

Research Overview and Updates





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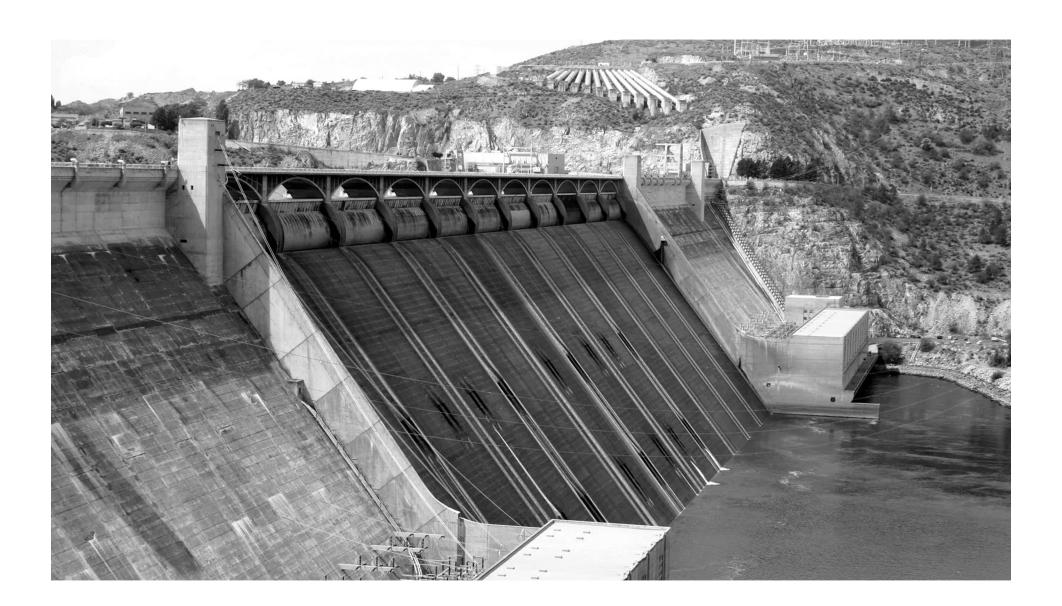


