HOW TO IMPLEMENT A FUEL BLENDING SYSTEM

Air quality management districts, AQMDs, are continually updating their standards for reciprocating engines and the resulting emissions. Although the changes are made with the best intentions (e.g., reducing airborne pollutants), these changing standards often impose large technical challenges and require equipment upgrades or replacements which adds unexpected costs for business and industries.

WASTEWATER DILEMMA

This is the situation one of our wastewater treatment customers found themselves in when a change in their local AQMD regulations instigated a large change in what was allowed for natural gas combustion.

This wastewater facility had three large CHP systems that used off-gas from the wastewater (produced through a digester process) as the main fuel source and natural gas as a backup fuel source. The CHP system provides electrical power for the plant, electrical power for the utility grid, and heat for the digester. The system had a combined electrical/mechanical efficiency of around 90% while removing GHG emissions from the environment so it was critical that it continue to run!

The challenge that the new AQMD ruling created was that the allowable natural gas consumption in their engines was changing from 100% to only 49%. However, the engines were originally designed with a dual fuel system that could run on either 100% natural gas or 100% digester gas but not a blend of the two fuels.

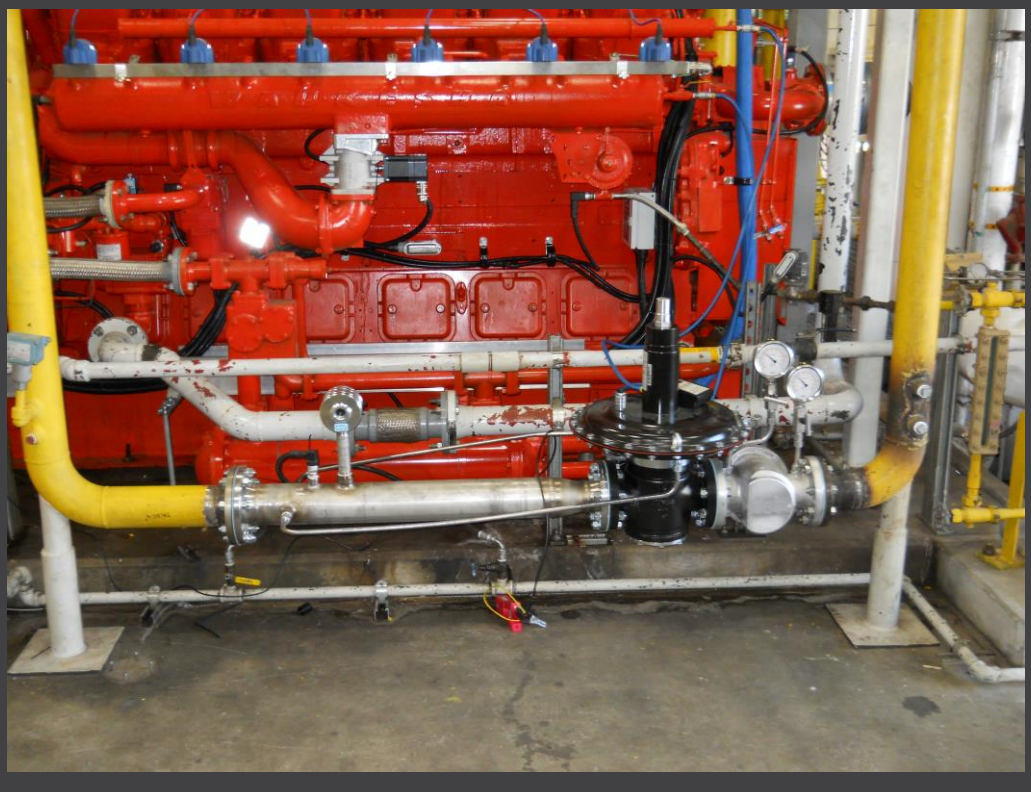
MORE INFORMATION

COLLICUTT Energy

CONTACT US

1-888-682-6888
info@collicutt.com
www.collicutt.com

HOW TO IMPLEMENT A FUEL BLENDING SYSTEM



This change in allowable fuel ratios caused a big issue with the plant operations!

In the past when the digester system would run low on digester gas, the engines would switch to burning natural gas until the digester gas replenished. However, that was not an option, so the engines were manually de-rating from their load set point to compensate as the digester gas ran low. This was causing unnecessary wear on the engines and often resulted in engine shutdown. This would result in loss of electrical power as well as loss of heat to the digester system.

The engine wear, power and heat interruptions were becoming very costly and the option to replace the system was way outside the customer's budget!

So, what was the solution?

THE SOLUTION: DYNAMIC FUEL BLENDING

After consulting with the customer, it was determined that the best solution would be to add a custom fuel blending system to the engines that would allow for dynamic fuel blending while under load. This blending system would:

- Be significantly more cost effective than replacing the existing CHP system with a new system
- Be programmed to maximize the digester gas consumption
- Allow a natural gas fuel blend of up to 49% which would only be used to prevent digester gas depletion
- Be implemented during a regularly scheduled engine overhaul to avoid costly, unplanned downtime

