

Energy, the Environment &
Today's Economic Reality

The Boiler Consultant™

"Resolving the Conflict"



Presents:

The Boiler Consultant™ & EzTrIm™ Efficiency Control & Monitoring System



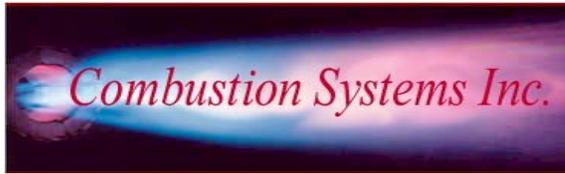
Surveys – Complete Thermal Process analysis – identifying opportunities and making recommendations for improvements.



Software – Real-time Continuous Efficiency Monitoring & Performance Modeling Control software.



Systems – Implementation of recommendations including Design /Build and Installation of Process Alterations. Turn-key Thermal Process Facility Upgrades for replacement of components or capital improvements.



Steam Process Surveys-an accurate first look though **The Boiler Consultant™** window into your energy consumption and steam distribution process

Available Steam Process Surveys

To determine the application feasibility and benefit of applying "**The Boiler Consultant™**" to a specific Boiler House, **Combustion Systems Inc. (CSI)** offers several survey services that vary in scope as outlined below. A proposal for any of these surveys can be obtained from **CSI**.

Boiler House Survey - Comprehensive on-site testing and evaluation of all primary Steam Process Equipment and associated ancillaries. Tests are conducted to determine efficiency and performance at various load levels. Appropriate operating personnel are also interviewed to obtain additional data. Existing instrumentation and hardware is also reviewed for compatibility with "**The Boiler Consultant™**"

Within 3-4 weeks after completion of the above survey, a written report of the survey results will be provided. All data obtained will be included along with conclusions and recommendations. The report will also include System Graphics showing the Steam System performance and efficiency obtained at each test load level. The System Graphics also will show the Steam Utilization Efficiency as determined by the Heat Balance calculated for each load condition. In depth evaluation of the Steam Distribution System is not part of this survey.

Steam Utilization Survey – In depth on-site evaluation of the Steam Distribution System to determine Thermal Loss locations and corrective actions needed. This survey can be conducted separately or at the same time with the Boiler Room Survey.

Within 3-4 weeks after completion of the above survey, a written report of the survey results will be provided. All information obtained will be included along with conclusions and recommendations. Graphics will be generated by "**The Boiler Consultant™**" Software showing current Steam Utilization Efficiency and the results to be expected if the survey recommendations are implemented.

Upon request a detailed proposal can be provided addressing any specific needs uncovered by the survey and outlining what is required to implement "**The Boiler Consultant™**" at the surveyed facility.



The Boiler Consultant™

Real Time Efficiency Monitoring & Performance Modeling Control System

Software Interface Capability

“The Boiler Consultant™” Real Time Efficiency Monitoring & Performance Modeling Control System software provides graphic interface file structure to existing DCS Software packages such as Intellution-iFix, Wonderware, Cimplicity and others or “The Boiler Consultant™” complete graphic interface package can be utilized. In addition to the information described below the Graphic Displays are also designed to report energy losses in Btu’s, dollars, % of fuel input or % heat loss, against a baseline.

Information available from “The Boiler Consultant™”

Continuous calculation of:

- % Plant Wide Thermal Efficiency
- % Overall Boiler Efficiency
- % ASME Boiler Efficiency
- % Blowdown
- Cycles of Concentration
- % Make-up or % Condensate Return
- Plant Wide Heat Balance and Heat Losses

Storage & Display of Trends

All calculated and displayed values generated in the firmware are fully accessible from Excel as well as other statistical formats such as SQL.

