Nostalgia

The end of the year is a good time to look back at what was. We had a nostalgic moment when we attended the dedication of a Historic Mechanical Engineering Landmark in August at the Knox County Museum in Mt. Vernon, Ohio. The American Society of Mechanical Engineers presented a plaque declaring the Cooper-Bessemer Type GMV Integral-Angle Gas Engine-Compressor as having been "a major contributor to the world's economy for more than a half century, providing compression energy for the natural gas transmission, gas treatment, petrochemical, refinery and power industries in the United States and forty-four countries around the world." See Figure 1.

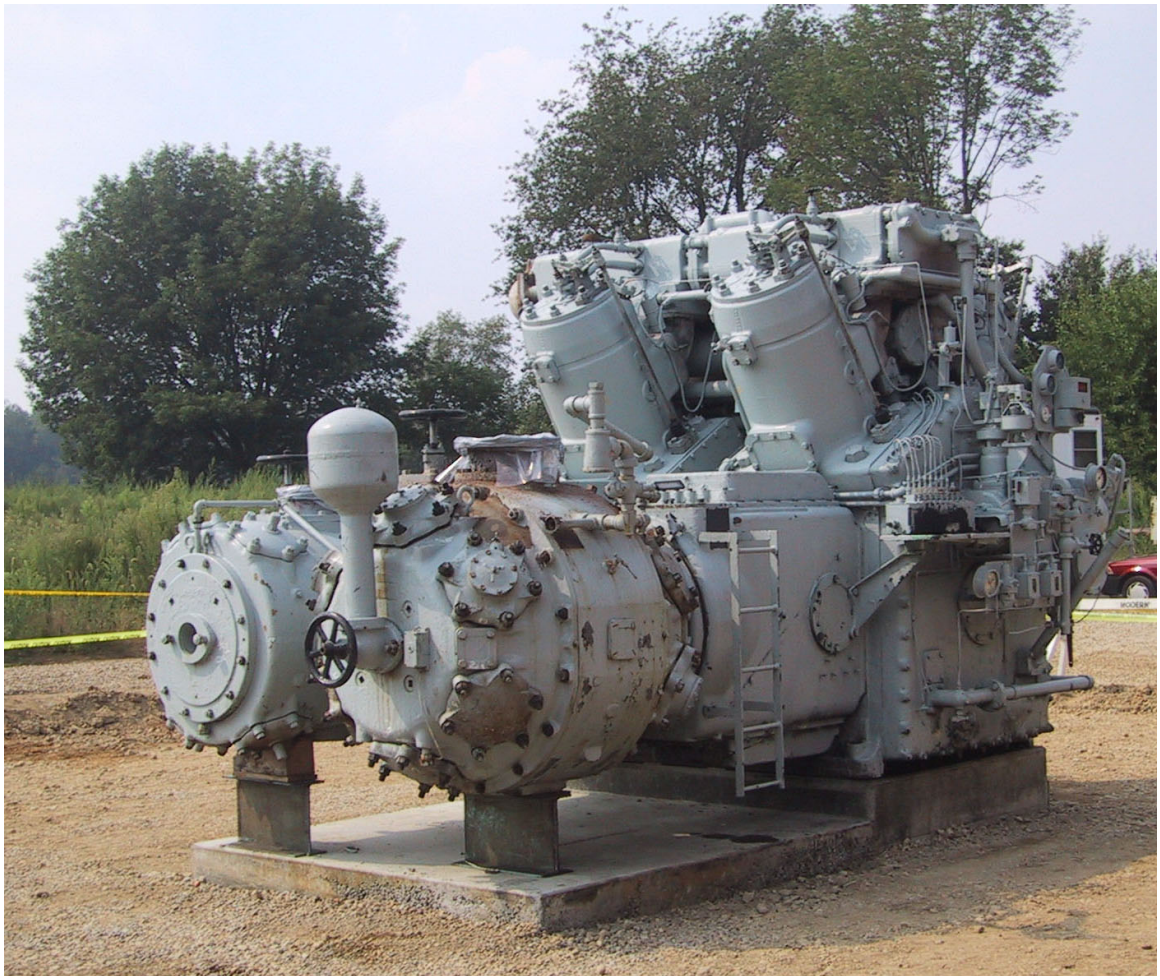

Figure 1. GMV-4 Landmark engine rated at 400 BHP, 300 rpm, 700 ft./min. (3.5 m/s) piston speed.[1]

[1] This picture was taken in 2004 when the unit was not yet painted and housed under roof.

