Altoona, PA: Railroading during the Steam Era

According to Interesting Engineering, who rated the top 35 inventions that changed the world, the steam engine was ranked third over the compass and the automobile. Steam engines led to the improvement of not only transportation but also agriculture and manufacturing.

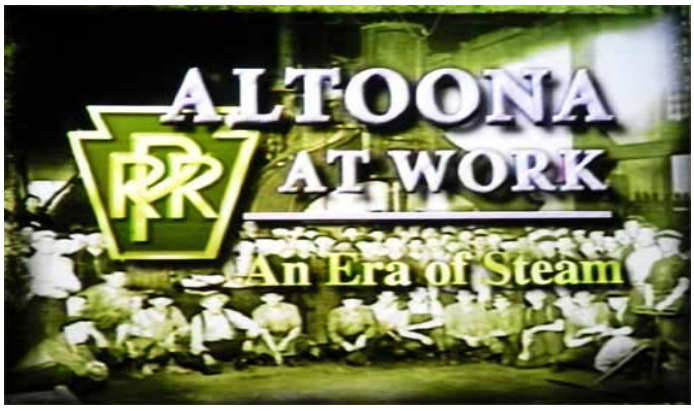
The Pennsylvania Railroad (PRR) Altoona Machine Shops' duty was to repair locomotives and cars that transported people and hauled freight. During the 1860s, the shops were handling over fifteen engines at one time. In 1862, the Altoona works built their first passenger steam engine. The engine weighed over 30 tons. After several years and design changes, PRR management adopted a policy that all locomotives would be constructed in accordance with a standard design. The management felt that standardization would lower the cost of repairs by using interchangeable parts. By 1900, one hundred percent standardization was achieved.

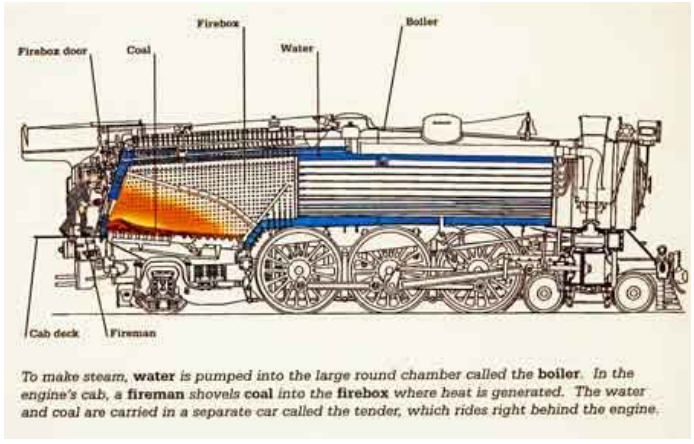
Over the years, the Altoona works began working on efficiencies. In 1884, they could construct a locomotive in less than 24 hours. In 1888, that achievement went to 17 hours in a timed test. Engines at that time were designed based on use according to grade of track, need for speed, and weight of loads. Design and testing were understood to be essential to maintaining business growth and profit. Various styles were developed.

The largest production for one year was 140 locomotives for the Altoona Machine Shops in 1891. By 1899, PRR engines were capable of hauling 300-ton trains at 75 miles per hour. As engines became bigger with higher steam pressure, they could haul over 640-ton trains. Between 1866 and 1924, 6,645 steam locomotives were constructed in Altoona. The age of steam ended between the 1940s through 1957 when the PRR converted from steam locomotives to diesel-electric locomotives.

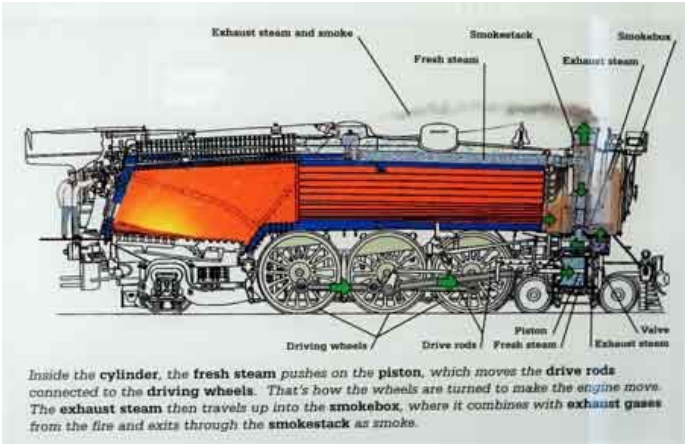
Building steam locomotives required many skills, techniques and constant safety awareness.

This photo program shares some of the historical activities and tasks in constructing a steam locomotive at the Altoona machine shops.