Alarms and Reports

Alarm parameters may be set for any of the measured or calculated values. Custom reports can be populated directly from “The Boiler Consultant™”



“The Boiler Consultant™” Modular Control Software permits selective implementation and/ or upgrading of Boiler Control Functions as required:

- **EzTrim™ Linkageless O2 Trim Control**
- **EzTrim™ Linkageless O2 & CO Trim Control**
- **Burner Management System (BMS) -NFPA Design**
- **Combustion Control System (CCS)**
- **Feed Water Control**
 - * **Single Element Control (Drum Level)**
 - * **Two Element Control (Drum Level & Feed Water Flow)**
 - * **Three Element Control (Drum Level, Feed Water Flow & Steam Flow)**

Multi Loop Screen

Single Loop Screens

1 Loop Display

Tuning Parameters

1 Loop Trending

**E-Stop
Flame Scanner Off
ALWCO
LWCO
Excessive Steam Pressure
High Steam Pressure
Combustion
Low Combustion
High Landfill
Low Instrumentation
Low Natural Gas
High Natural Gas**

BOILER 1	
Steam Header Pressure	0 PSI
Steam Flow	0 PPH
Fuel Flow	0 PPH
Feedwater Flow	0 PPH
Current Cost of Fuel	\$/mCF
Ambient Air Temperature	0 °F
Feed Water Temperature	0 °F
Flue Gas Temperature	0 °F
Stack Oxygen	0.00 %
Make-up TDS	0 PPM
Boiler Water TDS	0 PPM

Manual Data Entry & Set-Up

Quantitative & Qualitative Trends

The Boiler Consultant, Inc.

COMBUSTION SYSTEMS CO., INC.

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The Boiler Consultant™

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Existing Operating Conditions

Annual Fuel Cost	\$ 226.63
Annual Cost of Heat Losses	\$ 71.16
Cost per MMBTUH	5.35

Overall Boiler Efficiency: **80.58 %**

Plant Efficiency: **68.42 %**

Losses - 31.40 %

Boiler Thermal Efficiency: 81.69 %

Boiler Loss Trends

Blowdown	1220 PPH	396036 BTUH	0.00 %
Heat Loss to B.D.	0.00 PPH	0.00 BTUH	0.00 %

Plant Loss Trends

Make-up to DA due to Plant Loss	4780 PPH	110292 BTUH	79.57 %
Make-up due to Blowdown	1220 PPH	28138 BTUH	20.43 %
Total Make-up	6000 PPH	138390 BTUH	

O2 Analyzer

Flue Gas RTD

BALDOR

BALDOR

TBC ~ Ez Trim HMI Home Page Touch Screen

Before Ez Trim

After Ez Trim

Firing Rate 0-100%

TBC or Existing BMS

Load Index Pot

TBC ~ ASME Plant Performance

Boiler#1 O2 Trim

Firing Rate: 45%

O2: 0.0 %

FUP: 0.0 %

Built in 20 Point Characterization Set-up Page



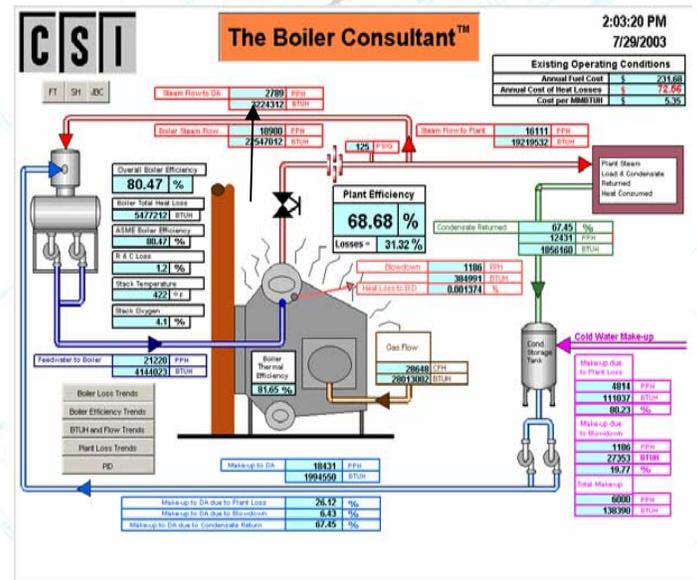
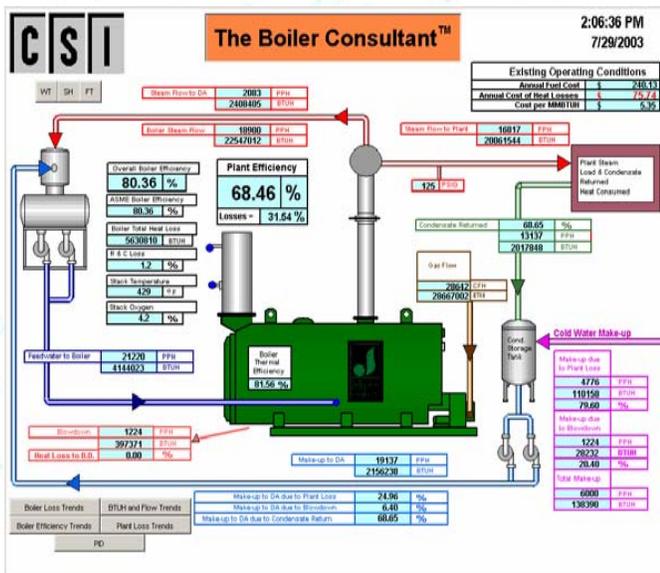
"Real Time" Continuous Efficiency Control with The Boiler Consultant™ Performance Modeling Control System

