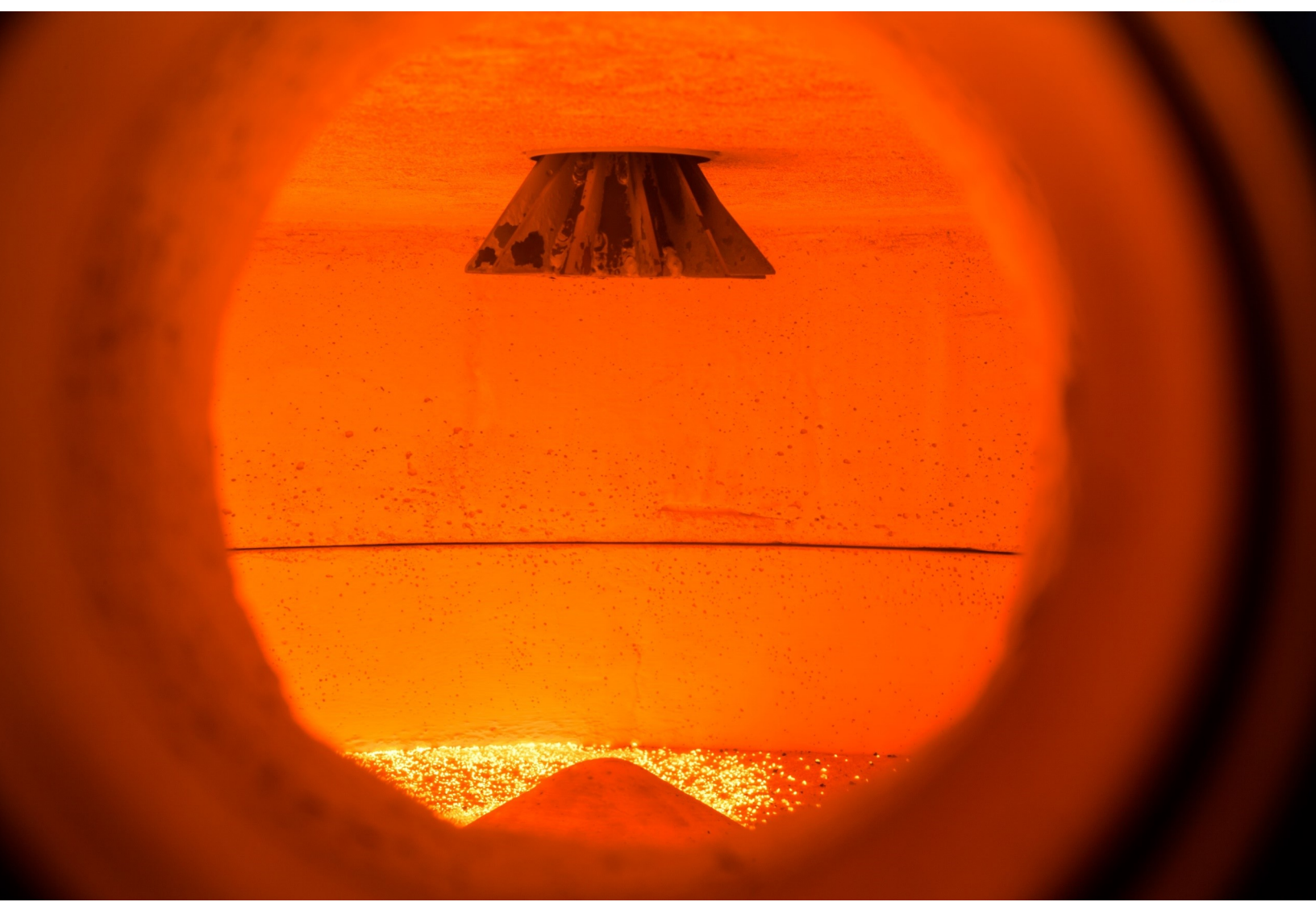


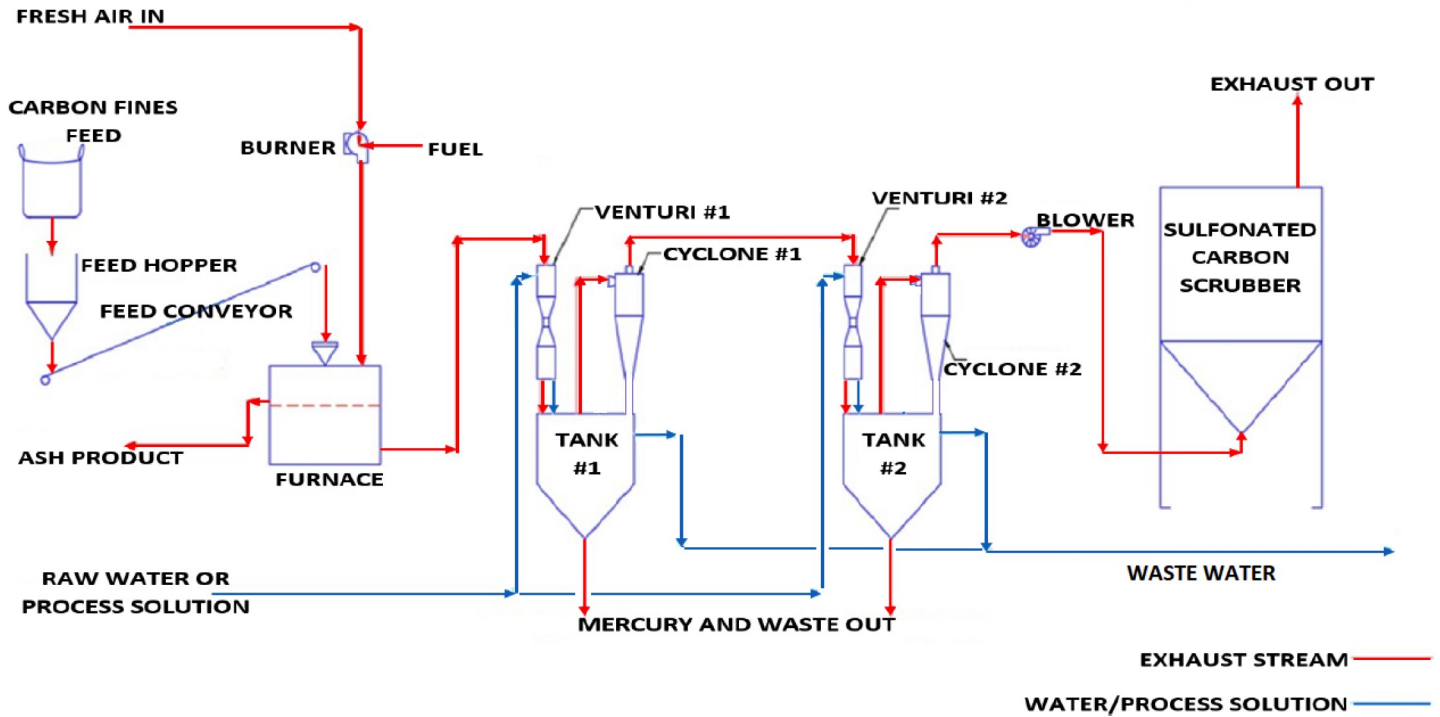


Kappes, Cassidy & Associates

KCA CARBON CONVERTER







High Performance Solution For Gold Recovery from Carbon Fines

The KCA Carbon Converter is a modular, self-contained unit, designed to process a minimum of 300kg of clean dry carbon per day. (The actual throughput is based on the carbon composition and moisture content of the feed material.) Dirty, wet carbon fines can be fed directly into the roasting chamber where the feather light carbon ash is fully captured as a dry product. The ash can then be processed to recover previously trapped gold. Environmental control is a key strength of the Carbon Converter; a three-stage exhaust scrubbing system fully captures mercury to best attainable EPA-acceptable levels. With demonstrated 99% gold and silver recovery, the Carbon Converter is the definitive solution to on-site carbon fines.

