ArcelorMittal Design Project

Lauren Nelson
Andrew Nelson
Ceillum O'Hare
Chee Hau Teoh

Summary

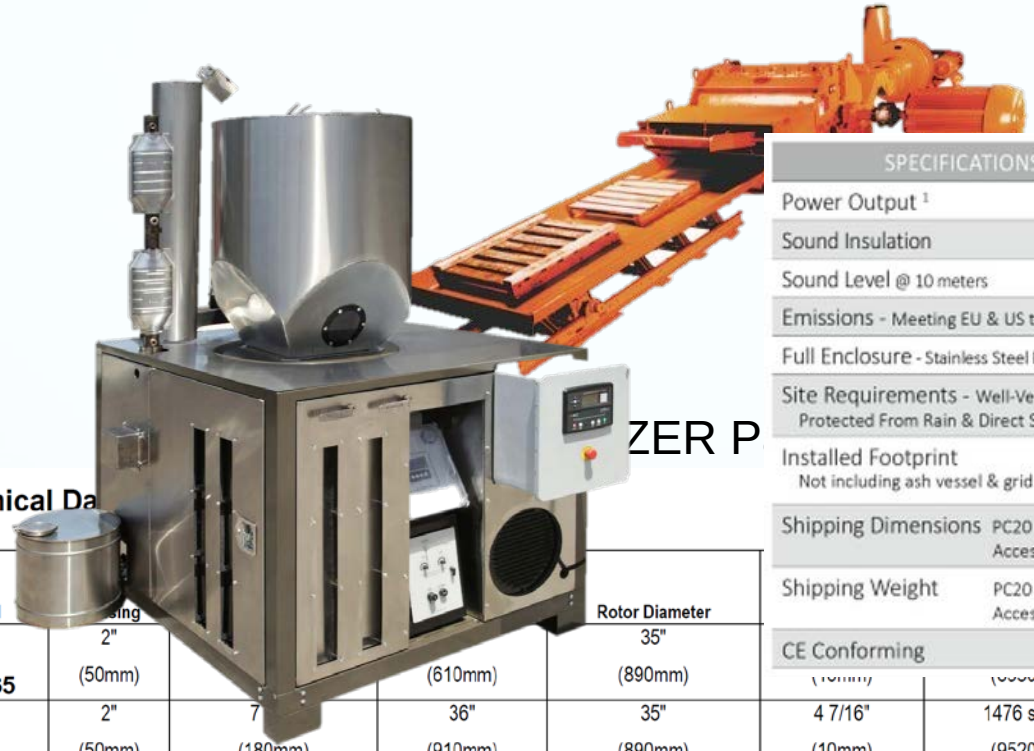
- Mission Statement
- External Research
- House of Quality
- Final Design
- Conclusion and Economics

Mission Statement

- Our objective in this design project, as requested by ArcelorMittal, is to reduce their waste stream by designing an opportunity to reuse and recycle their largest sources of waste (pallets, empty drums or totes, and waste refractory brick)
- Our main focus is on biomass/biodiesel power generation

[http://www.prescientpower.co.uk/sites/default/files/leaf%20symbol.png]

External Research



ZER P

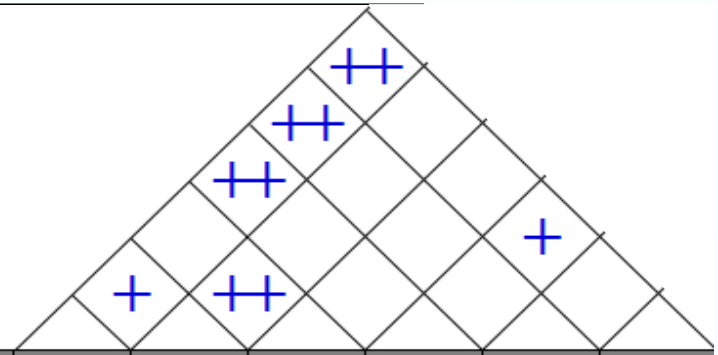
SPECIFICATIONS		PC20	PC20 CHP
Power Output [1]		60 Hz = 18 kW	60 Hz = 18 kW
Sound Insulation		✔	✔
Sound Level @ 10 meters		65 db(A)	65 db(A)
Emissions - Meeting EU & US targets [2]		✔	✔
Full Enclosure - Stainless Steel Panels		✔	✔
Site Requirements - Well-Ventilated Protected From Rain & Direct Sun		✔	✔
Installed Footprint Not including ash vessel & grid tie enclosure		136 x 136 cm	136 x 136 cm
Shipping Dimensions	PC20 - Crated Accessories- Crated	178 x 178 x 157 cm 125 x125 x 127 cm	178 x 178 x 165 cm 125 x125 x 127 cm
Shipping Weight	PC20 - Crated Accessories- Crated	1175 kg 210 kg	1250 kg 225 kg
CE Conforming		✔	✔

