CleaverBrooks®

V-Series

PROFIRE® BURNER RETROFITS

Upgrade your system to save fuel and lower emissions.

It’s time for burner conversions, upgrades, and retrofits.

The typical life span of a boiler is 25 years or more – in some cases, a lot more. While a boiler and other components can withstand the rigors of constant service for decades, burners need to be upgraded. Combined with the constant improvements in technology and manufacturing techniques, the practical service life of a burner is about 10 years. Even low-NOx burners more than 10 years old should be considered for replacement. Volatility with high fuel prices and low-NOx legislation mean now is the time to make sure your burner isn’t holding back the full potential of your steam or hot water system.

Quality, heavy construction, built to last.

E-Series

Burner and controls upgrades are easier than ever.

Cleaver-Brooks has the engineering team to design a turnkey solution for any boiler and any application. When you contact a Cleaver-Brooks authorized representative, they can determine exactly what upgrade is right for you.

Evaluate your burner and controls for an upgrade if:

- Boilers are operating with burners or controls that are over 10 years old and most likely not high turndown
- Burner and boiler are being operated without integrated boiler/burner controls, regardless of age
- Lower emissions are being mandated by legislative order or by corporate initiative
- Changing fuel type will help the facility more easily comply with emissions regulations
- A different fuel option is more cost effective

Lower fuel costs

Following initial installation, fuel costs will become your biggest operating expense. Cleaver-Brooks has more than 80 years experience increasing fuel efficiency. Nowhere does that experience shine more than in our complete line of ProFire burners. Cleaver-Brooks works with you to custom tailor burner and control solutions that help you increase efficiency and decrease fuel costs in virtually any boiler room environment. Our proprietary Boiler Operation Optimization Savings Test (BOOST℠) program can assist by showing you the exact upgrades your system needs to help lower fuel costs, and provide the numbers to back it up. By installing the right burners, controls, and heat recovery equipment, you can realize substantial savings immediately.

Lower emissions

Lowering boiler room emissions can be challenging, regardless of the fuel type you're using. Whether for a sustainability effort or the result of a government-mandated emissions program, you can look to Cleaver-Brooks to help you reach your goals. We have long been the leader in offering low- and ultra-low-emissions solutions that are right for any application. Our team will work with you to design a retrofit solution utilizing our ProFire burners to achieve the ultra-low emissions you need.

Maximize efficiency and minimize costs with

BOOST.

Total Annual Savings: $88,447

Payback: 28.0 Months
NPV: $216,838
IRR: 40.7%

PROJECT SUMMARY CASH FLOW												
Year	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
Total Implementation Cost	($143,780)											
Annual Incremental Pre-Tax Savings		$88,447	$88,447	$88,447	$88,447	$88,447	$88,447	$88,447	$88,447	$88,447	$88,447	$88,447
Less Depreciation from Boiler 1		($14,378)	($25,880)	($20,704)	($16,563)	($13,257)	($10,597)	($9,418)	($9,418)	($9,432)	($9,418)	($4,716)
Before Tax Savings		$74,069	$62,567	$67,743	$71,884	$75,191	$77,851	$79,030	$79,030	$79,015	$79,030	$83,731
Less Tax		($29,628)	($25,027)	($27,097)	($28,753)	($30,076)	($31,140)	($31,612)	($31,612)	($31,606)	($31,612)	($33,492)
After Tax Savings		$44,441	$37,540	$40,646	$43,130	$45,114	$46,710	$47,418	$47,418	$47,409	$47,418	$50,239
Add Back Depreciations		$14,378	$25,880	$20,704	$16,563	$13,257	$10,597	$9,418	$9,418	$9,432	$9,418	$4,716
Net After Tax Cash Flow	($143,780)	$58,819	$63,420	$61,350	$59,694	$58,371	$57,307	$56,835	$56,835	$56,841	$56,835	$54,955
Cumulative Net After Tax Cash Flow		$58,819	$122,240	$183,590	$243,284	$301,654	$358,961	$415,797	$472,632	$529,473	$586,308	$641,263

With our proprietary Boiler Operation Optimization Savings Test (BOOST) report, you can determine the exact upgrades and accessories your existing boiler system needs to increase its efficiency to its absolute maximum and decrease emissions. By installing the correct burners and controls, you can realize substantial savings immediately, essentially paying for themselves very quickly. And our customized financial report details the cost savings in real numbers, so you can prove it's the right thing to do.