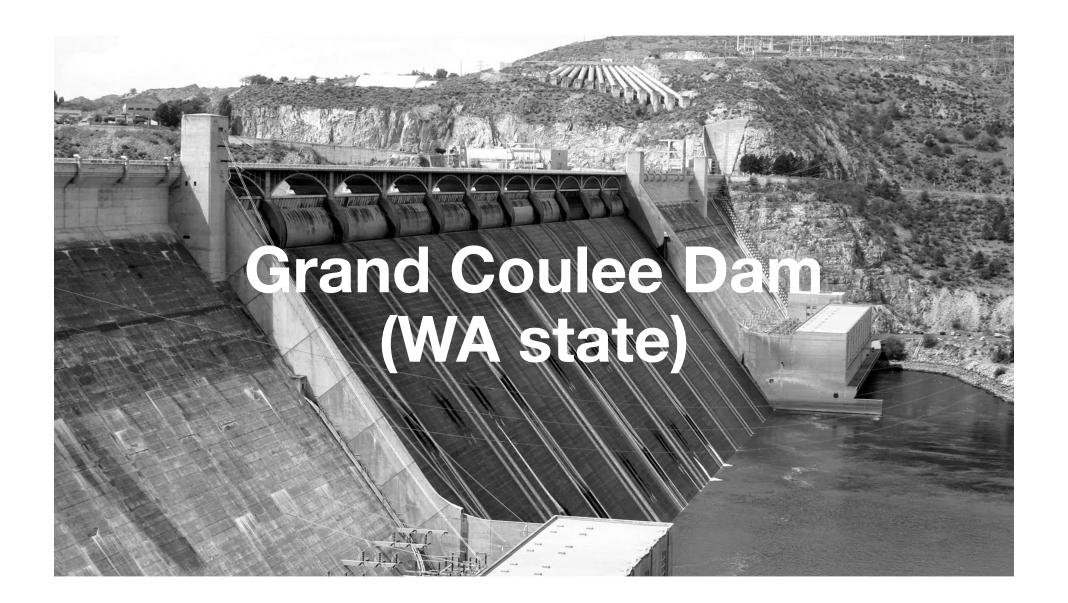
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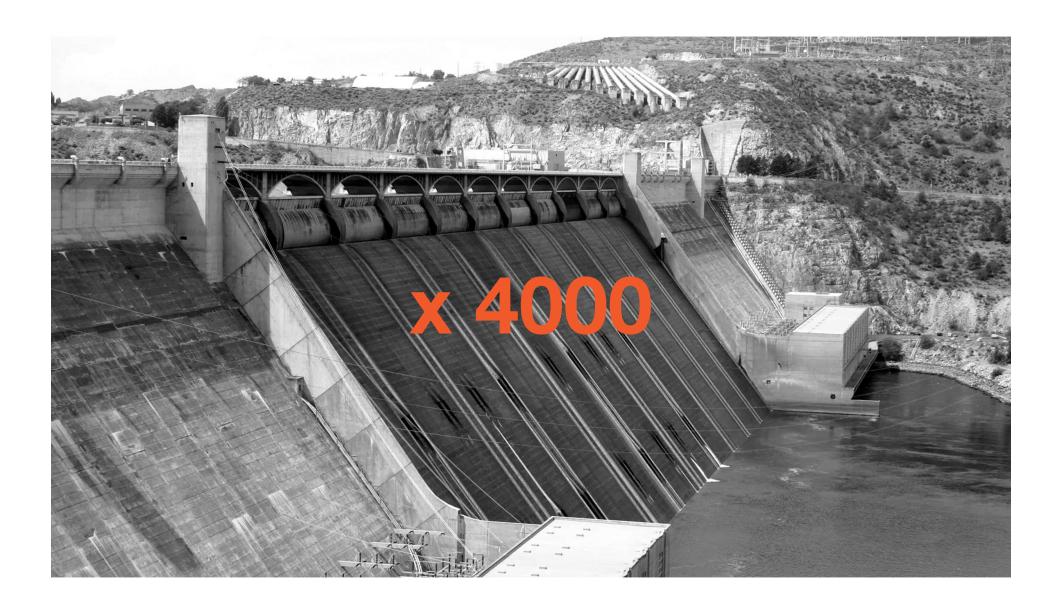
Drywall: the waste problem you've (probably) never heard of...

Drywall: the waste problem you've (probably) never heard of...
...you probably know more about than we do.

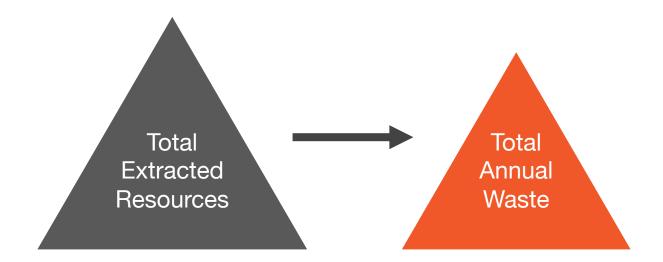
Globally, **93 billion tons** of resources are extracted from the earth every year.







Of the total 93 billion tons of resources extracted, more than **67 billion tons** are dispersed to the environment as **irrecoverable wastes**.



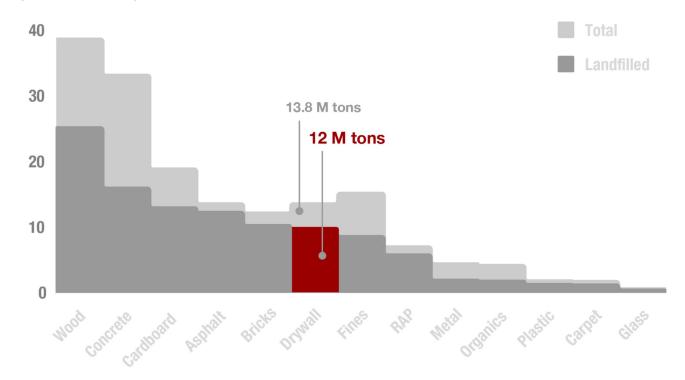
Source: Circle Economy; National Geographic

Building needs alone accounts for **42 billion tons** of extracted resources, with a similar percentage of waste.

...and in the U.S., building construction and demolition (C&D) accounts for 23% of the waste stream.