"Real Time" Continuous Efficiency Control with **The Boiler Consultant™ Performance Modeling Control System**, a PLC based continuous Energy Management tool for identifying and eliminating energy waste through investment-based maintenance, forecasting and control. **The Boiler Consultant™** continuously calculates and displays existing facility efficiencies while controlling the appropriate associated process components.

The Boiler Consultant™ (TBC) Control Functions such as Burner Management, Combustion Control, **TBC EzTrim™** O₂/CO Trim Control, Cross Limiting and 1, 2 or 3 Element Level Control are accomplished in the foreground while **ASME PCT** is running continuously in the background.

Standard features include "**Real Time**" display and trending of measured and unmeasured (modeled and/or calculated) variables, time stamping of alarm events, complete heat balance and modeling for predictive savings in several formats: BTU's, mass flow, dollars wasted, dollars saved, etc. **The Boiler Consultant™** communicates via Modbus and Ethernet with your existing equipment and/or our DCS or DAS Modeling software.

Accessing **The Boiler Consultant™ Performance Modeling** mode allows management to manipulate multiple on-screen conditions to demonstrate and evaluate resultant Efficiency and Control performance of contemplated changes prior to making



Analysis Graphics
Local and / or Remote Monitor

The Boiler Consultant™ & EzTrim™ Control System

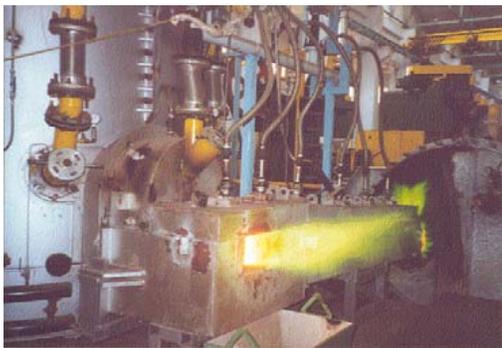
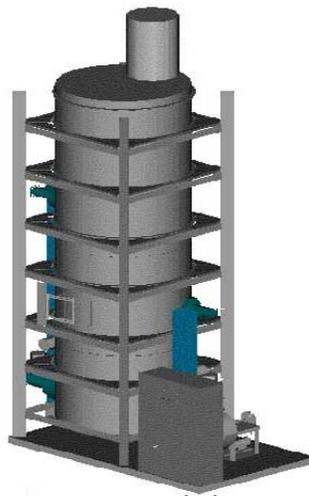
- A window into your energy consumption and distribution process.
- The holistic approach to Efficiency Control & Energy Management

Designed by **Combustion Systems Inc. (CSI)** Boiler Efficiency Monitoring and Control Systems for Industrial, Commercial and Institutional Combustion Process applications. Turn-Key system integration.
Serving the Combustion Market for over 30 years.



We also Custom Design and Build:

- Boiler Replacements & Control Upgrades
- Furnaces
- Waste Heat Recovery Systems
- Incinerators
- Crematoriums
- VOC Thermal Oxidizers
- Pyrolysis Systems
- Melt Preheat Systems
- Precious Metal Recovery Evaporators



**WHAT
CAN
CSI
BUILD
FOR
YOU?**



- **Manufacturers Representatives**
- **System & Component Fabricators**
- **Turnkey Contractors**
- **Design & Build, Sales and Service**

Combustion Systems Inc.

and Subsidiaries

**Conveying Systems Inc.
Contracting Services Inc.**

All at one Convenient Location

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