HUMAN DESIGN

- Mining – 39 billion tons/yr
- Heat treating – over 1,400 °C (releases 6% of GHG)
- Packaging
- Shipping

Photo Credits L-R: Dionatan Zibetti, CC-BY-NC; Wikimedia user Linguistic Demographer, public domain; Flickr user Judy_&_Ed, CC-BY-NC
• Built to shape
• Created on site
• Uses CO₂ as a building block
• Waste-free
• 450 million year old process

Stony coral

Photo Credit: NOAA, public domain
Instead of mining ancient sea beds, couldn’t we learn to make this material the way corals do?
“The conscious emulation of life’s genius is a survival strategy for the human race, a path to a sustainable future. The more our world functions like the natural world, the more likely we are to endure on this home that is ours, but not ours alone.” – J.B.
“Nature, imaginative by necessity, has already solved many of the problems we are grappling with. Animals, plants, and microbes are the consummate engineers. They have found what works, what is appropriate, and most important, what lasts here on Earth.” – J.B.
If the history of the earth were compressed into a calendar year...

- All of human history would take place in the last half hour of the last day.
- The industrial revolution would take place in the last 2 seconds.
Heat, beat, and treat
• High temperatures
• High pressures
• Toxic chemical processes
"Human ingenuity may make various inventions... but it will never devise any inventions more beautiful, nor more simple, nor more to the purpose than Nature does; because in her inventions nothing is wanting and nothing is superfluous."

– Leonardo da Vinci
ESSENTIAL ELEMENTS

- Ethos
- Emulate
- (Re)connect
ESSENTIAL ELEMENTS

Ethos

Photo Credit: Mark S. Elliot, CC-BY-NC
ESSENTIAL ELEMENTS

Emulate

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A MATTER OF SCALE

Form - *shape, surface, texture*

Process - *a series of operations*

Ecosystem – *a network operating together in an ongoing cycle*

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CASE STUDY - FORM

Photo Credits L-R: Albert Kok, CC-BY-SA; Sharklet logo; © Sharklet Technologies LLC, used with permission
CASE STUDY - PROCESS

Photo Credits L-R: NOAA, public domain; Calera logo; Mark Dumont, CC-BY
• Project-based and experiential learning
• Teamwork
• NGSS Crosscutting concepts

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Research has demonstrated:

“four days of immersion in nature, and the corresponding disconnection from multi-media and technology, increases performance on a creative problem-solving task by a full 50%.”

LEARNING ABOUT:

- Scientific name: *Pinus ponderosa*
- Found in low - mid elevations throughout the U.S.
- USDA Hardiness Zones 3-7
- Important U.S. timber species
- Needles 5-10” long, in clusters of 3
Scientific name: *Pinus ponderosa*

Found in low - mid elevations throughout the U.S.

USDA Hardiness Zones 3-7

Important U.S. timber species

Needles 5-10” long, in clusters of 3

Leaves create solar energy without toxins

Xylem transports water hundreds of feet without fuel.

Canopy re-humidifies air

Uses CO₂ as a building material

Expertly light-weighted materials

Photo Credit: J Stephen Conn, CC-BY-NC
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