MORE INFORMATION

COLLICUTT Energy

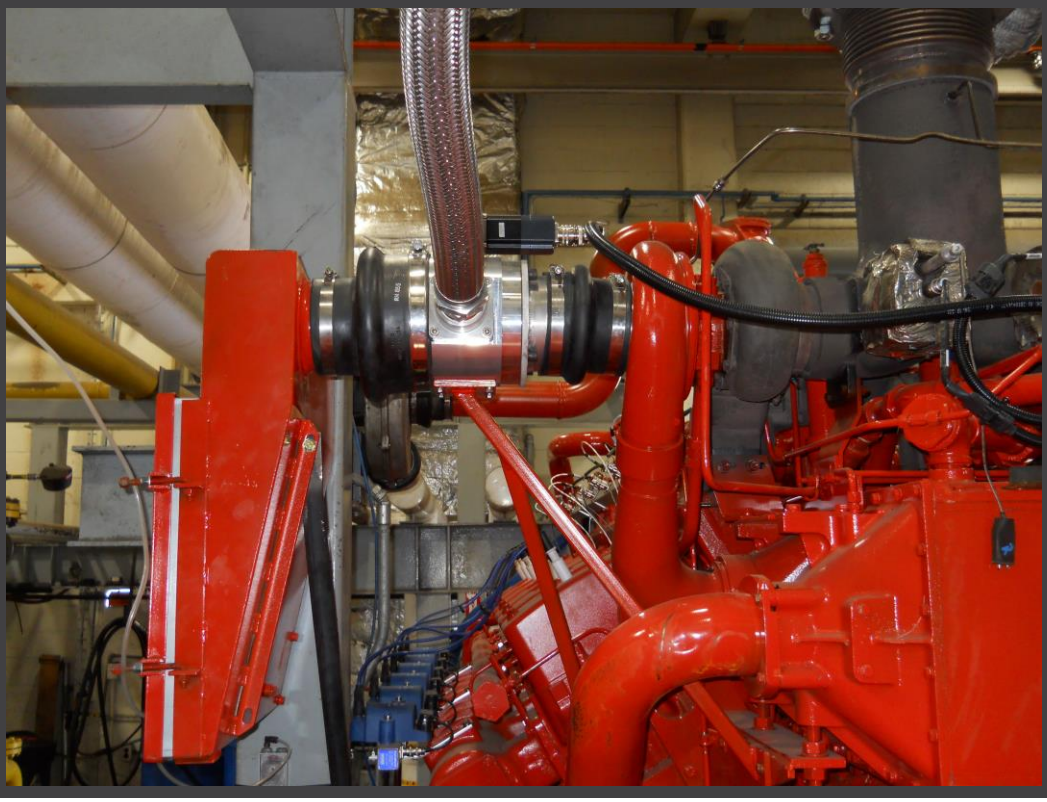
CONTACT US

1-888-682-6888

info@collicutt.com

www.collicutt.com

HOW TO IMPLEMENT A FUEL BLENDING SYSTEM



The Collicutt technical team determined that this blending system would require:

- More engine protection sensors
- Individual engine throttles
- Air/fuel ratio system
- New long-life spark plugs, ignition coils, ignition rails, and ignition system
- A new detonation control system along with exhaust cylinder temp probes
- Newly designed fuel regulation system by Collicutt
- Modification of the natural gas piping to join with the digester system
- Complete control system update to provide automatic control of the engine and generator
- Modifications between new control system and current switch gear

Collicutt worked closely with our engineering team, the customer, and our suppliers to design the system and then implemented it on site during a planned shutdown window.

THE RESULT

The end result was a fast acting, dynamic fuel blending system that minimized system downtime, maximized use of digester gas, minimized engine wear and expense, while operating well within the emission requirements of the California air board!

MORE INFORMATION

An additional benefit of the system was the ability for the customer and Collicutt to remotely monitor the CHP system to assess its operational performance and allow for predictive maintenance. Using this system, we are able to diagnose many potential issues before they occur, and we are able to implement corrective maintenance actions before more costly repairs are needed.

COLLICUTT Energy

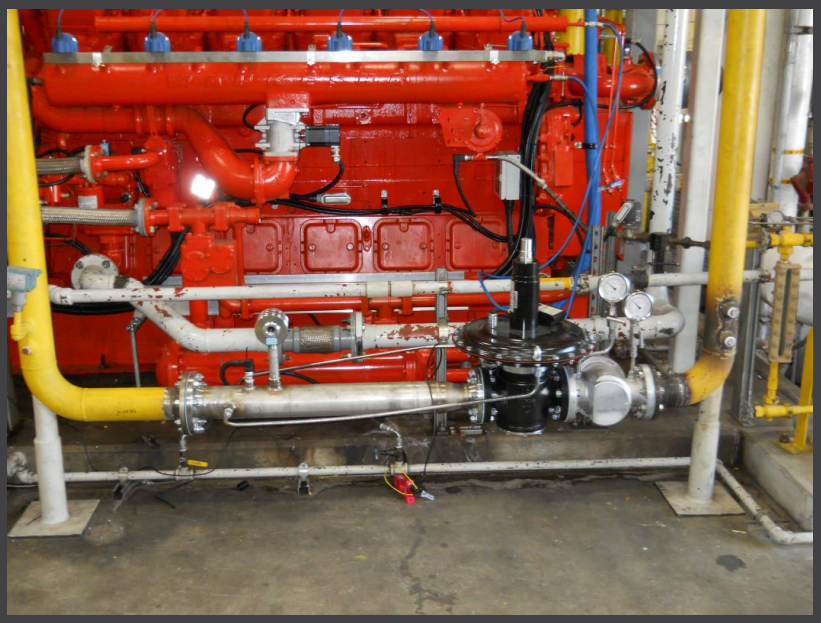
CONTACT US

1-888-682-6888

info@collicutt.com

www.collicutt.com

HOW TO IMPLEMENT A FUEL BLENDING SYSTEM



TAKE ACTION

There are many lessons that were learned throughout this project, but the overarching lesson is that a massive challenge can create innovative solutions!

When you or your facility face a challenge, accept it as an opportunity to innovate and create a solution that meets the challenge. If the challenge happens to involve big engines or power generation equipment, give us a call and we would be glad to assist!

MORE INFORMATION

COLLICUTT Energy

CONTACT US

1-888-682-6888
info@collicutt.com
www.collicutt.com