Annual C&D waste from buildings, United States, 2018

(Millions of tons)



Data source: US Environmental Protection Agency, 2020. *Advancing Sustainable Materials Management: 2018 Fact Sheet.*















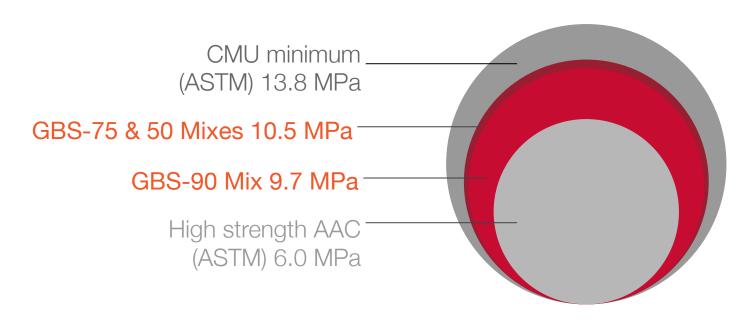






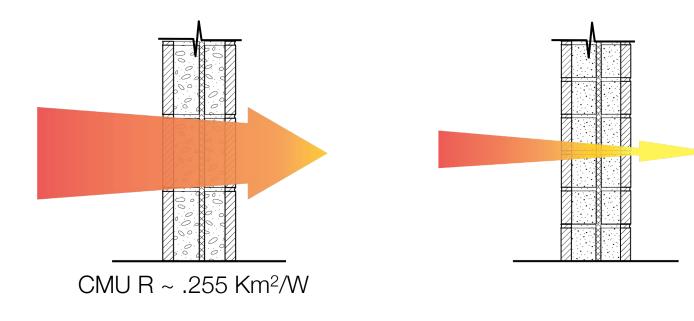


Compressive strength @ 56 days:





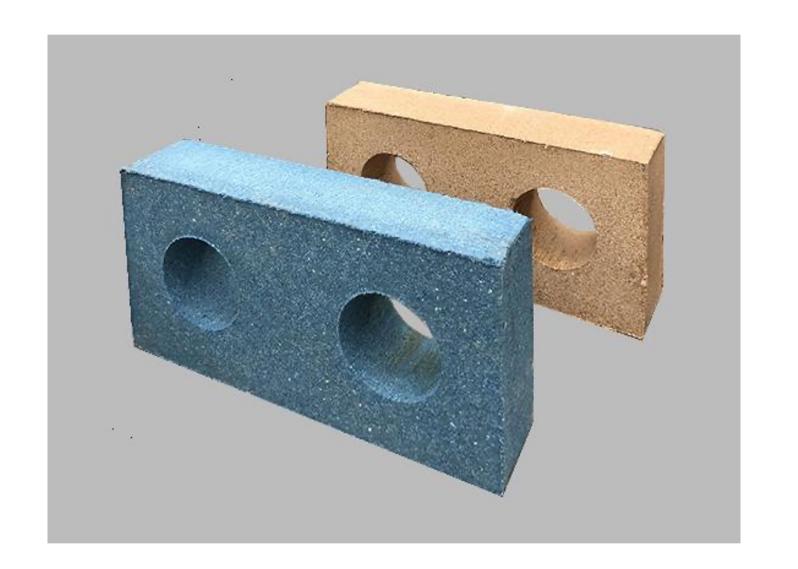
At Δ T = 20°, DWB resistance to heat flow (R) = 4 times published value for reinforced fully grouted CMU walls.



Data source: NCMA, R-values and u-factors of single wythe concrete masonry walls. TEK 6-2, 2013

Drywall Waste Block Proof-of-Concept Objectives:

- Agnostic to drywall type or scrap vs. demo.
- Simplified 'whole-board' waste processing: no paper removal or separation required.
- Portland cement reduced 50% or more vs. CMU.
- Total elimination of Portland cement from some block mixtures.









Conclusions:

- DWB performance approaches CMU.
- DWB compressive strength superior vs. insulative concrete systems (e.g., AAC).
- Some technical gaps remain.
- DWB use in non-structural applications may accelerate commercialization.