Kappes, Cassidy & Associates (KCA) specializes in the development, engineering and implementation of extractive metallurgical processes for the mining industry; and since 2011, KCA has invested significant R&D efforts toward bringing the Carbon Converter to market. Through rigorous testing and product development, the KCA Carbon Converter has been shown to handle any variety of carbon fines material, eliminating your on-site carbon fines problem.

The KCA Carbon Converter combines advanced technologies to effectively ash your carbon fines, allowing you to recover the precious metals locked within, and significantly increase the revenue of your operation.

Here's how it works: Carbon fines are conveniently loaded into the feed hopper directly from a super-sack. An automated conveyor then transfers the material to the top of the furnace, where it is continuously and evenly distributed over a layer of silica sand. Hot air from an overhead flame is pulled down through the carbon now deposited on the sand "bed". The carbon combusts, excess water is evaporated, and the carbon reduces to a metal rich ash.

When the bed has accumulated a full load of ash, the operator is alerted to exchange bottom sections for the next ashing cycle. Two interchangeable bottom sections of the furnace allow for semi-continuous operation, maximizing up-time. This semi-continuous batch system is easily operated by one person through a sophisticated PLC interface. The ash is then removed from the sand bed by the operator and either smelted directly or leached.

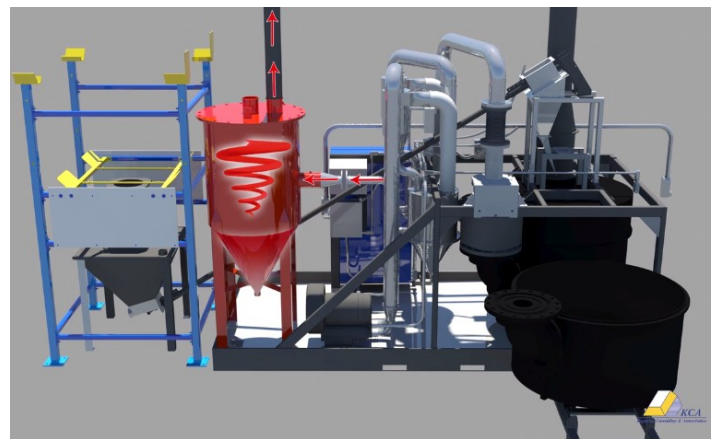
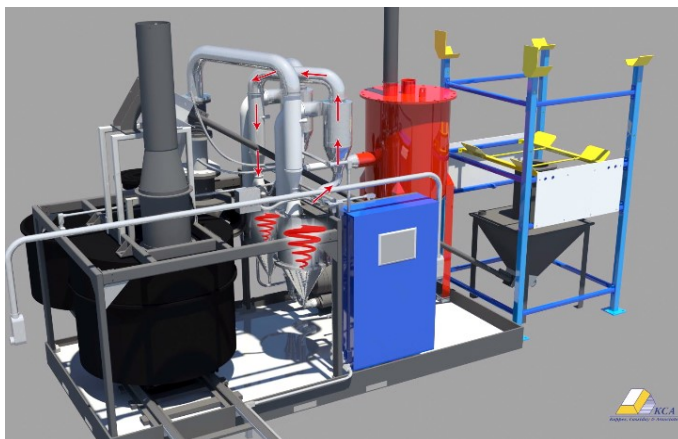
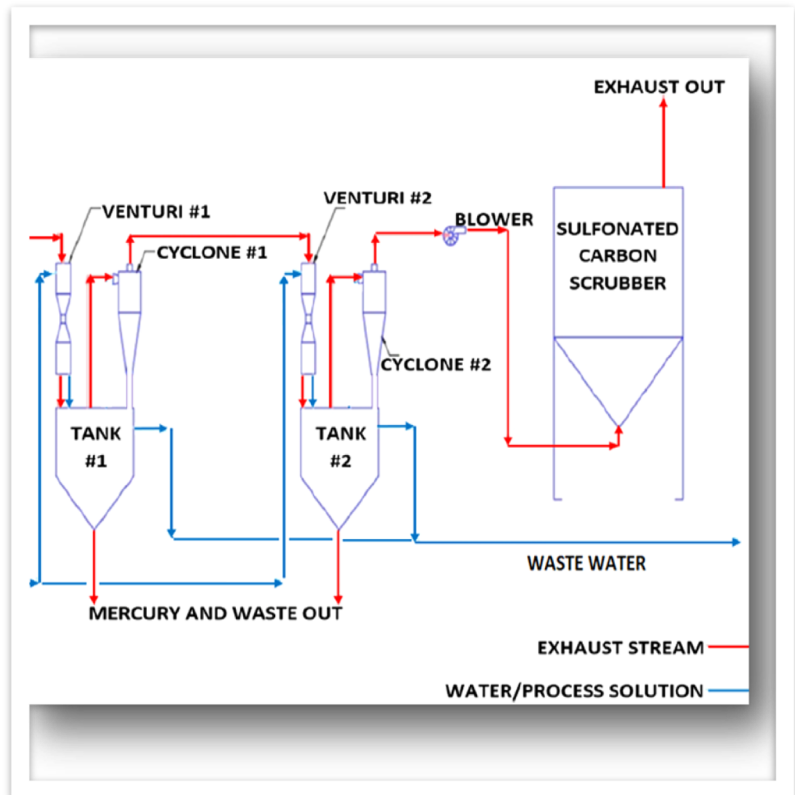
Created by Kappes, Cassidy & Associates, with over 40 years of experience in the global gold industry.

