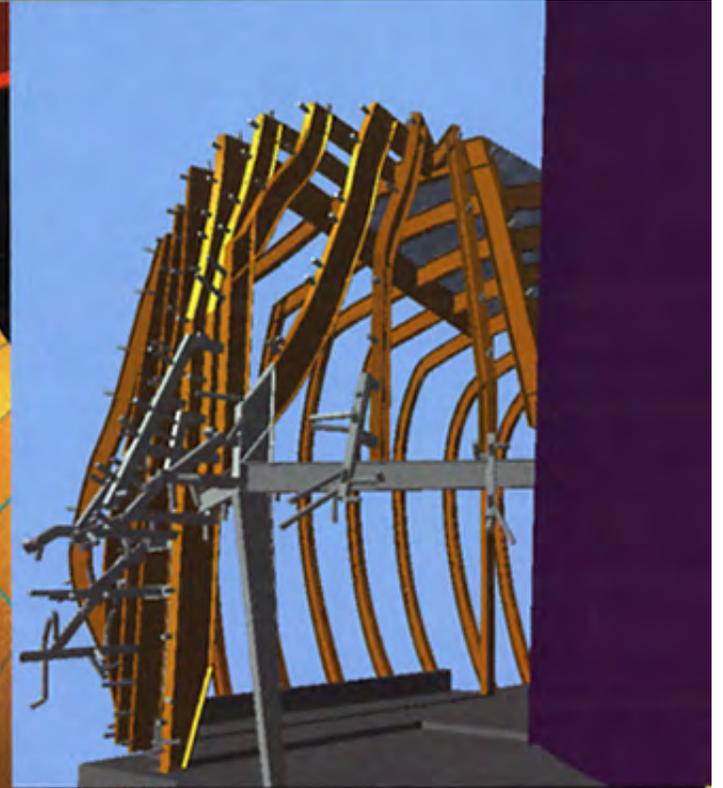
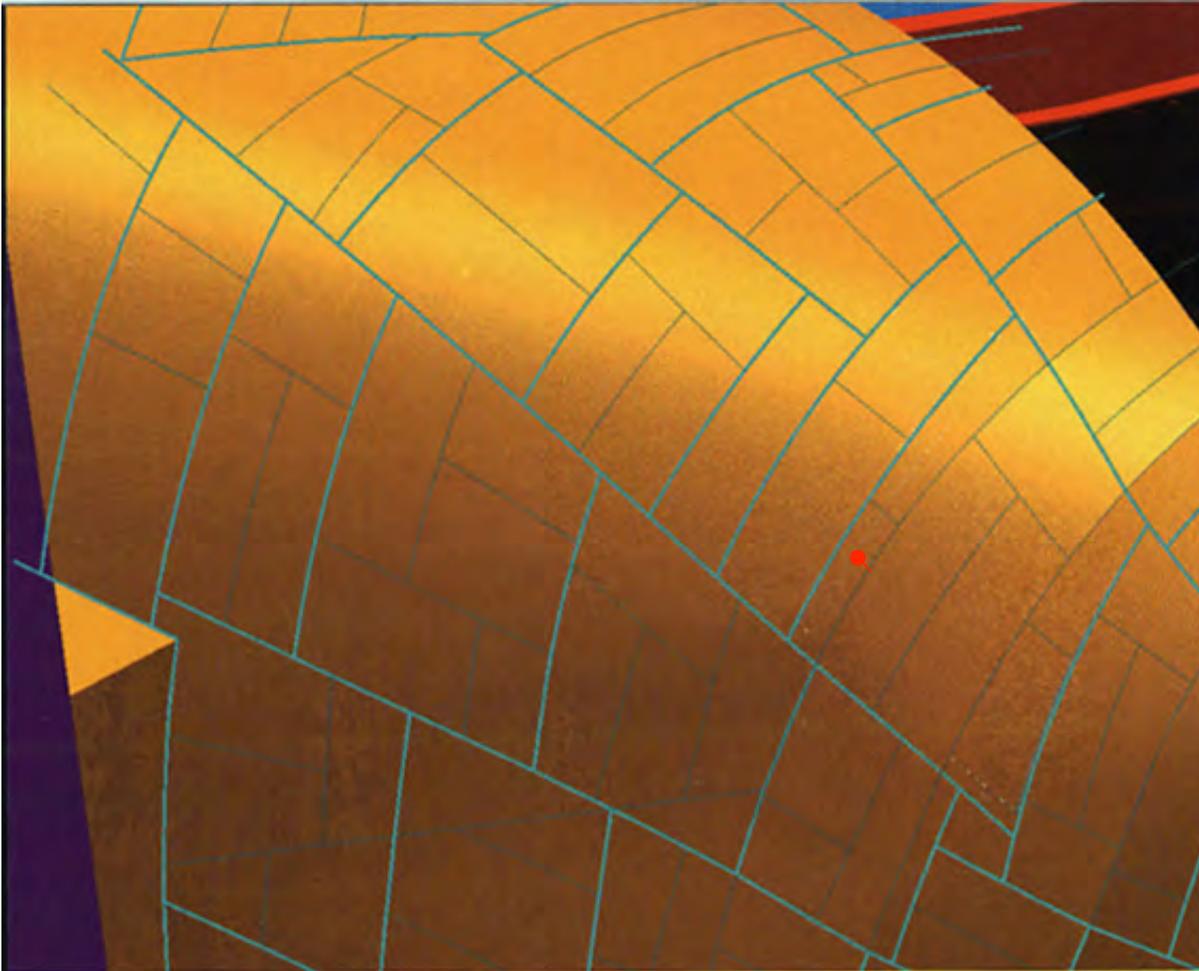
ADDING RIPPLES

The building's skin is divided into rectangular panels, each made up of an average of seven shingles. Can you find any repeating patterns?