Properties of common insulation materials

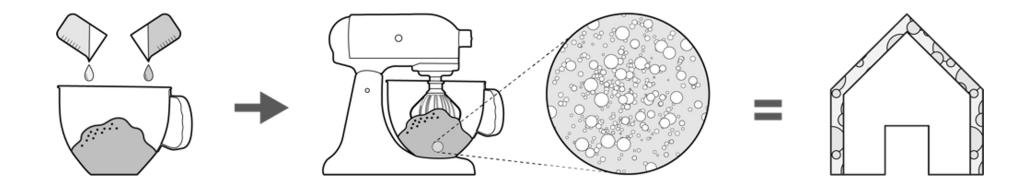
	EPS	XPS	Mineral wool	Target	Stretch
Thermal R-value	R-3.8 per in.	R-5.0 per in.	R-4.0 per in.	R-5. per in 0	R-8.0 per in
Water absorption	4%	2%	> 20%	20% or less	5% or less
Combustibility	High	High	Low	Low	Meets E136
Compressive strength	10 psi	25 psi	4 psi	25 psi	50 psi
Weight density	1 lb / ft ³	1 lb / ft ³	7 lb / ft ³	6 lb / ft ³	2-3 lb / ft ³
Installation	Easy	Easy	Difficult	Easy	Easy +
Cost per board-foot	\$0.13 / bd. ft	\$0.45 / bd. ft.	\$0.78 / bd. ft.	\$0.50 / bd. ft.	\$0.25 / bd. ft.

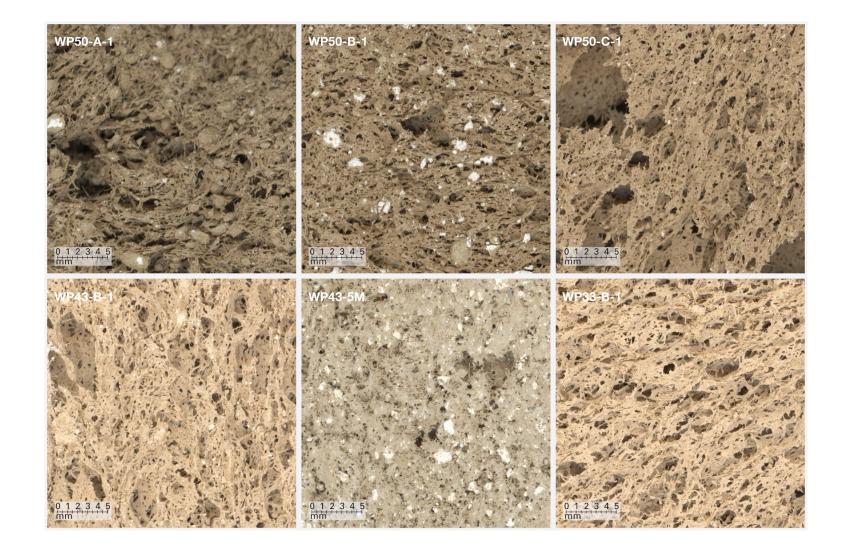
Source: STO (2019). *Open Challenge: Next-generation building insulation materials.* https://problemspace.io/challenges/next-generation-building-insulation-materials/