Environmental Control: Complete Mercury Removal

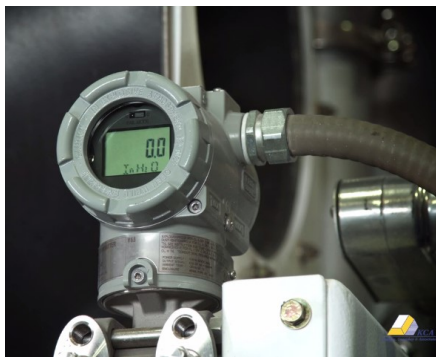
Within the Carbon Converter unit, KCA has designed a unique system for removing mercury and other volatiles that may be released during carbon ashing. The hot exhaust gas from the furnace flows through a series of two venturi/water scrubbers, using water at ambient temperature to remove volatiles including mercury. Mercury is collected in a conical sump below each scrubber from where it can be safely disposed. In most cases, coolant for this stage is process solution, flowing into the system and discharging back into the leaching process.

As a final polishing step, the cooled exhaust gas passes through a tank filled with sulfur-impregnated carbon to remove any trace amounts of mercury from the exhaust gas stream.

Once the ashing cycle is complete, the ash, which has been roasted at high temperature, has no mercury remaining. This design ensures that emissions meet emission standards of every US state and foreign country.



The KCA Carbon Converter: A sophisticated and well designed solution to your carbon fines problem.