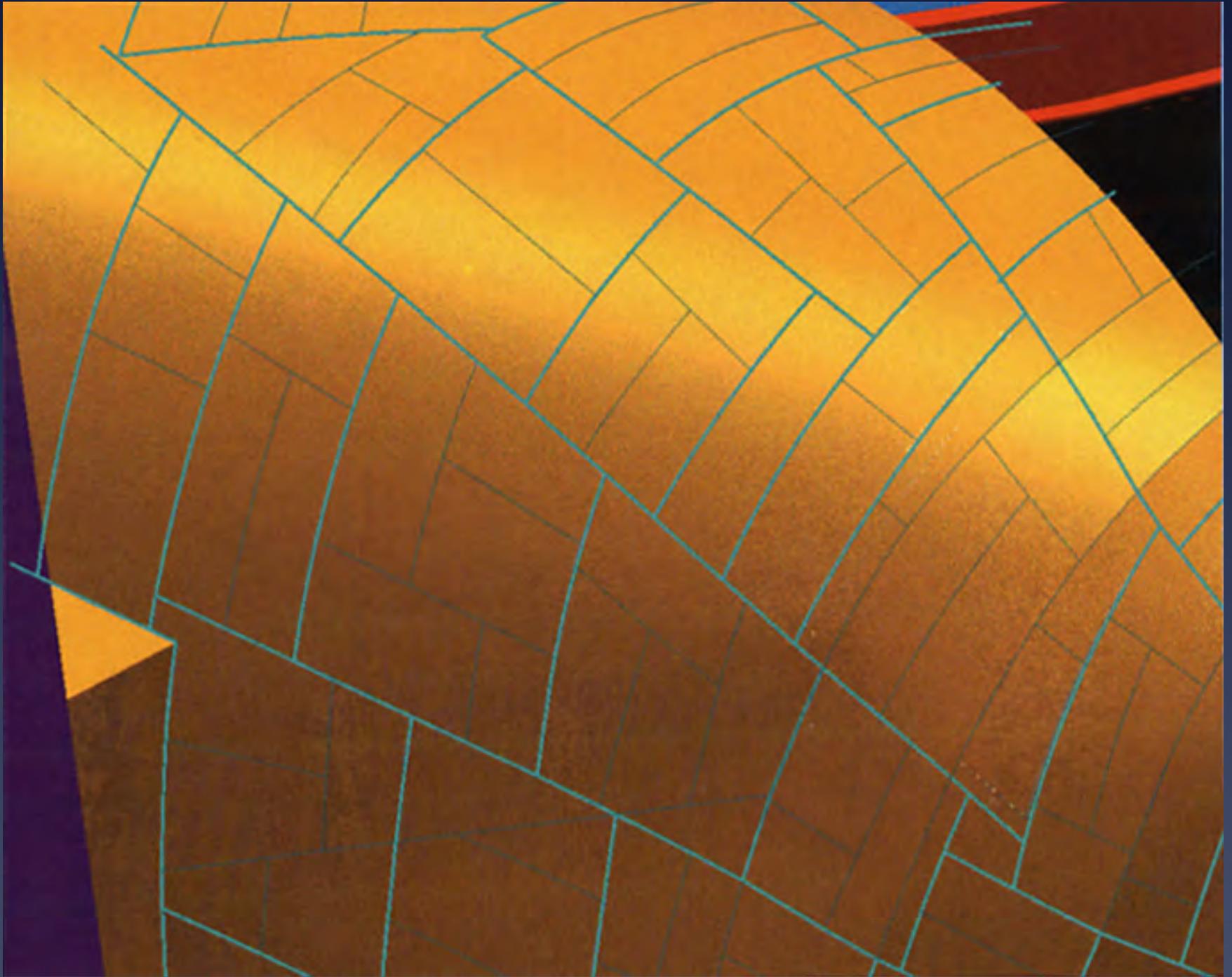
The skin is made from more than 21,000 shingles—no two are alike.

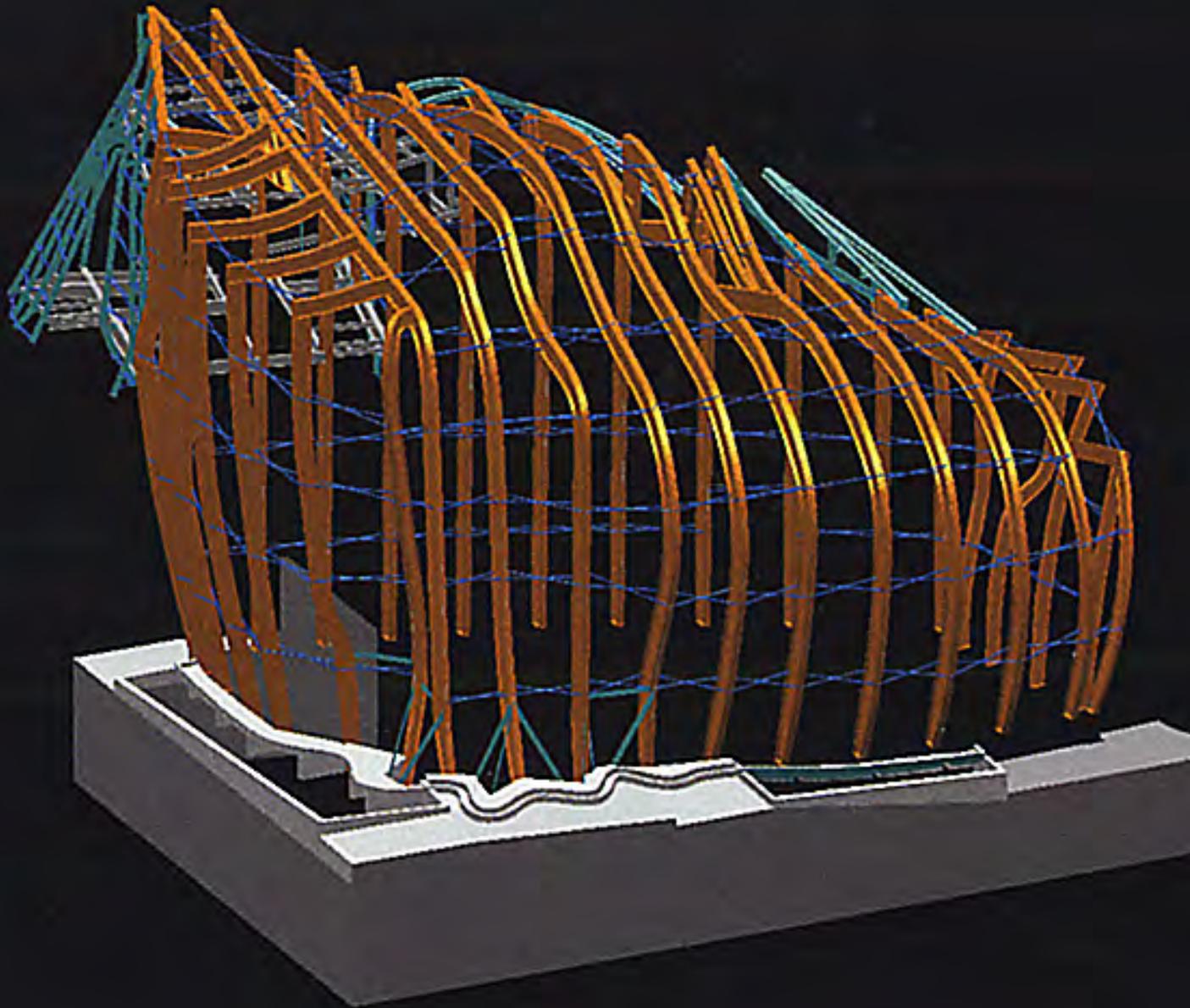
The purple color is made by dipping steel shingles in an acid bath. The gold shingles are covered in a beaded glass finish.