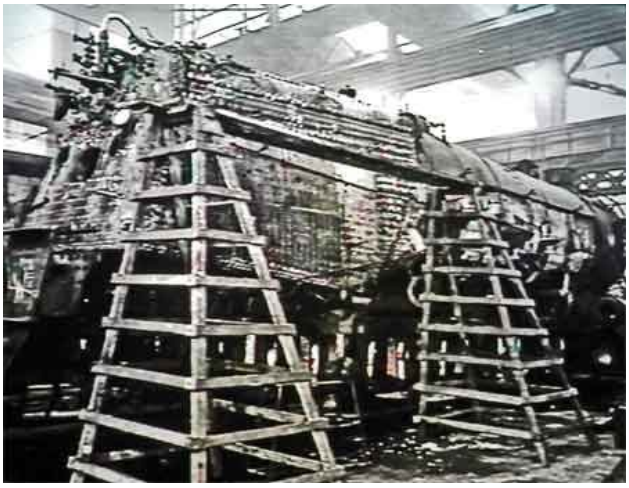




*To make steam, **water** is pumped into the large round chamber called the **boiler**. In the engine's cab, a **fireman** shovels **coal** into the **firebox** where heat is generated. The water and coal are carried in a separate car called the tender, which rides right behind the engine.*



*Inside the **cylinder**, the **fresh steam** pushes on the **piston**, which moves the **drive rods** connected to the **driving wheels**. That's how the wheels are turned to make the engine move. The **exhaust steam** then travels up into the **smokebox**, where it combines with **exhaust gases** from the fire and exits through the **smokestack** as smoke.*

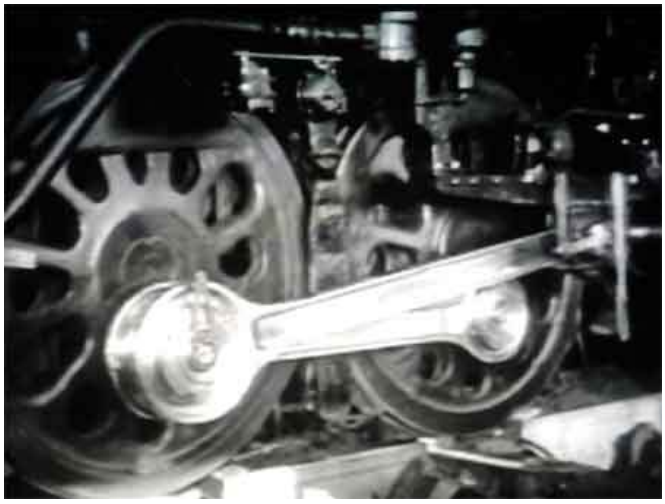


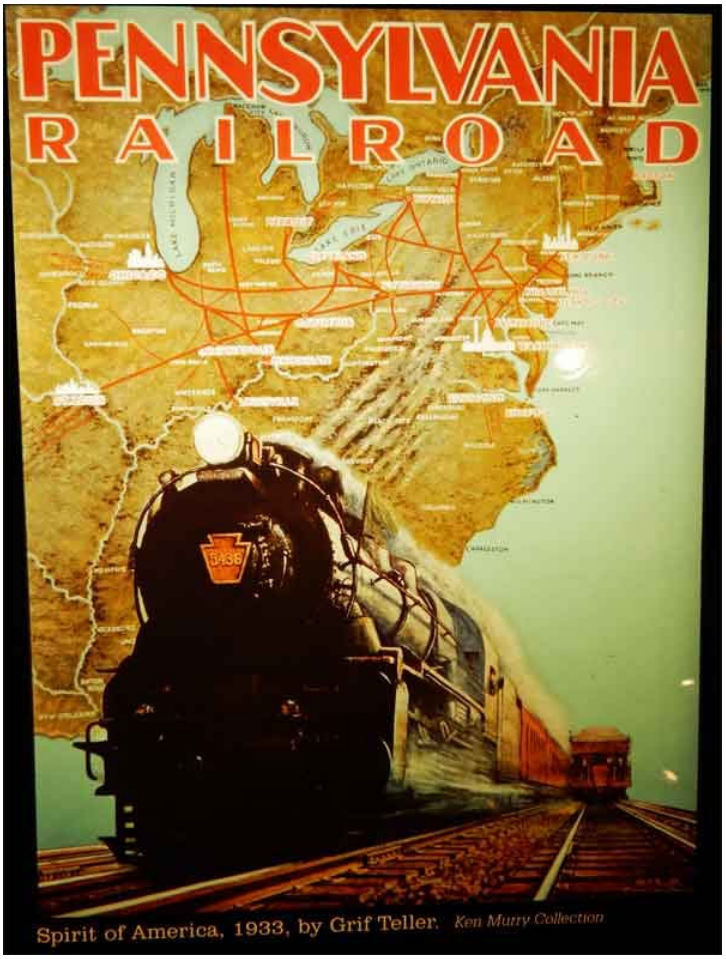
Five passenger engines line up at the West Philadelphia engine terminal.
St. Louis Mercantile Library Association, c. 1935

In an era when "standard" meant the criterion by which everything else was judged, the Pennsylvania Railroad called itself the Standard Railroad of the World.

PA State Archives Collection

Thousands of questions, ranging from what kind of snow broom sweeps the longest to what kind of locomotive pulls the hardest, kept the Altoona labs busy.





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Source: RR Memorial Museum, Altoona PA, https://www.railroadcity.com/, https://interestingengineering.com/35-inventions-that-changed-the-world, https://www.nps.gov/parkhistory/online_books/railroad/shs2a.htm, http://www.altoonaworks.info/timeline.html, and http://www.phmc.pa.gov/Archives/Research-Online/Pages/PRR-Accidents.aspx.