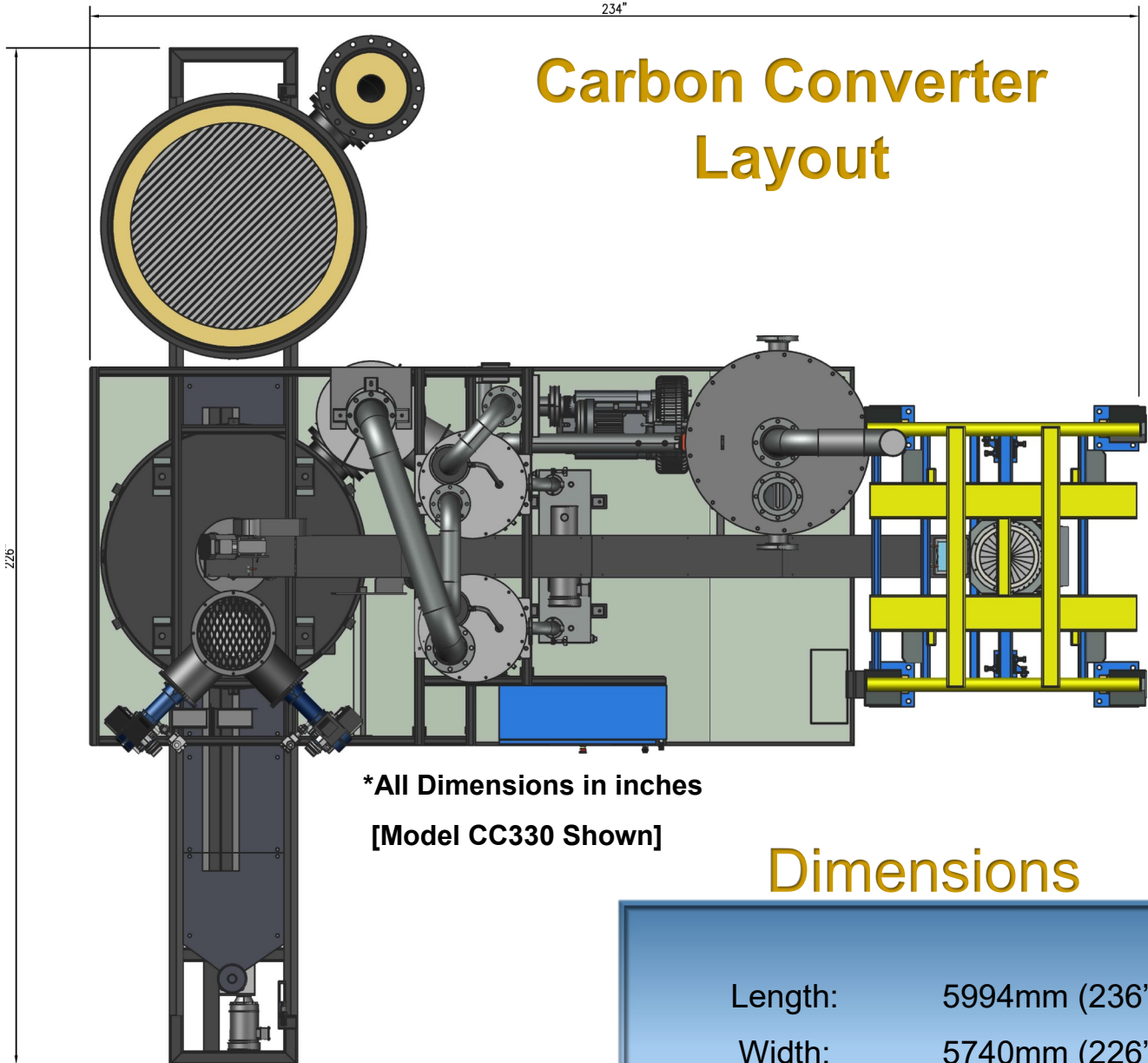
A Sophisticated PLC Interface

Safety interlocks, automated valves, and monitoring systems all play an integral role in keeping personnel and equipment safe from harm and working efficiently. The Carbon Converter's PLC helps operators run the Carbon Converter with minimum downtime as well as track performance. Installed load cells continuously register the weight of the carbon fines feed, and measure throughput in real time.

High quality materials of construction ensure that the furnace will operate for an extended period of time without major service or corrosion, regardless of the impurities on the carbon. The entire Carbon Converter unit is mounted on a containment base designed for easy cleaning after operation or in the event of a spill.



Carbon Converter Layout



Dimensions

Length:	5994mm (236")
Width:	5740mm (226")
Height:	4930mm (194")



The Carbon Converter package conveniently ships in two 40-ft high-cube containers.

Sample Analyses & Operational Expenses

During the opportunity analysis phase, KCA will complete scoping test work on small 3-5kg samples of on-site carbon fines. The results of the test work include analytical analyses and anticipated OPEX for each carbon sample provided. The sample test program is a courtesy to the client and is completed free of charge.

By taking advantage of the sample analysis opportunity provided by KCA, prospective operations can better anticipate project economics and gold recovery when using the Carbon Converter.