What makes Cleaver-Brooks burners the best

ProFire is the global leader in burners, with a full line of high-quality, low- and ultra-low-emissions burners specifically engineered to increase your boiler's efficiency and decrease fuel costs and emissions. Innovative features like swing-away housings for easy access, and proprietary oil nozzles, compressors, and metering pumps help the ProFire line improve the performance of any boiler, **even if it's not a Cleaver-Brooks boiler.** With the flexibility of multiple fuel options, the ProFire line is appropriate for commercial, industrial, and institutional applications.

D-Series

The burner is the heart

Designed for maximum efficiency and low emissions, Cleaver-Brooks offers the right burner solution for virtually any boiler room retrofit application. With our extensive engineering expertise and vast aftermarket support network, we can help determine what burner is right for you, regardless of boiler manufacturer.

Lower Excess Air

Excess air robs every burner of power and efficiency. Cleaver-Brooks designs its burners to have the lowest excess air possible for the given turndown range and NOx level. We can evaluate your current burner to determine if you are losing efficiency through high excess air levels.

High-Turndown Capability

Most older burners and many new burners operate in a high/low mode, with very little adjustability, meaning you can only produce steam at two levels – high or low – regardless of your variable load demands. This causes your boiler to needlessly cycle, wasting steam, fuel, and money. ProFire burners are high-turndown burners, allowing the boiler to modulate up and down to better match the needs of the process and reduce energy waste.

Lower NOx with NT Technology

Designed and developed with a flue gas recirculation system that has since proven to be the industry benchmark, our lower-NOx burners feature advanced combustion technology for a stable, controlled flame front througout the entire firing range. Computational Fluid Dynamics modeling helps us develop absolute compatibility of the burner and furnace.

It’s the controls that make the difference

ProFire burners are designed to reach their full potential when paired with our Hawk family of integrated burner management systems. Only through proper controls can the burner constantly fire at peak performance. The Hawk can make the most of your burner.

Hawk Controls

Parallel Positioning

Instead of a single modulating motor to the fuel valve and air damper, parallel positioning allows for separate, dedicated actuators for the fuel and air valves. This arrangement allows the control to adjust the fuel-to-air ratio for environmental changes, such as temperature, pressure, and relative humidity, ensuring combustion is as efficient as possible. Burners that incorporate parallel positioning can be set with the lowest excess air levels, optimizing your efficiency and fuel savings.

Adjusting Oxygen Trim

An oxygen sensor and transmitter for the exhaust gas can ensure peak efficiency. The sensor/transmitter continuously senses oxygen content and provides a signal to the controller that “trims” the air damper and/or fuel valve, maintaining a consistent oxygen concentration. This minimizes excess air while optimizing the fuel-to-air ratio, saving you money.

Variable-Speed Drive

When you allow a motor to operate only at the speed needed at a given moment (as opposed to the constant 3,600 rpm of a typical drive), you eliminate unnecessary electrical cost. These variable-speed drives also produce quieter operation compared to a standard motor, and they reduce maintenance costs by decreasing the stress on the impeller and bearings.

Controlling Lead/Lag

Lead/lag sequences the operation of multiple boilers, matching system load to the optimum output for your system. It enables the boilers to operate at peak efficiency, reduces cycling, and decreases maintenance and downtime, all controlled from a Hawk burner management system.