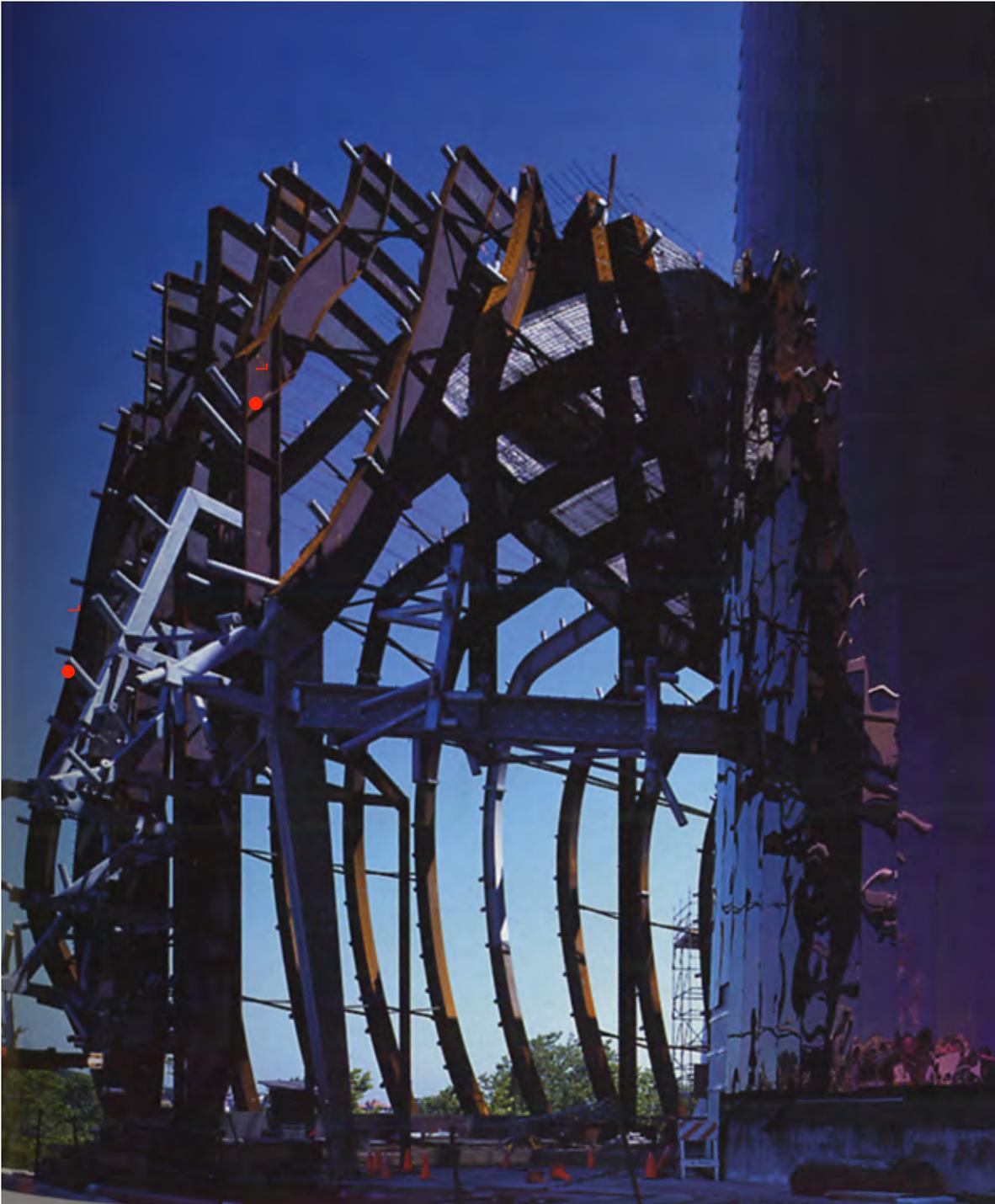
Like at Bilbao, Catia Cad makes it possible

Skin panel assembled out of 7 metal •
shingles wherever possible, 3,000 panels
overall





Catia makes
“noodle” WF steel
columns, to get
close (1 to 35 feet)
to the form
then mediating
structure fills
between noodles
and skin.



The steel industry bends, splices, rolls, and sometimes welds up the “noodles columns” out of steel plate, or wide flange members.

- Gusset plates are welded into the web where the steel changes direction in order to add stiffness to the noodle