Carbon Converter Operating Parameters		
Description	Units	Value
Carbon Fines Feed Characteristics		
% Carbon (dry basis)		80.0%
% Sand / Gangue (dry basis)		20.0%
% Moisture		30.0%
Average Mercury Grade (dry basis)	mg/kg	0.00
Average Gold Grade (dry basis)	gms/MT	400.000
Fuel Type		Propane
Site and Operating Conditions		
Altitude	meters	300
Operating Hours	hrs/day	24
Operating Cycles	cycles/day	2
Operating Days	days/year	336
Burner Time	hrs/cycle	1
Burner BTU Input	btu/hr	300,000

Typical Carbon Converter Production and Costs			
Description	Unit	Daily	Annual
Productivity per Unit			
Calculated Wet Feed Weight	kg	536	180,000
Calculated Dry Feed Weight	kg	375	126,000
Target Dry Carbon Feed	kg	300	100,800
Ash Production	kg	100	33,600
Total Gold Recovered	gms	150	50,400
Carbon Converter Operating Cost		\$US	645 216,832
Processing Cost (Wet Feed)		\$US/MT	1205 1205
Ash Processing Cost		\$US	60 20,160
Processing Cost (Wet Feed)		\$US/MT	112 112
Total Processing Cost		\$US	705 236,992
Total Processing Cost (Wet Feed)		\$US/MT	1317 1317

