

# Innovative design solutions for enhanced engine performance and reliability

**Larry Osland, USA Compression, and Dakota Gormley, Global Compression, discuss innovative bracketry and control system enhancements for the Cummins 855 engine, to reduce fatigue and boost performance.**

**G**lobal Compression Services was tasked by USA Compression to develop bracketry to accommodate an ActuCOM R8 governor and CD200 ignition for the Cummins 855 engine. After collaborating closely with the customer and refining several prototypes, Global Compression Services delivered a cutting-edge, customized solution. The innovative bracket design removed the venier throttle assembly, streamlining the control system and significantly reducing operator fatigue. This improvement eliminated the need for operators to climb on and off the compressor package to adjust RPMs, which also reduced the risk of slips, trips, and falls. By integrating speed control into the control panel, the overall operator interface became more efficient and safer.

Additionally, the removal of the Cummins accessory drive and the Woodward hydraulic governor improved reliability and run time by stabilizing RPM, while also reducing equipment lifecycle costs. Replacing the Magneto ignition system with a modern, electronic ignition made timing adjustments easier, further enhancing engine performance and reliability. This solution offers a practical alternative to the original components, which are becoming harder to source. It addresses common reliability challenges, simplifies maintenance, and provides a cost-effective way to reduce lifecycle costs. The ease of installation and minimal disruption to

operations make this solution an appealing choice for operators seeking to enhance engine performance and reliability.

In the following Q&A, CT<sup>2</sup> asked USA Compression's Larry Osland and Global Compression Services' Dakota Gormley for more details on how this project delivered a practical, economical solution to known problems with the OEM options.

## **WHAT ARE SOME COMMON RELIABILITY ISSUES WITH THE CUMMINS 855 ENGINE?**

**LO:** The Cummins 855 engine, particularly in natural gas applications, has some reliability issues primarily due to its origin as a diesel engine adapted for natural gas use. While it has been largely successful and is D-rated for natural gas applications, certain design features present challenges.

The most common issue lies with the cylinder heads, especially in oil and gas settings where the engine often runs on unprocessed wellhead gas instead of pipeline-quality natural gas. The impurities in wellhead gas can accelerate wear and reduce reliability. Another frequent problem is with the accessory drive, which powers the ignition generator, also known as the magneto. Failures in this component can cause significant downtime. Additionally, mechanical or hydraulic governors, typically supplied by Woodward, are another common source of failure that impacts engine performance and operation.

Despite these concerns, the rest of

the engine is generally very reliable and performs well when properly maintained.

## **WHAT ARE THE BEST WAYS FOR EQUIPMENT LIFECYCLE COSTS TO BE REDUCED?**

**LO:** To reduce lifecycle costs for the Cummins 855 engine, one of the best approaches is upgrading it to a full-authority electronic control system. This allows the engine to operate with true closed-loop air-fuel ratios, improving efficiency and reliability. Most of these engines are mechanically tuned, relying on a mechanical throttle, a magneto ignition system, and a single RPM setting. If the engine needs to operate at a different RPM, manual adjustments are required, which can be time-consuming and less precise.

By upgrading, several benefits are achieved. For example, replacing the magneto generator with a more reliable drive system eliminates a common failure point. At the same time, the problematic hydraulic or mechanical governors can also be removed. A key part of this upgrade is the custom bracket designed by Dakota and his team, which integrates space for an electronic ignition



system, specifically the CD200. This system is calibrated for the 855 engine, providing ignition tables tailored to different RPMs.

**DG:** This upgrade not only improves overall reliability and efficiency but also helps extend the life of the cylinder heads by optimizing performance at varying operating conditions. It's a comprehensive improvement that addresses multiple reliability and cost concerns in one package.

**WHAT'S INNOVATIVE ABOUT THE BRACKET DESIGN?**

**LO:** The innovation in the bracket design lies in its robustness and precision. While some might say it's more robust than necessary, in the oilfield environment, where bolts aren't always torqued as they should be, over-engineering is a benefit, not a drawback. The bracket takes full advantage of bolting points on the Cummins 855 cylinder block, creating a sturdy and reliable solution.

What sets it apart is that it is specifically designed for the Cummins 855—it's not a generic, one-size-fits-all part. It fits perfectly without requiring any modifications to the cylinder block or head, making installation straightforward and hassle-free.