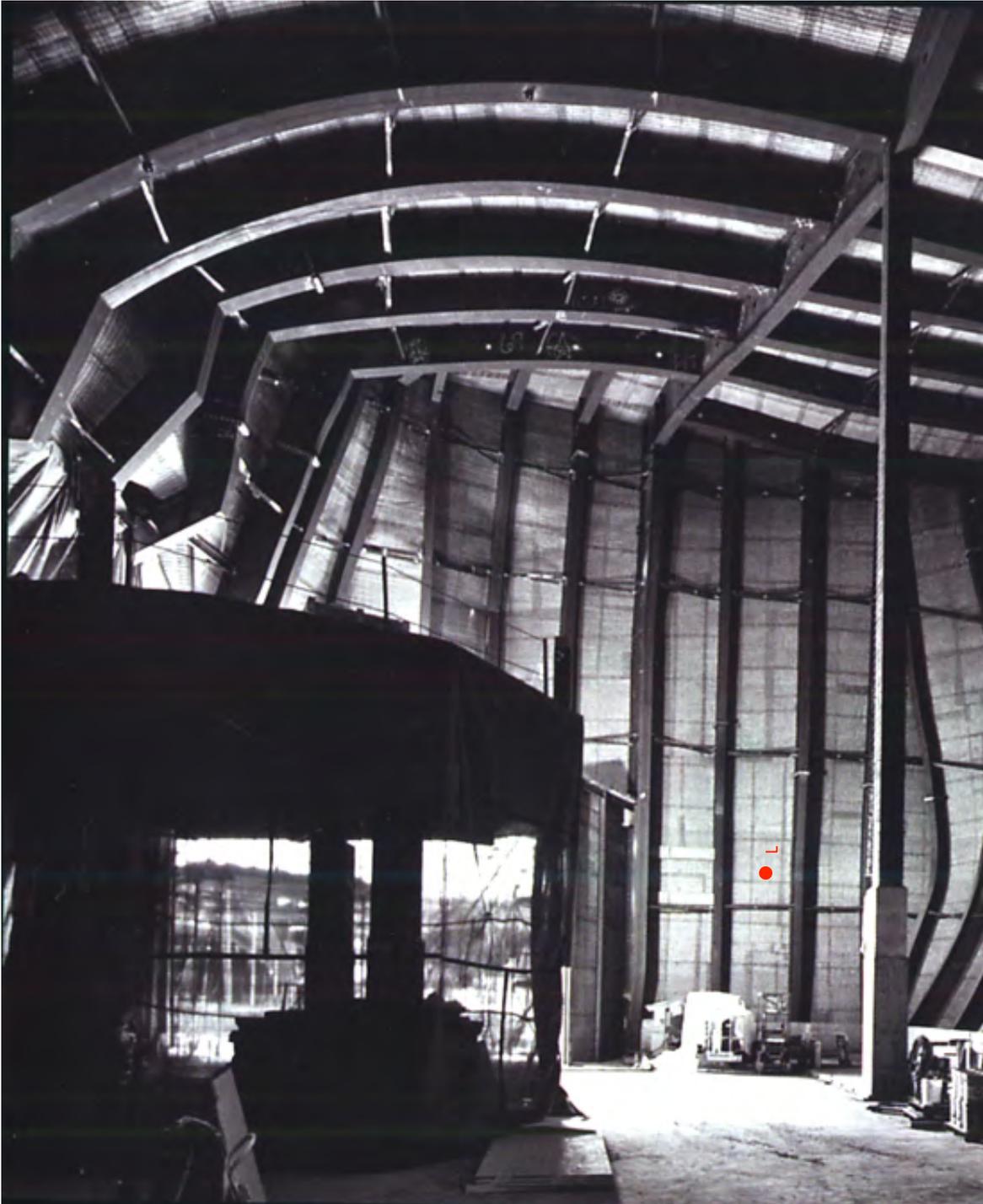
Steel pipe stanchions are added to support tubes that will carry the metal skin



- The presence of Nelson's or shear studs indicates this steel is designed to work in composite action with a concrete (shot-crete) sprayed on skin
- Sprayed-on fire protection