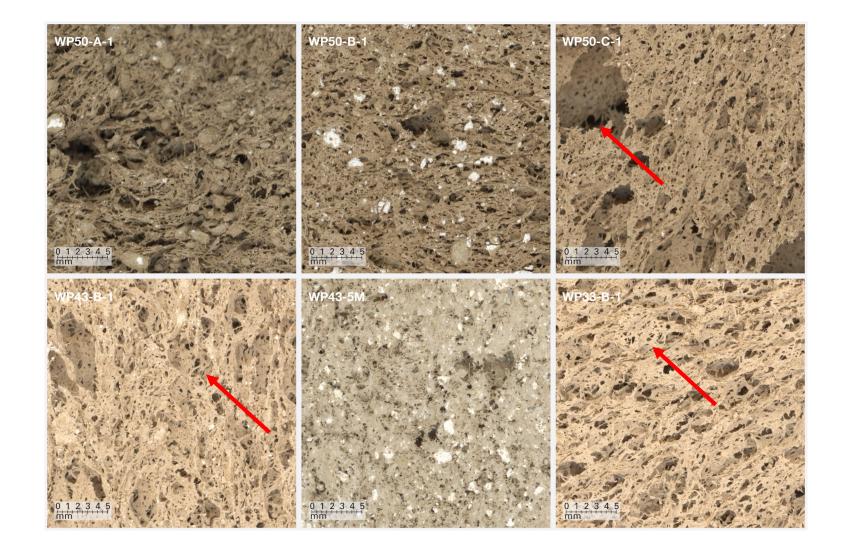






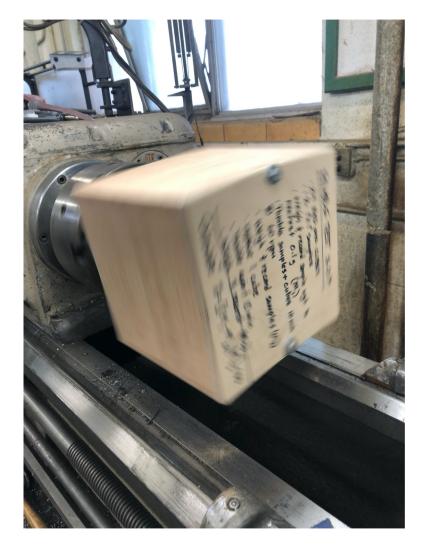






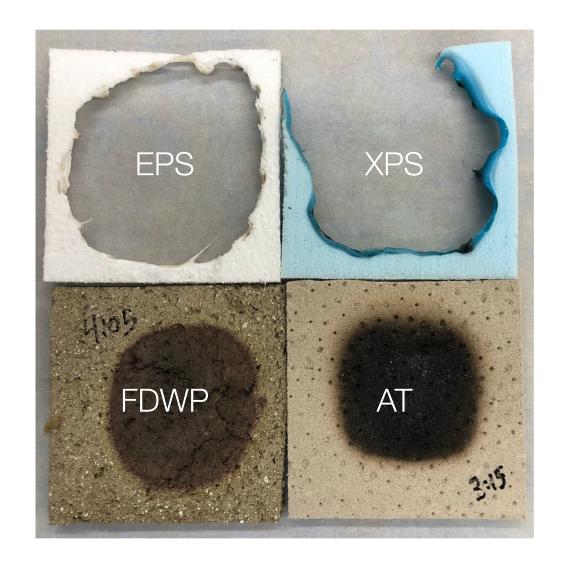






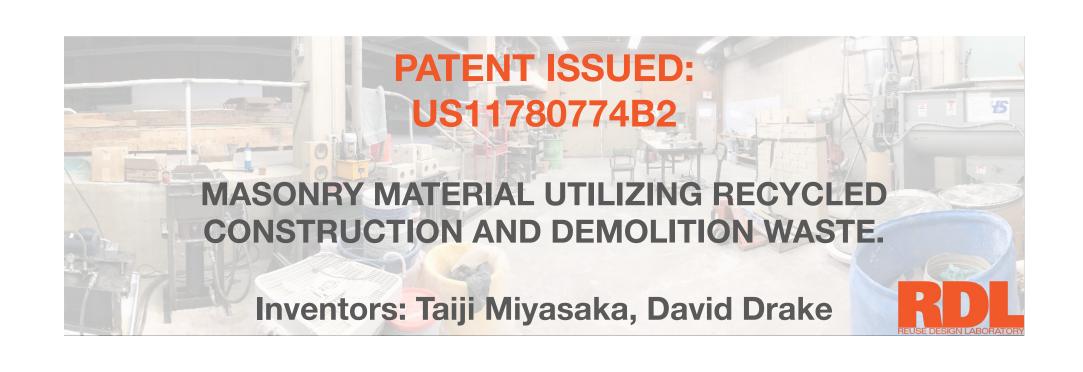




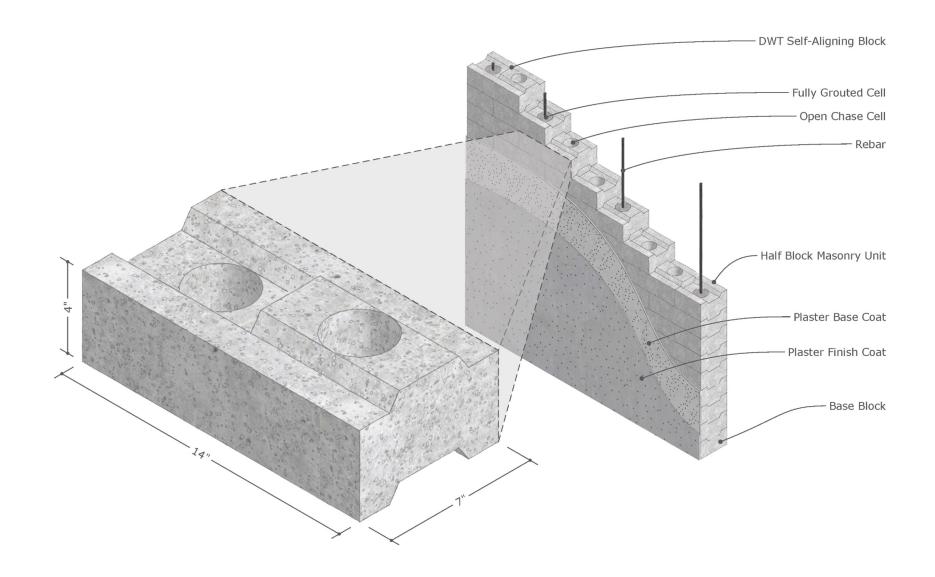


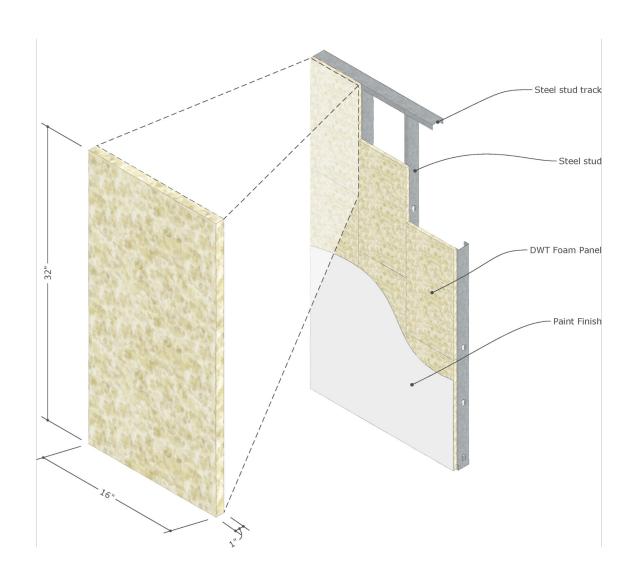