Additionally, the bracket works in tandem with a system upgrade that replaces the accessory drive first. This step clears space and eliminates a known troublesome

component, allowing for the seamless installation of the new parts



sourced from global suppliers. This thoughtful integration makes the design both practical and effective for improving engine reliability in demanding applications.

**DG:** GCS has many different bracket configurations to accommodate several different engine models. We can also assist with create new custom designed brackets for nonstandard engines and other custom applications.

**CAN YOU DESCRIBE THE PROCESS OF HOW YOU WENT ABOUT INSTALLING THE NEW BRACKET DESIGN?**

**LO:** The process of designing and installing the new bracket was very hands-on. Dakota and Freddie came to our site to assess several Cummins 855 engines we had in stock, looking for any variations and identifying the best fit. We went through a few different prototypes before settling on the final version, which turned out to be robust and easy to install with no issues.

Once the bracket design was finalized, our technicians, who had been involved in the field installations, were excited about the improvements. Since the installation, we've received positive feedback from both our technicians and our customers. The upgrade has made a significant difference in how the engines are operated. Operators no longer need to climb on and off the unit or walk back and forth to check RPMs. Instead, they can remain at the control panel where all functions are easily accessible and bring the unit online quickly.

Additionally, the new design has improved engine start-up. The system now commands a starting position, preventing the engines from flooding out, which was a common issue with the hand throttle. The engine now waits for the commanded RPM before opening the throttle and allowing fuel into the cylinders, resulting in much smoother starts.

This has not only saved on battery life but also reduced downtime, making the equipment more reliable. Our customers who rent these units are absolutely thrilled with the results.

**DG:** We work with the customer to make sure that the bracket is placed in a manner that will minimally impact the routine maintenance is a priority when we design the brackets. We work to make the brackets functionality can accommodate other needs. For this example, the bracket was designed to mount both the ActuCOM as well as the CD200 ignition system to help reduce complexity and help maximize the free space on the small engine.

**WHAT BENEFITS WERE DELIVERED BY REMOVING THE VENIER THROTTLE ASSEMBLY?**

**LO:** Removing the venier throttle assembly delivers several key benefits. One of the main challenges with the venier throttle is that if a compressor goes down—particularly with older, more traditional control systems—the only way to lower the engine RPM is for an operator, often not one of our employees, to manually climb onto the compressor, release the throttle, and adjust it. This process is necessary to restart the engine at a lower RPM, warm it up along with the compressor, and then gradually bring it back to its rated speed.

By switching to an electronic throttle, the engine automatically resets to a low idle set point whenever the compressor shuts down and restarts. This ensures that the engine starts at the proper RPM for warming up before it ramps back up to operating speed.

**DG:** Another major advantage is improved safety and convenience for the operator. Instead of climbing on and off the compressor to make adjustments, the operator can stay at the control panel, monitor key gauges like oil pressure and coolant temperature, and make adjustments directly from there. It's also easier for operators to start, operate, and shut down the machine, as the electronic throttle allows for precise control of the maximum and minimum RPMs. This not only simplifies operation but also reduces wear and tear on the equipment.

**ARE THE CUMMINS ACCESSORY DRIVE AND WOODWARD HYDRAULIC GOVERNOR ESSENTIAL COMPONENTS? WHAT ARE THE CHALLENGES WITH NEEDING/USING THEM?**

**LO:** The Cummins accessory drive and the

Woodward hydraulic governor are essential components in this application, as they perform critical functions. The accessory drive is used to power various components, such as hydraulic pumps, air compressors, and, in this case, the governor, which controls engine speed and maintains a steady RPM setpoint. It also drives the mechanical magneto or ignition system.

These components cannot simply be removed without a suitable replacement, as the accessory drive is also responsible for operating essential systems like the engine's water jacket cooling pump and other belt-driven components. To address this, we've sourced an updated accessory drive solution that aligns with Cummins' current product line, even though it's not available through global suppliers.

Once this updated accessory drive is in place, it enables us to replace the Woodward hydraulic or mechanical governors with modern alternatives. In this case, the ActuCOM R8 system takes over those responsibilities, providing a more reliable and efficient solution while eliminating the challenges associated with the older components.

