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## TECHNICAL SPOTLIGHT

**Subject:** General Electric (GE) GE90/GENx/GP7200 Competitive Evaluation

<b>Part Numbers:</b>	<b>Champion:</b>	<b>CH31919</b> <b>CH31919-1</b>
	<b>Unison Industries:</b>	<b>9044650-2</b> <b>511889-1</b>

**Purpose:** To provide design and experienced based competitive evaluation of Champion and Competitive Igniter Designs for all General Electric (GE) GE90/GENx/GP7200 engine applications.

**Champion Claim:** Champion's igniter designs provide lower overall cost of ownership and improved ignition system reliability from design approaches that optimize igniter life, mechanical robustness, increased temperature capability and igniter performance/survivability. From the igniter perspective, the use of one of Champion's GE90/GENx/GP7200 Igniter designs will provide:

- Increased spark erosion resistance from the unique air cooled center electrode design
- Improved thermal shock resistance (CH31919) from advance ceramic designs to eliminate sparking end insulator fractures and, therefore, increase MTBUR in engine applications experiencing premature removals due to sparking end insulator fractures (Reference **Note 1**)
- A more robust design from optimized internal insulator clearance and seated terminal
- A more robust design from location of high temperature spring and internal glass seals in more benign temperature regions (Reference **Note 1**)
- Reduced Maintenance Burden, Delays and Cancellations; Improve ATA Chapter 74 reliability

**Note 1:** GEAE issues Service Bulletin 74-0005 to introduce an improved competitive igniter due to field issues with insulator failures and glass seal leakage.

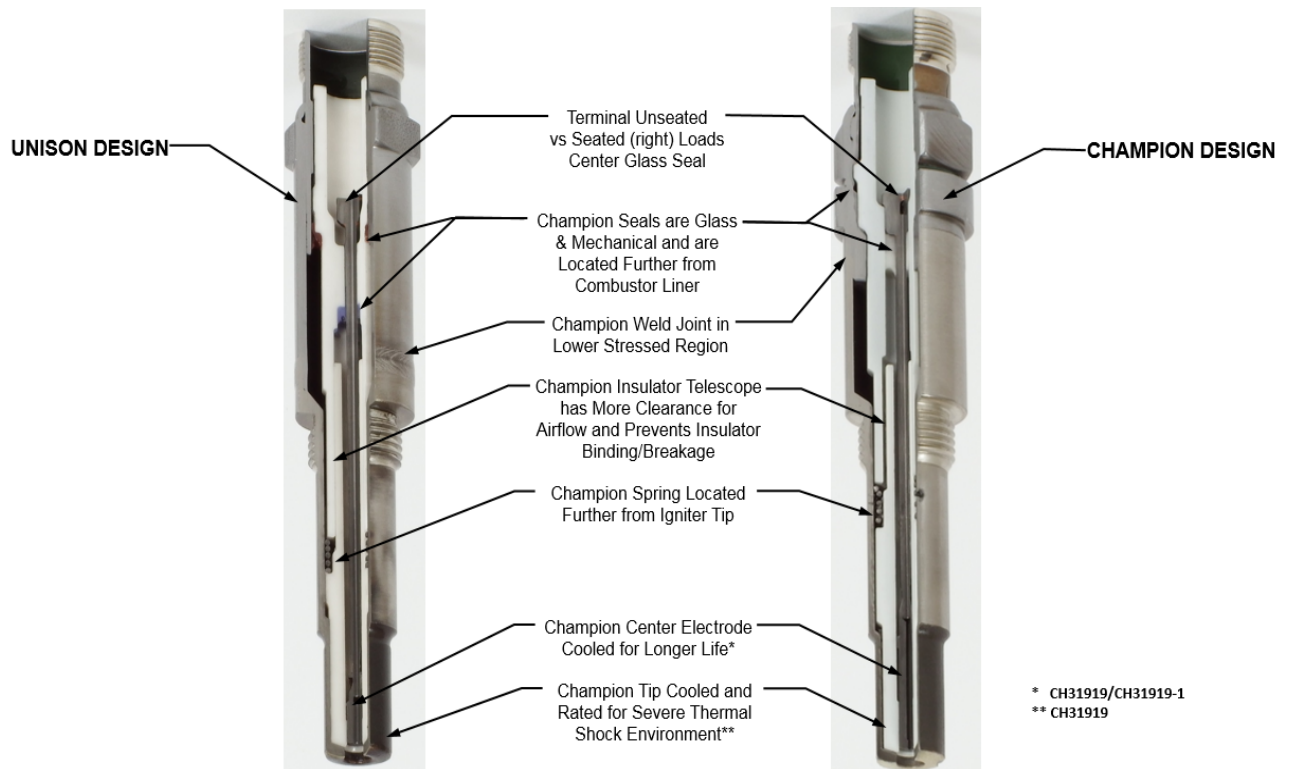
A comparison of the Champion and Unison design is provided in **Figure 1**.

