**CASE STUDY: Olin Chlor Chemicals**
**INDUSTRY: Petro-Chemicals**

# Cleaver-Brooks Reduces Fuel Costs Significantly for Olin Chlor Chemicals

## Cleaver-Brooks integrates innovative technology with the Nebraska watertube boiler and NATCOM burner.

Rack-mounted fuel trains were prepiped and wired at the factory

Cleaver-Brooks prides itself on being at the forefront of combustion technology. NATCOM developed a burner package that was able to burn by-product $H_2$ gas while simultaneously firing natural gas or #2 oil. NATCOM does not deviate from the basic fundamentals of combustion when developing these state-of-the-art specialty application burners. Safety and reliability are of paramount importance in all of NATCOM's designs.

The combination of $H_2$ Burner injectors, fuel train instrumentation and control strategy allowed this customer to optimize the use of $H_2$, a low-cost by-product of their process. With the cost of fuel skyrocketing, this project became one of the major cost-cutting undertakings for Olin that year.

A relatively high turndown of 20 to 1 was required to make this project viable. In addition, it was to be accomplished with only 7 psig of available $H_2$ pressure. In order to fire $H_2$ safely, NATCOM developed a method of staging the injection of $H_2$ gas. Gas was supplied to four individual lances and two additional headers. Each header was then connected to four additional $H_2$ injectors. Shutoff valves were provided to the individual and headered lances for maximum control. With such low $H_2$ pressure, flow elements must also be designed to minimize pressure drop. However, in order to have a representative flow signal throughout the turndown range, typically high DPs are required. In this case, NATCOM worked with the instrumentation supplier to develop a split range strategy for the flow elements to insure safe, accurate flow signals with minimal pressure loss throughout the firing range. The $H_2$ main train is 8" and the low-flow bypass for partial load $H_2$ flow measurement is 3".

### OLIN CHLOR CHEMICALS

**LOCATION**
Niagara Falls, New York

**PROFILE**
Olin is a leading producer of Chlor Alkali products including chlorine, bleach, hydrochloric acid & hydrogen gas.

**CHALLENGE**
With fuel costs continuing to rise, Olin was searching for a way to utilize a by-product of their industrial processes, low-pressure hydrogen gas, as a fuel source to reduce their dependence on pipeline natural gas.

**SOLUTION**
Cleaver-Brooks developed a state-of-the-art integrated boiler/burner system that favors hydrogen gas over other fuels, simultaneously firing supplemental natural gas or fuel oil when needed.

**RESULTS**
- Fuel costs are significantly reduced by the ability to fire hydrogen gas which was previously sent to a flare.
- 20:1 turndown allows for extreme operational flexibility
- Low-pressure hydrogen gas is fired in a safe & reliable manner

Integrated Boiler/Burner package ready for shipment

| End User | Olin Chlor Chemicals |
|---|---|
| City: | Niagara Falls |
| State/Province: | New York |
| Boiler Make: | Nebraska Boiler - Model NS-E-61 |
| Boiler Type: | D-Style membrane wall furnace throughout |
| Boiler Capacity: | 75K PPH |
| Boiler Operating Pressure: | 150 psig |
| Fuel(s): | $H_2$ / Natural Gas / #2 Oil |
| Capacity Achieved: | 100% |
| Emissions: | $H_2$ = 75 ppm / Natural Gas = 40 ppm / #2 oil = 110 ppm |
| Project Jurisdiction: | Use low cost $H_2$ fuel as primary fuel |
| Scope Supplied: | 1. $H_2$ N. Gas & #2 oil firing burner, windbox |
| | 2. FD Fan windbox mounted |
| | 3. New $H_2$ N. Gas, #2 fuel trains |
| | 4. New $N_2$ purge train |
| | 5. Engineering logic for CMS for DCS programming |
| | 6. Engineering support for CCS strategy for DCS programming |

NATCOM worked in conjunction with Nebraska Boiler to provide Olin with a complete boiler island consisting of two (2) 75,000 lb/hr packaged steam boilers including the power plant DCS. Our in-house combustion controls expertise ensured that all equipment performed safely and reliably.

Targeted NOx on $H_2$ firing was 0.10 lb/MMBTU (110 ppm). $H_2$ is a rapidly burning fuel which inherently produces high levels of thermal NOx (in excess of 300 ppm). Upon final commissioning, the resulting NOx emissions firing $H_2$ fuel with sustaining natural gas were in the order of 72 ppm, well below the targeted 110 ppm limit!

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