Technical Da

Model	sing			Rotor Diameter					ip Speed
#30-35	2" (50mm)		(610mm)	35" (890mm)					16,485
#42-35	2" (50mm)	7 (180mm)	36" (910mm)	35" (890mm)	4 7/16" (10mm)	1476 sq inches (9520 sq cm)	200 hp (150 kw)	1800 rpm	16,485
#56-35	2 (50mm)	7 1/4 (180mm)	48 (1220mm)	35" (890mm)	4 7/16" (10mm)	1968 sq inches (12700 sq cm)	250-300 hp (190-220 kw)	1800 rpm	16,485

PC20 Power Cube

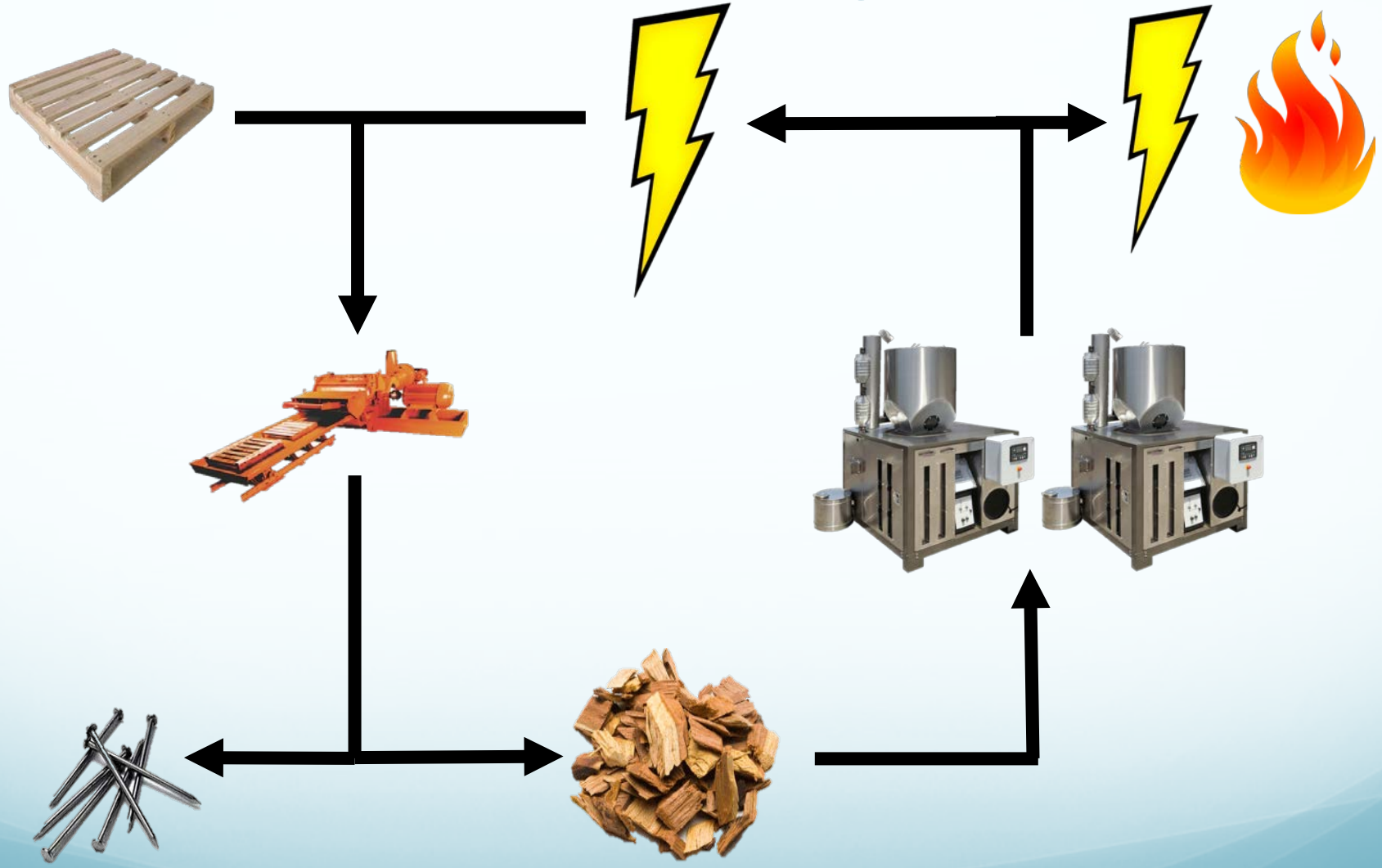
House of Quality



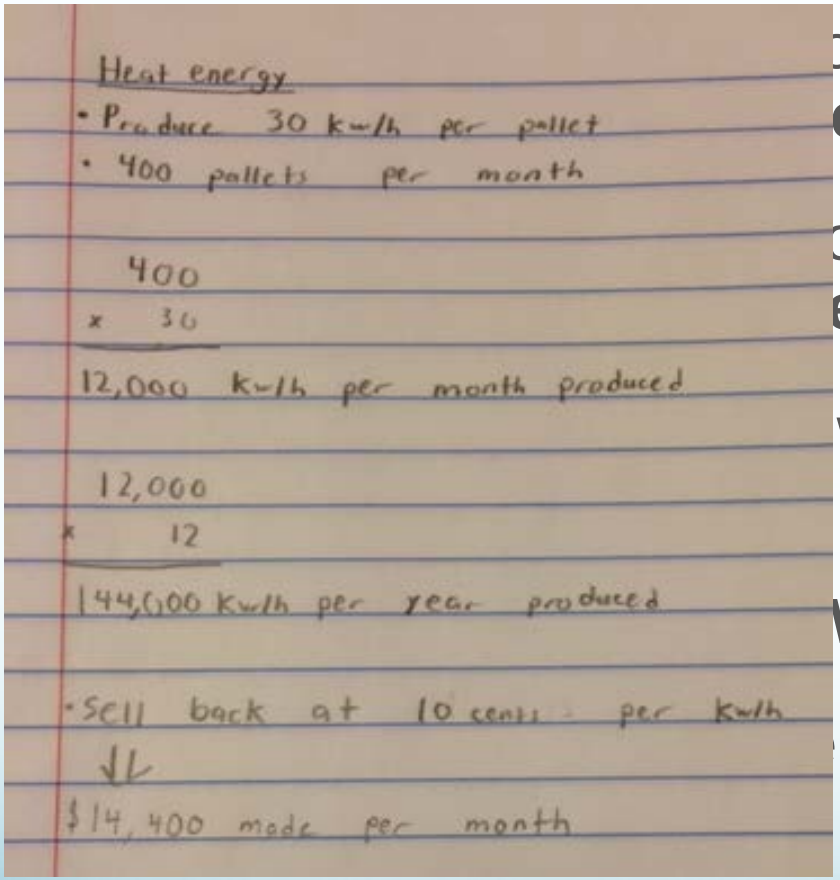
Column #	1	2	3	4	5	6
Direction of Improvement: Minimize (▼), Maximize (▲), or Target (x)						
Quality Characteristics (a.k.a. "Functional Requirements" or "Hows")	PC 20 Power Cube	Hog Erizer Grinder	Magnetic nail seperator	Grid tie system	Hopper Storage	Heat System