	Fire Protective	Acceptable Strength	Potential GHG Reductions	C&D Waste Reductions	Water Resistance
DWF	√	√	√	√	?
Acoustical Ceiling Tile	√	√			
EPS		√			V
XPS		√			V

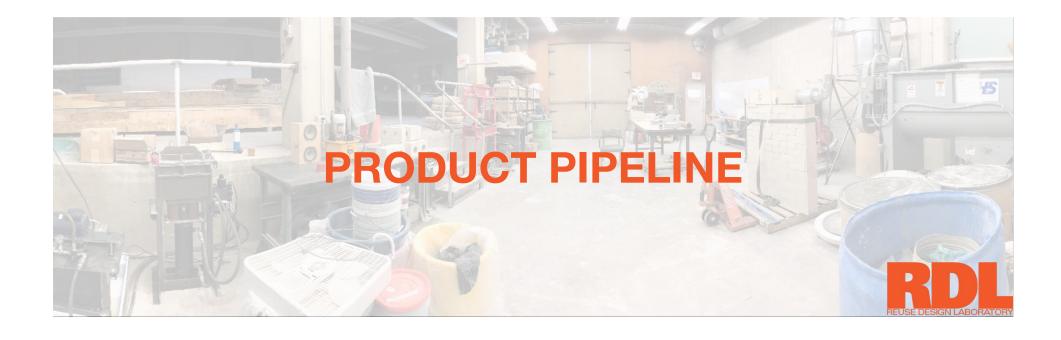




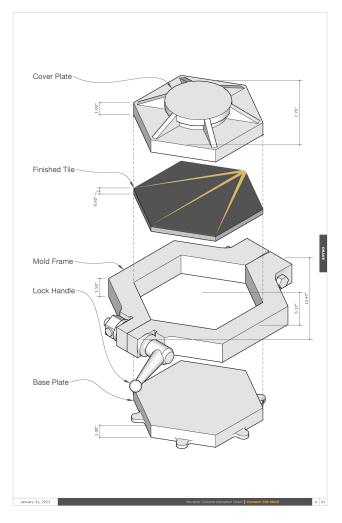


















QUESTIONS?





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