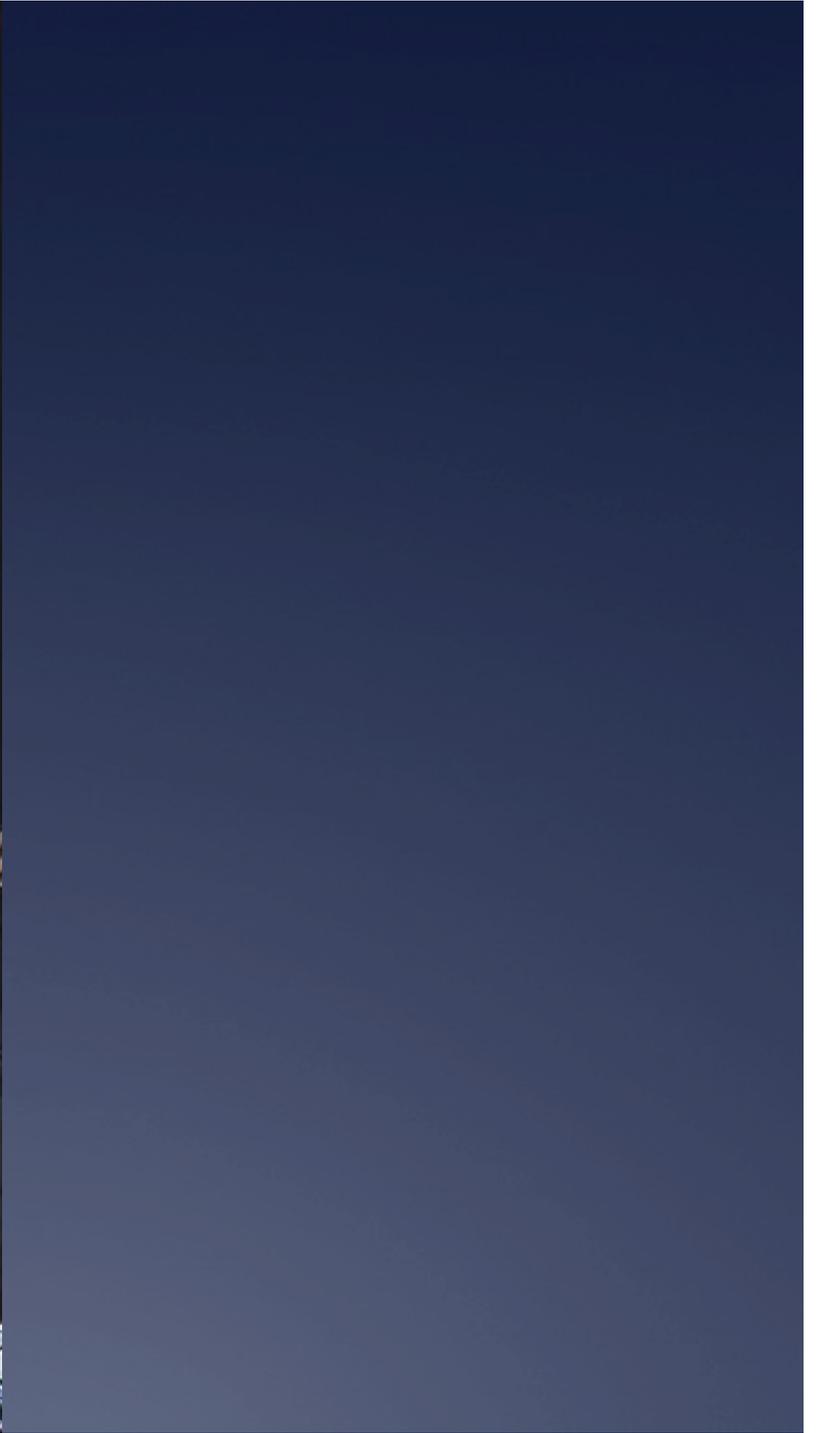


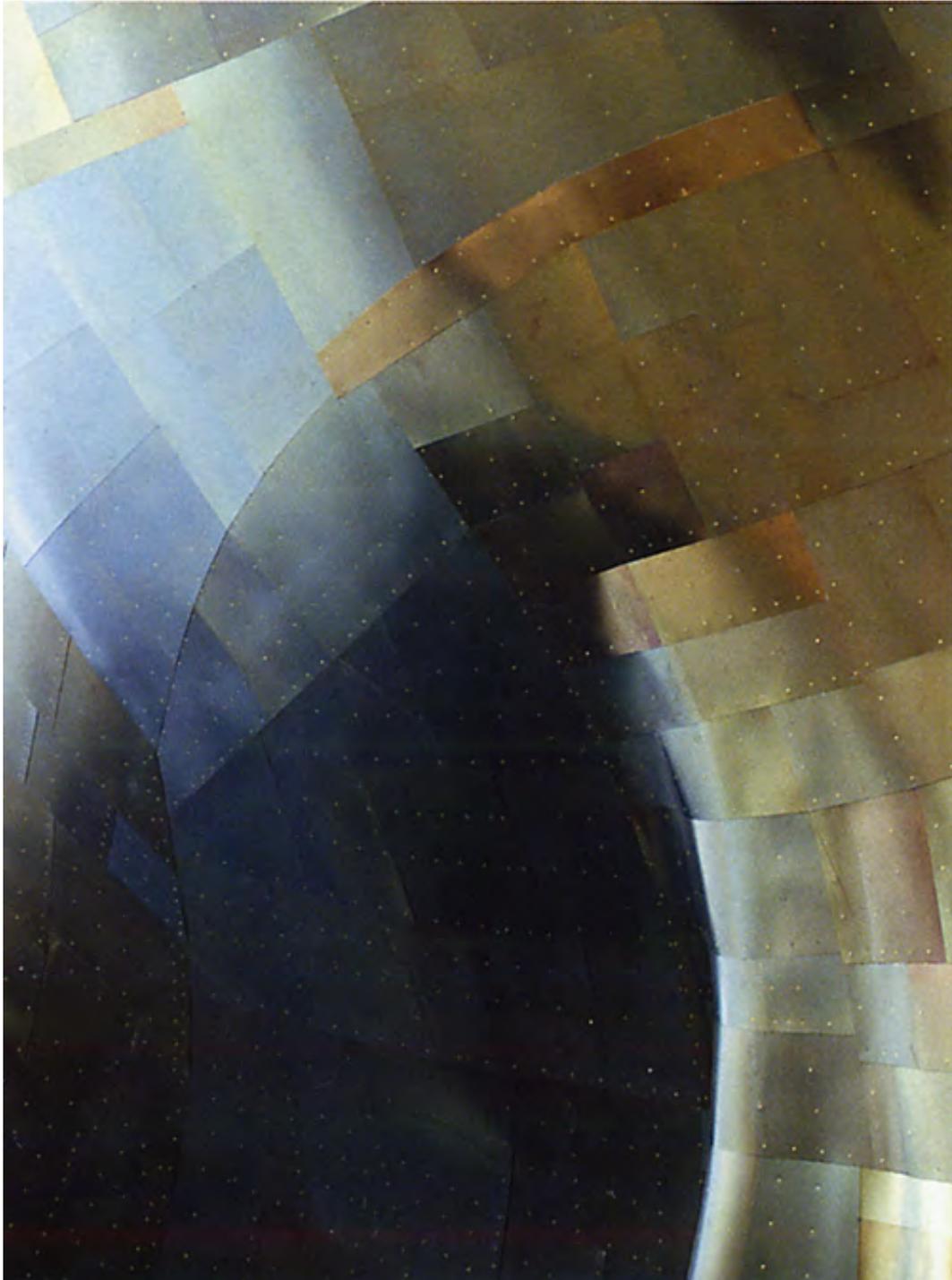
- Foil-backed insulation blankets between the steel noodles



- Looks like a bead of sealant between the shingles
- Metal shingle (21,000 in varying sizes)
- Sprayed on concrete bonding skin

Stanchion (2,400 thus)





Metal shingles come in aluminum and stainless steel. Gold color from glass bead and chromic/sulfuric acid bath treatments.