Demanded Quality (a.k.a. "Customer Requirements" or "Whats")						

7	9	12.3	7.0	Reduce carbon footprint/energy usage

Final Design



Conclusion & Economics



Heat energy

- Produce 30 kw/h per pallet
- 400 pallets per month

400
× 30

12,000 kw/h per month produced

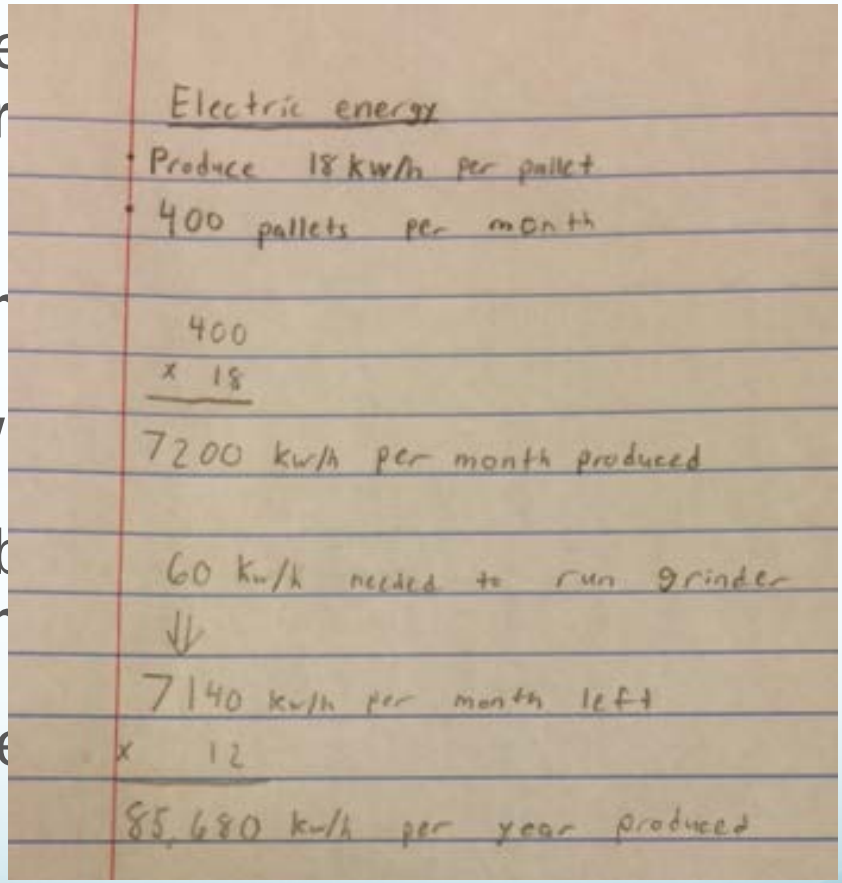
12,000
× 12

144,000 kw/h per year produced

- Sell back at 10 cents per kwh

↓↓

$14,400 made per month



Electric energy

- Produce 18 kw/h per pallet
- 400 pallets per month

400
× 18

7200 kw/h per month produced

60 kw/h needed to run grinder

↓↓

7140 kw/h per month left

× 12

85,680 kw/h per year produced