**DG:** GCS is collaborating with the engine manufacturer to source hard-to-find replacement materials for the ActuCOM / CD200 engine upgrade. We will provide two options: the first is a complete kit containing all the materials necessary to fully install the upgrade, and the second is for engines that have already received the updated components. This second option will include all the required Altronic materials and bracketry to complete the upgrade.

### **WHAT CAN YOU SAY ABOUT THE MAGNETO IGNITION SYSTEM? WHAT ARE ITS MODERN FEATURES THAT MAKE IT AN IMPROVEMENT OF WHAT WAS USED BEFORE?**

**LO:** The magneto ignition system is one of the earliest ignition technologies, dating back to the Henry Ford Model T and even earlier vehicles. It was the original ignition system, used before the advent of battery-powered or more advanced systems. Magnetos are durable, simple to install, troubleshoot, and replace. However, they rely on numerous internal mechanical

components that can wear out over time, and troubleshooting them requires significant experience to identify issues effectively.

As part of our conversion process, we replace the magneto with a modern electronic ignition system, unless the engine has already been upgraded. This electronic system offers several advantages. It simplifies timing adjustments, making it much easier for technicians to set when the spark is delivered to each cylinder. Troubleshooting is also far more straightforward thanks to features like an LED light that flashes diagnostic codes and indicates whether the system is live and functioning.

**DG:** The modern electronic ignition system is also more durable because it eliminates moving parts and mechanical couplings. Instead, it operates electronically, using engine position data to determine spark timing. This significantly reduces wear and, barring major failures, makes it a lifetime conversion, ultimately lowering lifecycle costs while improving reliability and ease of maintenance.

### **OVERALL, WHAT WOULD BE YOUR MESSAGE TO PEOPLE LOOKING TO ENHANCE THEIR ENGINE PERFORMANCE AND RELIABILITY?**

**LO:** If you're looking to enhance engine performance and reliability, this conversion is a logical and cost-effective choice. The older Woodward governors, while reliable in their time, are no longer in production and have been replaced by alternatives that aren't direct bolt-on options. Although repair parts are still available, finding qualified service providers is becoming increasingly difficult. For equipment like compressors, which are expected to run 97% of the time, minimizing downtime is critical, making this upgrade a natural step forward in improving reliability.

**DG:** The ActuCOM kits for Cummins engines, as well as many other engine models, offer a bolt-on solution that enhances engine reliability. By replacing older technology, which often has mechanical inefficiencies requiring frequent maintenance, the kits introduce new electronic technology with fewer moving parts. This results in longer

maintenance intervals and improved overall performance.

### **HAVE YOU STANDARDIZED THESE CONVERSIONS ACROSS ALL CUMMINS 855 ENGINES PASSING THROUGH YOUR REMANUFACTURING FACILITIES?**

**LO:** Yes, we have. Once in the field, this upgrade adds only about 30 minutes to the installation process compared to older engines equipped with a magneto ignition and a Woodward hydraulic governor. The slight additional installation time is well worth the significant operational advantages gained, including better performance, easier maintenance, and enhanced reliability.

Initially, we had concerns about implementation, but Dakota's team has provided excellent onsite support, one-on-one training for our technicians, and next-level troubleshooting assistance. They've also developed a comprehensive package of wiring diagrams, installation instructions, and troubleshooting materials, making the entire process seamless. We couldn't be more pleased with the results and the support provided by Dakota and the global industrial team. This conversion has proven to be a smart and reliable choice for long-term engine performance and reliability.

### **WHAT'S NEXT ON THE HORIZON?**

**LO:** Next, we're looking at another family of engines in our fleet that has been experiencing issues with the Woodward throttle actuator or electronic governor. We're planning to explore installing the ActuCOM R8 system on those engines as well. Based on the positive experience we've had so far, we're eager to expand and apply the same improvements across more of our equipment.

**DG:** GCS is always looking for new opportunities to help customers make their equipment more efficient, longer maintenance intervals, and over all better operations capability. GCS is the largest Altronic distributor and we have an array of products that can help your maintenance teams reduce downtime by upgrading to the latest aftermarket ignitions systems, AFR controls, control panels, throttle actuators, and electronic louver controls.

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