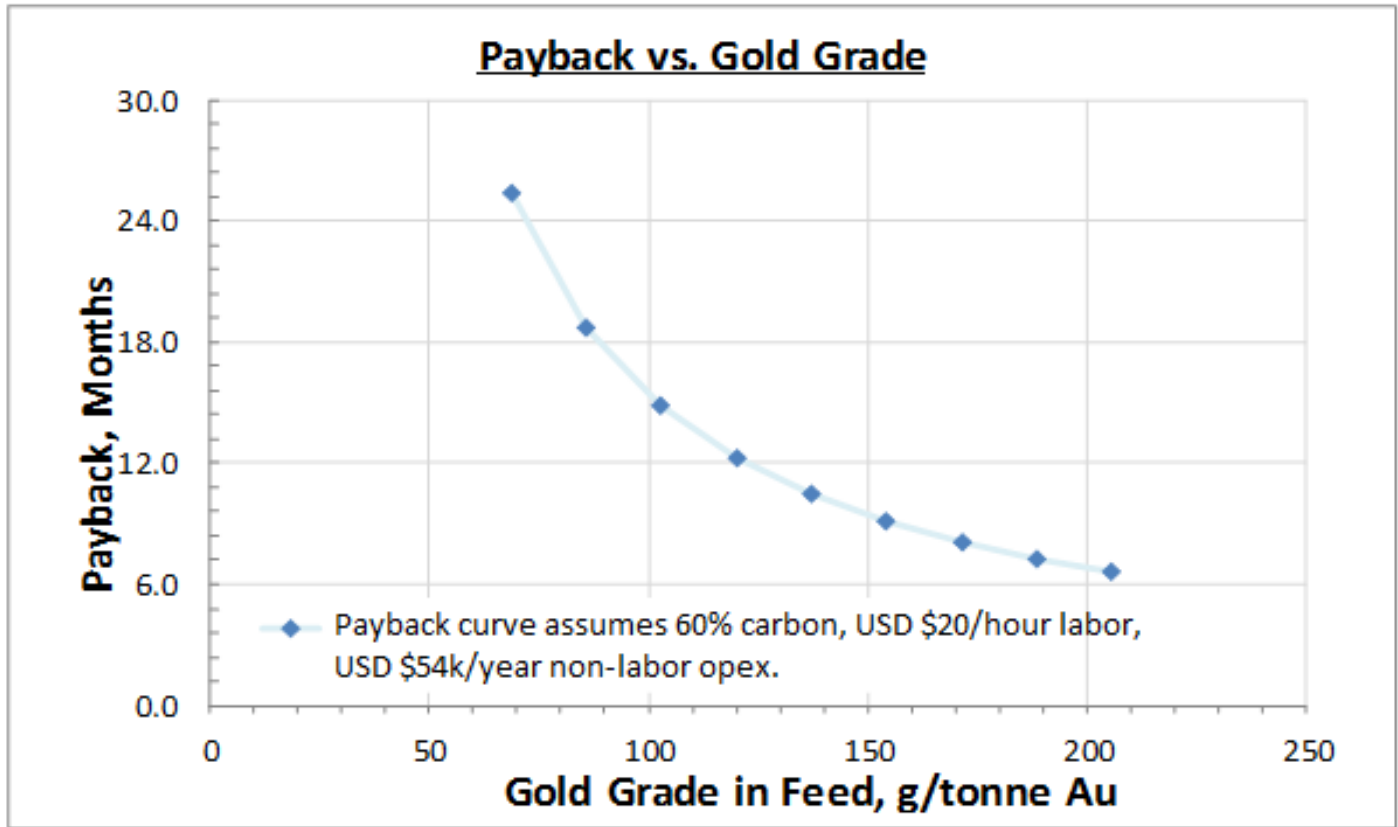
Field Services

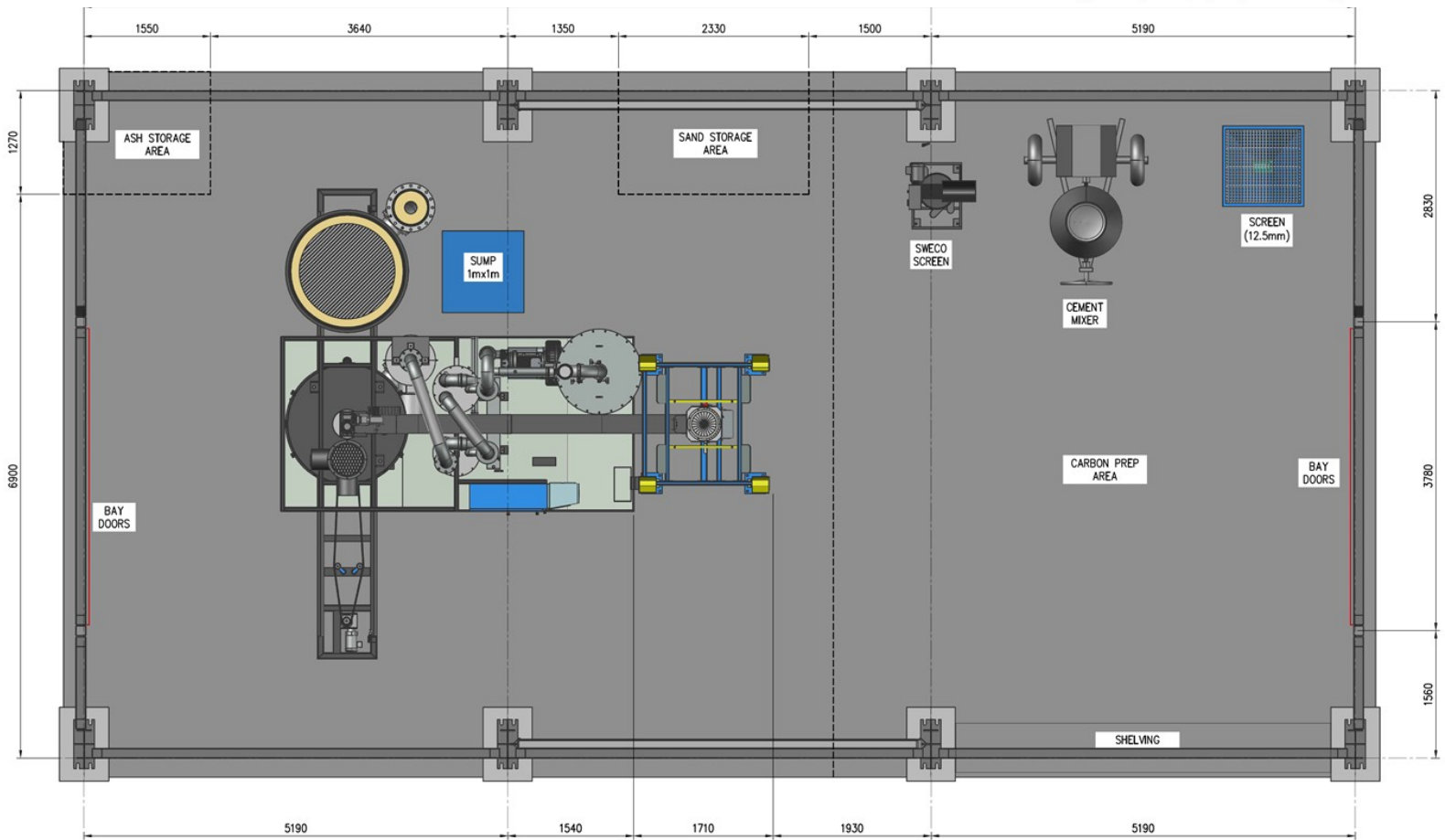
- * With the purchase of a Carbon Converter, KCA field engineers will arrive on site for installation, commissioning, training, and start-up support of the unit. Before the unit arrives on site, a KCA engineer will help plan ideal placement, explain required utilities, and provide any information requested by the operation.
- * Once the unit is on site, KCA engineers will verify installation of the unit before beginning commissioning services. After commissioning, KCA will provide training for operators through the start-up phase of the unit, while providing assistance with ash processing.
- * The complete Carbon Converter package includes a high temperature ash removal vacuum, a wet/dry vibratory screening unit, a feed loading hopper with 12.5 millimeter screen, a spare parts package, a consumables package, and an installation and commissioning tools package. These items are provided at no additional cost for easy operation and maintenance of the Carbon Converter once KCA is off site.
- * The Carbon Converter comes equipped with a dedicated modem for remote monitoring and programming assistance. KCA provides remote assistance services whenever needed, free of charge.