**Champion GE90/GENx/GP7200 Program Background:** The Champion igniters are an example of PMA parts built to address technical and reliability issues. The added thermal shock resistance capability of the CH31919 design was initially developed by Champion to overcome technical limitations of the thermal shock performance of the incumbent product. Champion's superior ceramic knowledge and capabilities were used to overcome field performance limitations of the incumbent igniters.

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**Figure 1 – Comparison of Champion vs Unison Designs**

**Champion’s Product Offerings:** Champion offers two different igniters (CH31919 and CH31919-1) for these demanding engine applications. Both igniter designs use Champion’s superior glass seal technologies for the center electrode seal. These seals are located further from the combustor and are mechanically superior because of the center electrode assembly is mechanically seated within the igniter assembly. In addition, both designs utilize Champion’s “Hot Lock” shell seal technology to seal between the insulator and outer shell. Both sealing technologies have been field proven in applications such as the GE CFM56 engine. Finally, the mechanical location of critical design features such as the insulator spring, shell weld and internal component clearance details have been optimized to provide a more robust igniter.

The CH31919 igniter design is considered the “Gold Standard” for severe thermal shock/high temperature applications of the GE GE90/GENx/GP7200 engines. This design incorporates the following design improvements which will increase installation time in the engine and eliminate premature igniter removals as compared to the competitive design:

- **Internal Cooling Airflow Capability/Capacity for center and ground electrode cooling**
- **Advanced Proprietary Thermal Shock Resistant Sparking End Insulator**

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The CH31919-1 igniter design is considered the “Improved Standard” for less severe thermal shock/high temperature applications of the GE GE90/GENx/GP7200 engines. This design incorporates the following Design Improvements which will increase installation time in the engine and eliminate premature igniter removals as compared to the competitive design:

- **Internal Cooling Airflow Capability/Capacity for center electrode cooling**
- **Proprietary Thermal Shock Resistant Sparking End Insulator**



**CH31919-1**

**CH31919**

**Figure 2 – Comparison of Champion’s Two Product Offerings**

**Air flow Comparison:** Igniter internal cooling is created by utilizing the inherent higher pressure of the compressor by-pass air to generate a cooling air flow through an igniter into the turbine combustor. The cooling of internal components is desirable because it enhances igniter spark erosion resistance and provides critical cooling which inhibits thermal shock of the internal ceramic components. Figure 3 documents to relative air flow rate (SCFM) through the three igniter designs discussed and confirms that the Champion CH31919 igniter design has significantly more air flow than the Unison design. This increase in air flow does not impact engine performance. Figure 4 documents the air flow comparison of the Champion CH31919-1 center electrode cooling arrangement to the Unison design. Again, it is