Most of the attendees at the dedication ceremony, including the writer, had an involvement with this two-cycle engine at one time or another during their careers. The GMV product was designed and developed in Mount Vernon at the Cooper-Bessemer Corporation located on North Sandusky Street in Mount Vernon in what has evolved into today's Rolls-Royce Energy Systems facility. The local C. & G. Cooper Company had merged in 1929 with the Bessemer Gas Engine Company of Grove City, Pennsylvania to form Cooper-Bessemer.

The GMV was a joint effort by engineers, designers, and technicians from both companies. Consequently, the technology and design heritage from both companies fed into this precedent-setting, compact, V-angle engine design. The key breakthrough in compactness was the articulated connecting rod arrangement (Figure 2), which allowed two power piston connecting rods to drive onto one master compressor rod for each throw of the crankshaft. This patented articulated rod design was much more robust than competitive side-by-side rod arrangements because it resulted in much lower bearing loads.

Figure 2. Connecting and articulating rods of an integral-angle gas engine-compressor[2].

During the period from 1945 to the end of the seventies the integral-angle gas engine-compressor went through an extensive development which saw its thermal efficiency increase from around 25 percent to some 37 percent. This was mainly achieved by moving from an engine driven "scavenging" arrangement to a pure turbo-charged design. High efficiencies of engine compressors tended to delay the acceptance

[2] Picture taken at a gas transmission compressor station in Germany.

of competing gas turbine driven centrifugal compressor packages. The GMV line also kept up with the times; in 1978, in response to the increasing pressure being brought on by the EPA, it was the first gas engine to adopt "Clean Burn" combustion.

When this engine was finally replaced by gas turbine packages, particularly in the gas transmission field, it had enjoyed a remarkable 55 year production run. The assembly line style manufacture of this product in Mount Vernon provided a high level of employment. The success of this product also greatly strengthened Cooper-Bessemer's financial status, which had suffered during the depression.

Total production was:

Produced by C-B in U.S. and Canada	2,825
Produced by licensees*	225
Produced by Soviet Union**	1,566
Total	4,616

* Production locations included: United Kingdom, France, Germany, Italy, Mexico, and Japan

** Produced at Gorky Works. These are "clones" of 25 Lend-Lease engines delivered by C-B in 1945.

The impact of the GMV line of engines on industry can best be summarized by the following comments provided by two industry spokesmen associated with the operations of these engines:

"It gives me great pleasure to support the nomination of the Cooper-Bessemer GMV engine as an ASME Historical Landmark. The engine was one of the most advanced of its day, and one of the very first to be designed using modern diagnostic techniques. The effectiveness of the basic design is seen in the fact that the engine was in continuous production for 55 years. Many of the engines produced in the 1940's are still in use, operating '24hours/7days' with high reliability and good efficiency. The pipeline industry still operates over 2000 GMV model engines."

"It is my opinion, that from an operating standpoint the GMV series of engines have an unparalleled safety, reliability, and cost of operation record. Our station operators have always viewed the GMV series units as first on, last off compression."

As always in such projects, there are key persons who relentlessly pursue the objective of historic evidence preservation. The nomination of the GMV for the award was mainly the work of Mel J. Helmich, retired Director of Engineering and Technical Director of Cooper-Bessemer Reciprocating. Mel Helmich spent many hours preparing documents for the nomination and shepherding it through its many ASME reviews. The American Society of Mechanical Engineers, founded in 1880, is the only national association serving all branches of mechanical engineering. Their Historic Mechanical Engineering Recognition Program illuminates America's technology heritage and serves to encourage the preservation of the physical remains of historically important works. It provides an annotated roster for engineers, students, educators, historians, and travelers, and helps establish persistent reminders of where we have been and where we are going

along the divergent paths of discovery.

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Reference: Mel J. Helmich, *Cooper-Bessemer Type GMV Integral-Angle Gas Engine-Compressor*, Knox County Historical Museum, Mt. Vernon, OH, 2006.

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