

BAMBOO

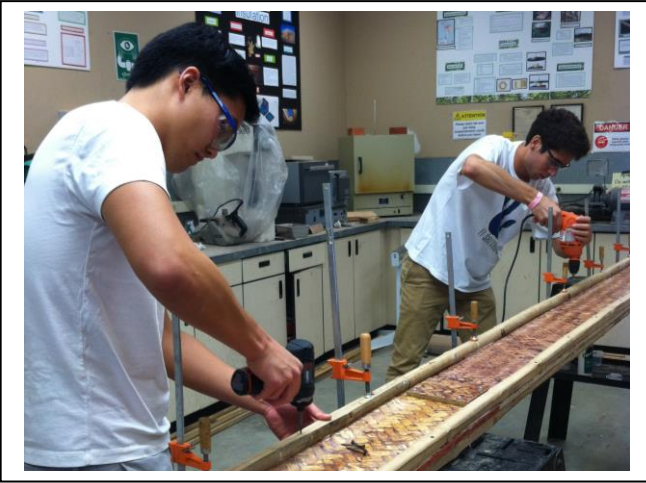


Photo courtesy of 2013 team

Important Facts

- **Use:** shear walls, gravity walls, I-joists, ceiling beams (compressed), deck covering, structural integrity
- **Key structural benefits:** Equal to timber in compressive and tensile strength; stronger than concrete in shear; ductile; lightweight

Solar Decathlon 2013

We are working with bamboo from a supplier in Vietnam named Hao Dang who owns The Grass Company, which sells bamboo for a variety of applications. He has agreed to subsidize the cost of the raw material and cover all shipping costs. Hao says that his passion for bamboo design stems from a desire “to live sustainably.” In 2009, he donated 100 acres of bamboo to help low-income households generate a sustainable source of income.

All of the joists and walls will be constructed by students working in the structural lab to cut and assemble the raw bamboo pieces.

Ethical Issues Raised

Bamboo has multiple properties that make it an ideal sustainable construction material. It grows extremely quickly, reaching maturity in 3-5 years, compared to 25-35 years for the fastest growing lumber used in the US. Bamboo also re-grows with minimal effort once cut, since it is a grass and not a tree. A typical densely packed bamboo grove produces 30% more oxygen than a forest of similar size.

Bamboo grows easily in tropical climates, making it an affordable option for many developing countries. It has the potential to create a whole industry centered on this inexpensive yet strong construction material. Ironically, while bamboo is seen as a luxury material in the United States, there is still a stigma in the developing world that it is merely a “poor man’s wood” since it is so common and easy to grow. To become popular, its applications must be innovative and unique enough to remove this stigma.

Currently, there is no US code regulating the use of bamboo in structural applications. The Santa Clara senior design groups put in months of innovative work in testing the strength of bamboo to show it was safe enough to serve as a structural material. As a result, the DOE has approved the use of bamboo in the Radiant House, making SCU the only school in the competition to use bamboo in this way. Used in its raw form, there are no concerns about added chemicals or destructive processing methods.

Bamboo has a low level of embodied energy and it sequesters carbon quickly. However, many of its benefits are offset by the high energy costs to transport it from overseas, especially since our supplier is from Vietnam. The team can lessen these effects by ordering all necessary bamboo at once, preventing excess packaging and fuel emissions from multiple shipments. The hope is that future demand will create a bamboo industry within the United States. This would ideally combine sustainable harvesting with minimal transportation energy costs.

Bamboo has clear environmental benefits and a potential to revolutionize development in the third world. These are compelling reasons to carry out more research to establish the necessary guidelines to make bamboo the construction material of the future.