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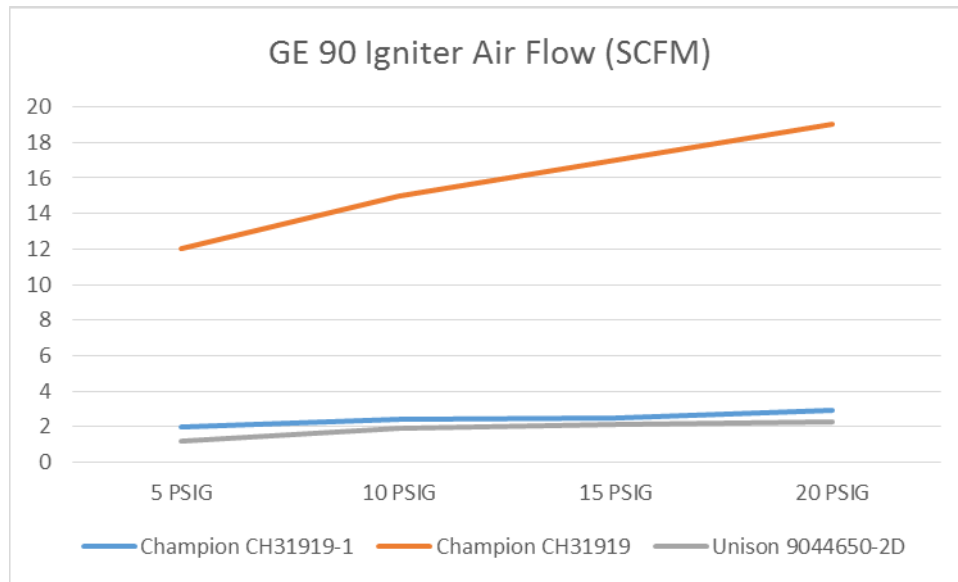
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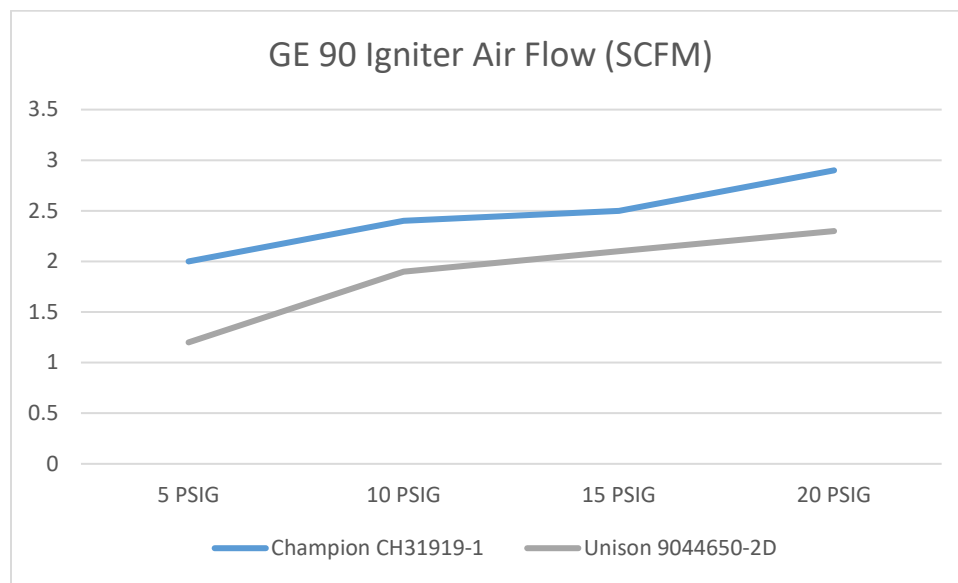


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confirmed that the Champion design has superior internal air flow. These air flow results clearly demonstrate that the Champion designs have superior air flow technology which will lead to increased installation time in an engine.



**Figure 3 – Air Flow Comparison of all Designs**



**Figure 4 – Air Flow Comparison of Designs**

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