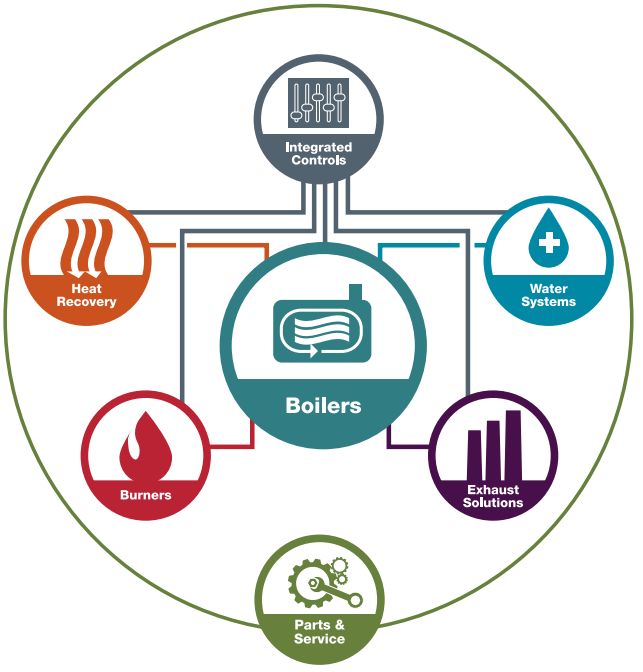
The right burner for every boiler.

Burners

Cleaver-Brooks has been manufacturing complete, integrated boiler systems for more than 80 years, so we know how to properly match a burner to the boiler's furnace – whether it is a Cleaver-Brooks boiler or another manufacturer's. A burner that does not properly match an existing furnace can cause a boiler to lose significant efficiency and capacity. Contact Cleaver-Brooks for assistance in matching the furnace geometry to the correct burner.

	Capacity	Fuel	NOx Levels	Recommended Boiler Types	Recommended Uses	Turndown
 **D-Series**	4.2 to 42.0 MMBTU input range / 100 to 1,000 HP	Gas, #2 and #6 oil, combination, alternative fuels	Available to less than 9 ppm NOx	Firebox Thermal Fluid Heater Firetube Industrial Watertube	Light Commercial Commercial Light Industrial Industrial	6:1 on natural gas and #2 oil
 **E-Series**	8.4 to 42.0 MMBTU input range / 200 to 1,000 HP	Gas, #2 oil, and combination	Available to less than 30 ppm NOx	Commercial Watertube Firebox Thermal Fluid Heater Firetube Industrial Watertube	Commercial Light Industrial Industrial	10:1 turndown on natural gas, up to 8:1 turndown on light oil and up to 8:1 turndown on low-NOx natural gas
 **V-Series**	1.3 to 16.8 MMBTU input range / 31 to 400 HP	Gas, #2 oil, and combination	Available to less than 30 ppm NOx	Cast Iron Hot Air Furnace Commercial Watertube Firebox Thermal Fluid Heater Firetube	Light Commercial Commercial Light Industrial	10:1 turndown on natural gas and up to 5:1 turndown on natural gas for low-NOx models
 **MTH-Series**	2.5 to 16.0 MMBTU input range / 60 to 380 HP	Gas only	Available to less than 9 ppm NOx	Firetube Industrial Watertube Commercial Watertube	Light Commercial Commercial Light Industrial	5:1 turndown on natural gas
 **XL-Series**	37.8 to 92.4 MMBTU input range / 900 to 2,200 HP	Gas, #2 and #6 oil, and combination	Available to less than 9 ppm NOx	Firetube Industrial Watertube	Industrial Heavy Industrial	10:1 turndown on natural gas and up to 8:1 turndown on oil (for standard and low-NOx models only)

*For 5 ppm NOx, consider boiler replacement with our CBEX Elite Firetube Boiler. For less than 5 ppm NOx, consider custom-integrated Selective Catalytic Reduction, provided by Cleaver-Brooks.



Total integration doesn't stop with the burner.

Only Cleaver-Brooks offers complete boiler systems, from fuel inlet to stack outlet, that are completely designed, engineered, manufactured, integrated, and serviced by one company. That integration starts with the burner, and Cleaver-Brooks has been perfecting this integral element of the boiler system through innovation and expert engineering for more than 80 years.

CleaverBrooks®

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