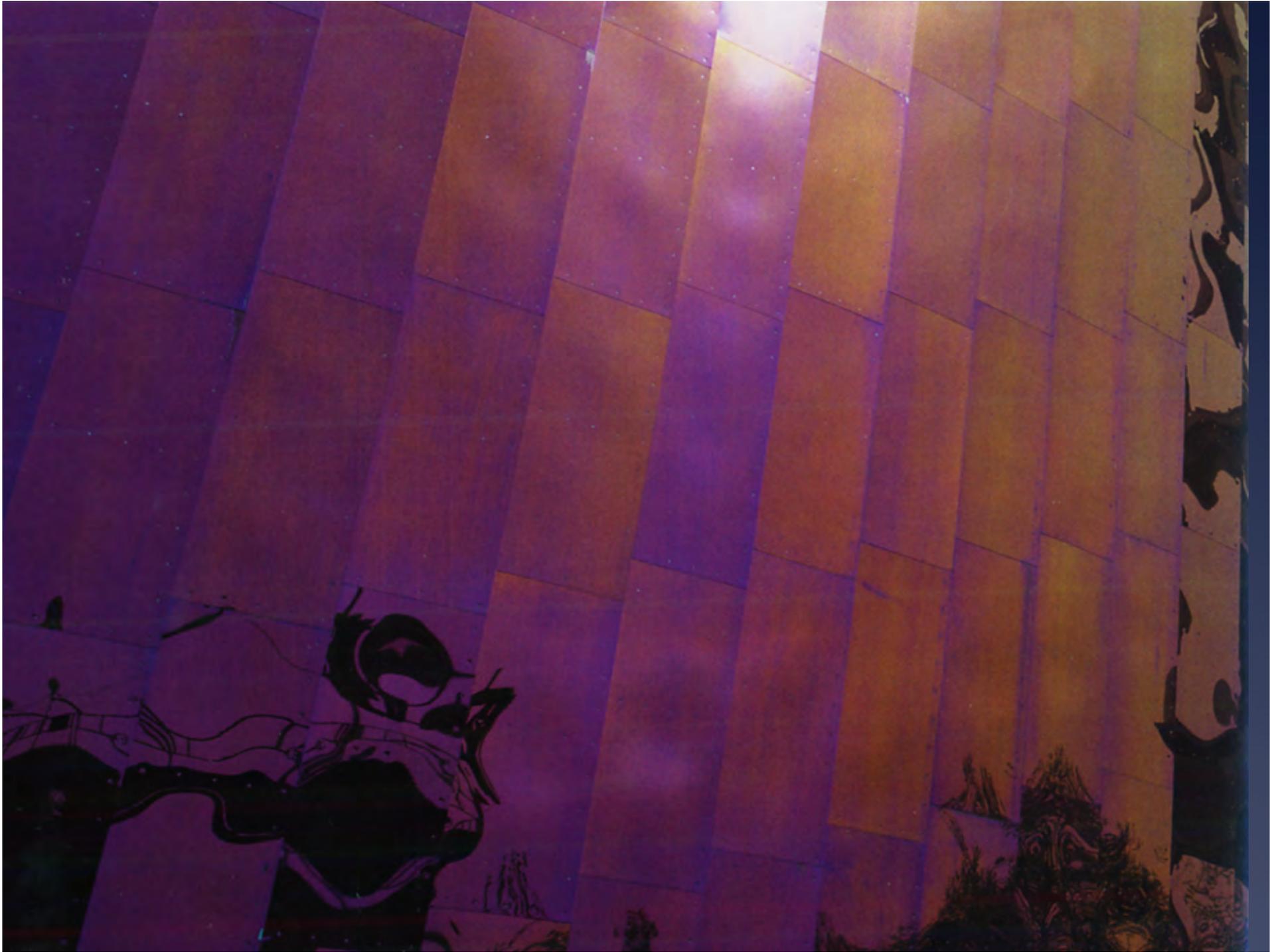
The longer the stainless remains in the bath the more thicker the layer of chromium oxide (the lens) builds.

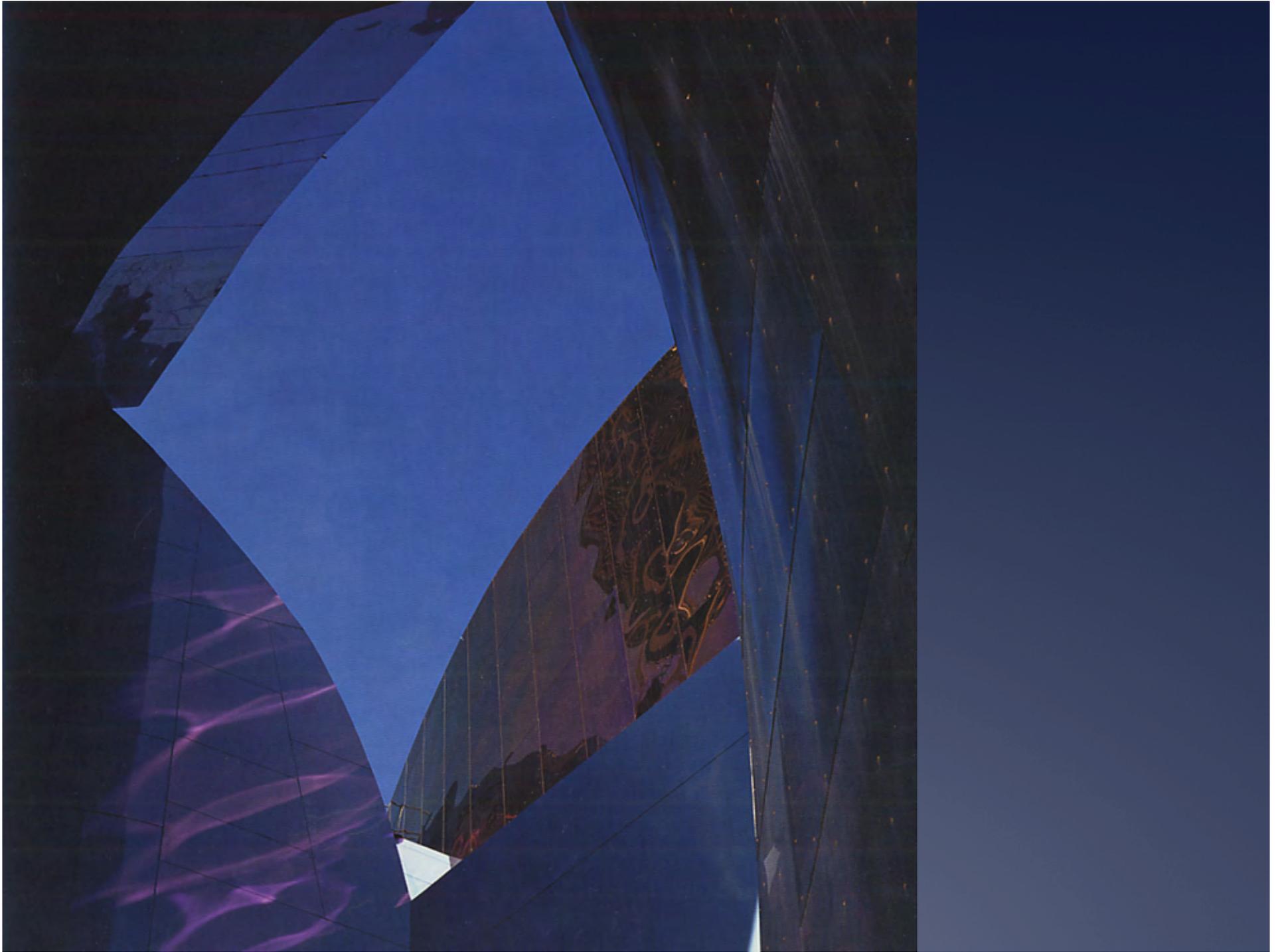
A short bath gives Bronze color (11 min)
Blue color (13 min)
Gold color (15 min)
Red color (16 min)
Purple color (17 min)