KCA supports every step of your project planning and deployment, ensuring performance and success.

Economics

At a grade of 200 grams gold per tonne of carbon fines, KCA expects a 7 month or faster return on investment (ROI), assuming US operational costs. Carbon with gold grades greater than 200 grams gold per tonne have shown better than a 6 month ROI.





Operating and Installation Specifications

Criterion	Description	Parameters
Feed Rate [carbon content], kg C/24 hrs.	Design Parameter	300
Feed Rate [dry carbon fines], kg/24 hrs.	Feed Material Specific	300-600
Feed Moisture Content, %	Feed Material Specific	20-40
Maximum Feed Particle Size, mm (in.)	Design Parameter	12.5 (0.5)
Agglomerate Particle Size, mm (in.)	Material Specific - nominal	6.3 (0.25)
Maximum Operating Temperature, °C (°F)	Design Parameter	900 (1650)
Maximum Air Flow, m ³ /hr (CFM)	Site Specific	680 (400)
Scrubber Water Source, (Fresh, Process)	Site Specific	Fresh, Process
Scrubber Water Supply, L/min (gal/min)	Design Parameter	75 (20) @ 20 PSI min
Maximum Operating Elevation, m (ft.)	Design Parameter	3,050 (10,000)
Ash Recovery, %	Design Parameter	100
Gold Recovery, %	Recovery Method Specific	99
Mercury Removed, %	Design Parameter	99
Modulating Burner Output, Btu/hr.	Design Parameter	50,000 - 500,000
Average Fuel Consumption, Btu/24 hrs.	Feed Material Specific	900,000
Burner Fuel Source- (NG, LP, Fuel Oil)	Site Specific	NG, LP, Fuel Oil (#2)
Total Power Required, kW	Design Parameter	75
Average Power Consumption, kW	Design Parameter	30
Electrical Requirements (V/Ph/Hz)	Site Specific	220-480V/3Phase/50-60Hz
PLC Specifications	Site Specific	
Ash Treatment Method	Direct Smelt, or Fine Grind and Cyanide Leach	

For More Information, Contact:



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