A long bath gives Green color (18 min)

The authoritative source on metals
"Architectural Metals" by L. William Zahner

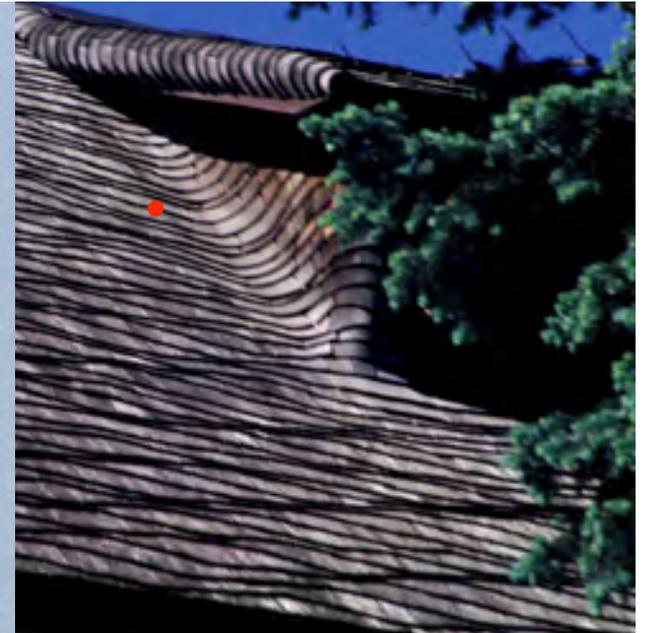










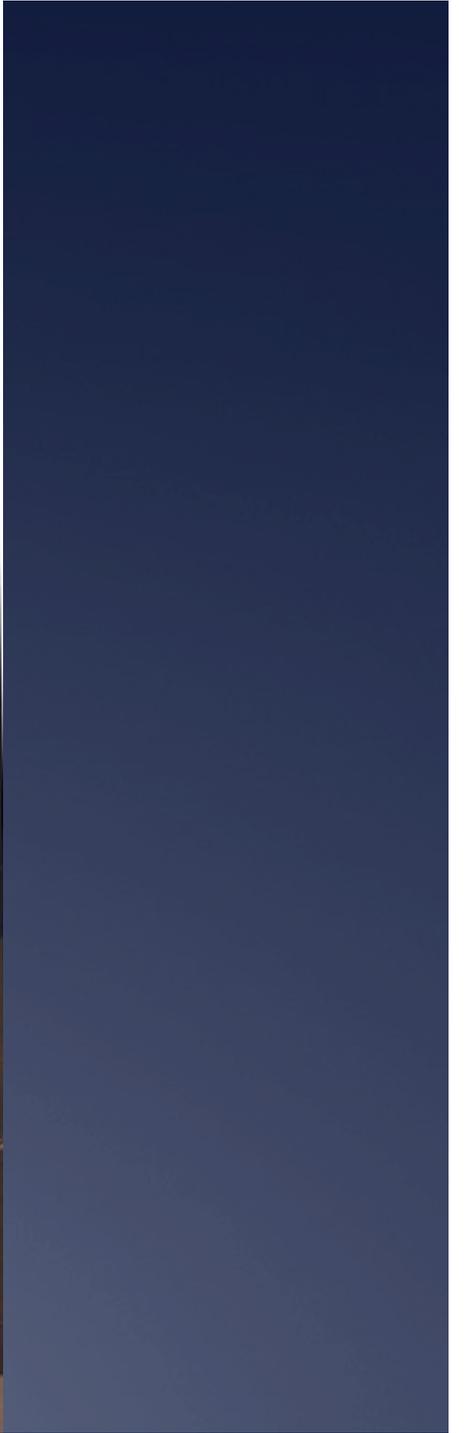


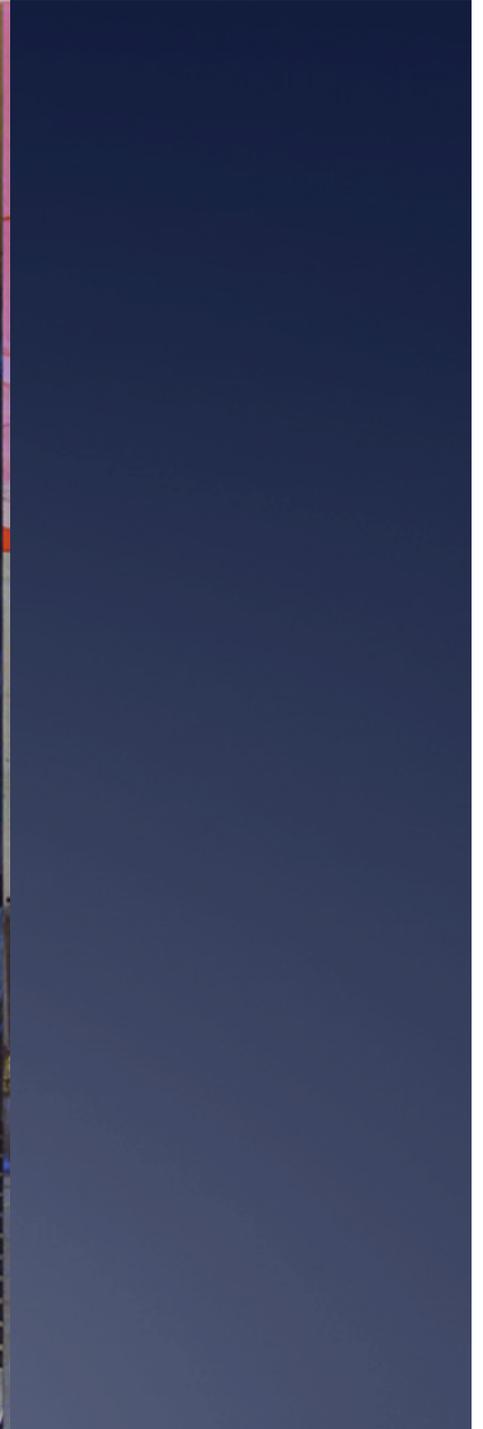
- Wood shingles simulating thatch
- Metal shingles simulating wood shingles simulating thatch?

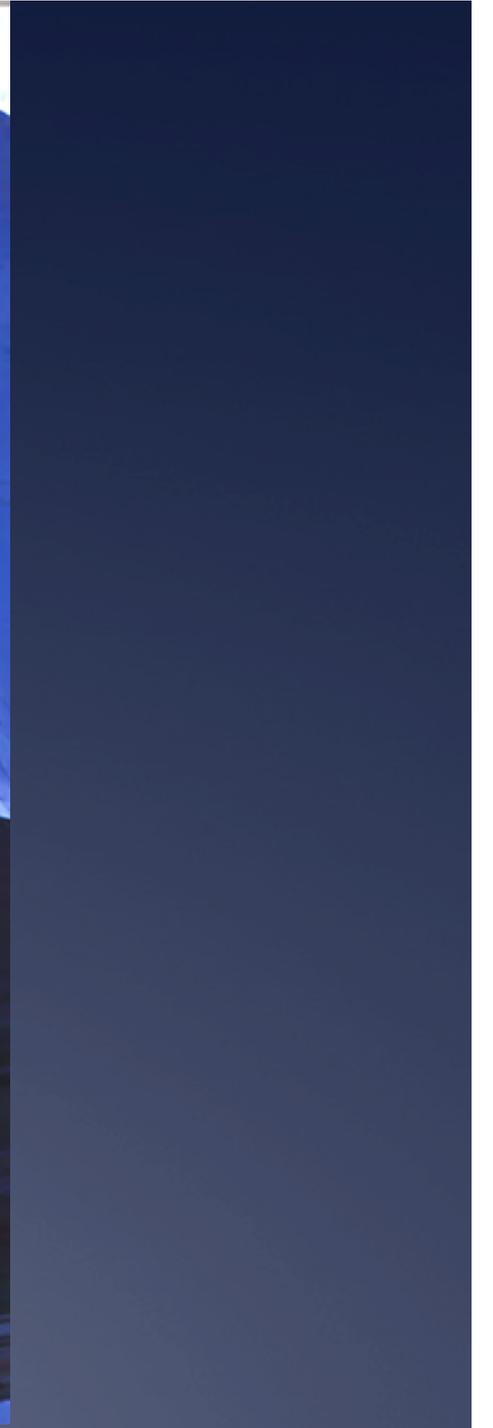
Claus Sluter "Mourners..." 1406

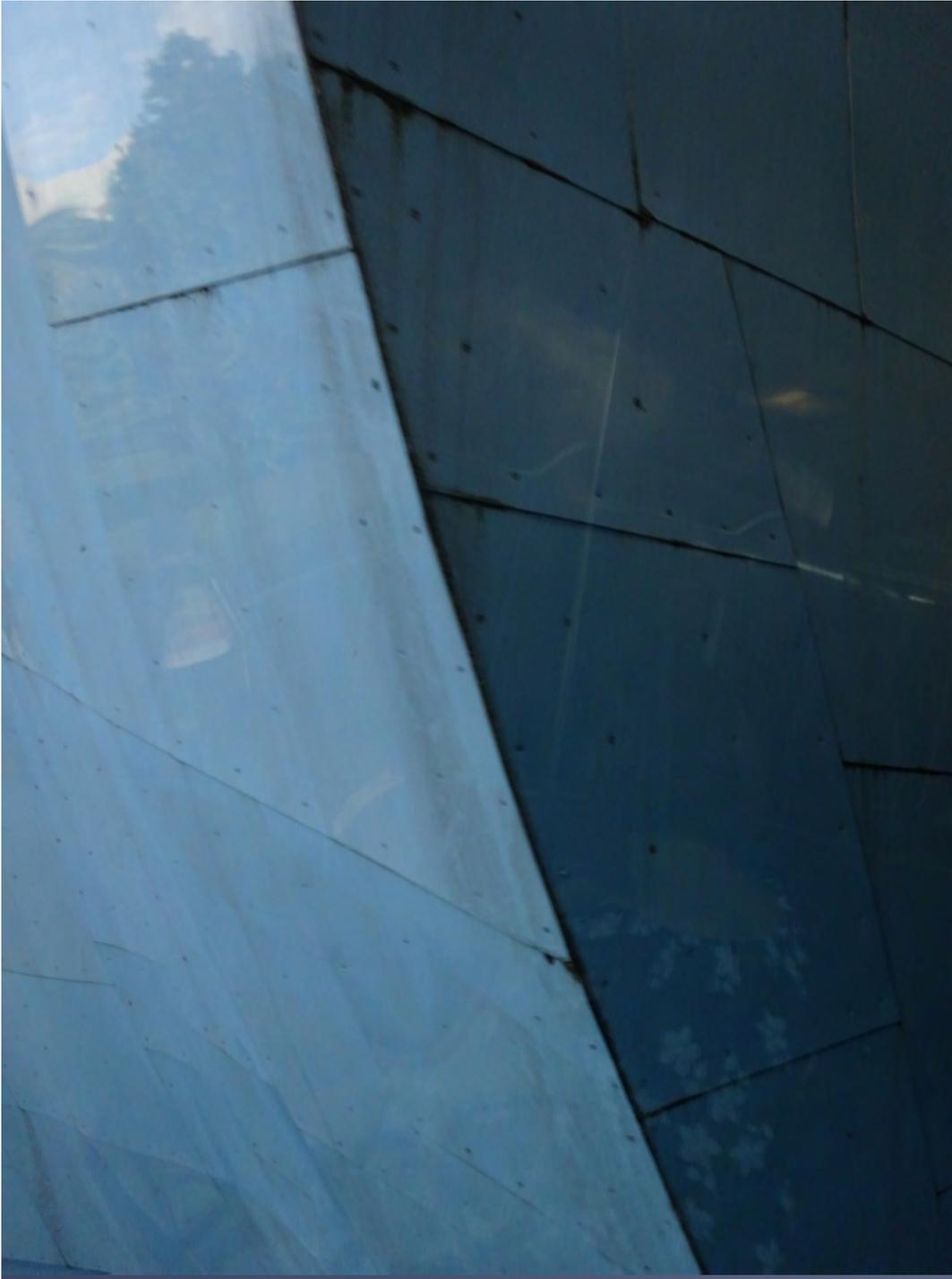


"I try it on, I assimilate it, and then it comes out some other way"









...the trouble with airborne dirt



