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Building from the Rails, Up: The PRR T1 Trust

GUEST COLUMNISTS: JASON JOHNSON AND BRADFORD NOBLE, D.O.

THE PENNSYLVANIA RAILROAD T1 Steam Locomotive Trust is a non-profit organization with a unique approach to railroad preservation. Through hard work, dedicated volunteers and the financial support of many generous donors from around the globe, the T1 Trust is constructing PRR T1 No. 5550. Slated to become the fifty-third locomotive of its class when complete, No. 5550 combines stunning art deco design with a unique 4-4-4-4 wheel arrangement. The goal is simple; to provide mainline steam excursion service, and to set the world speed record for a steam locomotive.

The T1 class represents the pinnacle of steam locomotive design in the United States, with the capability of achieving speeds in excess of 120 m.p.h. In all, 52 class T1 locomotives were produced, 25 at the PRR's Altoona shops and 27 at the Baldwin Locomotive Works in Philadelphia. Sadly, not a single example of this magnificent machine escaped the scrapper's torch.

The production of T1 No. 5550 will fill a large gap in historic locomotive preservation. Perhaps more importantly, this locomotive will inject new life blood into an aging heritage fleet. Most mainline steam excursion locomotives operating today are more than 60 years old. Wear and tear are taking their toll. Efforts such as this one will become increasingly important if regular steam operations are to survive in the future.

Inspiration from Across the Pond

The die has already been cast for this project. In 2008 a group of railway enthusiasts in Great Britain completed London & North Eastern Railway (LNER) Peppercorn Class A1 No. 60163 *Tornado*, the first mainline steam locomotive built in the United Kingdom since 1960. The success of the *Tornado* project provides inspiration, and a framework the T1 Trust will rely on for the 5550 project.

The T1 Trust was founded in 2013 and its business plan calls for a 17 year project lifespan with an expected completion date of 2030 and an estimated price tag of \$10 million. By the following year the T1 Trust had achieved several major milestones in engineering and original blueprint research. A talented and experienced team of historians, mechanical

engineers, fabricators, and operators make up the T1 Trust leadership. How could we make the most of our effort to date, as well as demonstrate our capabilities to potential donors? The decision to start manufacturing a few key components was made. A bold plan to start with the very complicated 80" Boxpok wheels was put in place.

From Blueprints to CAD

The first step was obtaining the original drawings from the Pennsylvania State Archives in Harrisburg. The PRR T1 Trust's CMO Scott McGill spent countless hours pulling old drawings and scanning them in to digital format.

Once Scott had obtained the original drawings, they were sent off to our senior CAD draftsmen. Over the next three months, the two-dimensional drawings were transformed into three-dimensional digital models. Every measurement was meticulously checked and rechecked by Scott and his team.

The next step was to locate a foundry capable and willing to take on such a large complicated part. These would be the first mainline steam locomotive drive wheels manufactured in America in more than 70 years. A typical spoked driver is solid, while the Boxpok driver is completely different in that the driver is almost entirely hollow. This design promotes a high strength-to-weight ratio and allows for the fine tuning necessary for high-speed operation.

Selecting a Foundry

When starting the process, the T1 Trust wanted to stay close to Pennsylvania for casting the first components, but also wanted to include several highly qualified foundries outside of the region. A Request for Proposal (RFP) was drafted which included the material specifications and CAD model as well as quality control requirements. With the help of our membership more than 60 foundries were located and requests submitted. Several foundries responded with quotes and we began the selection process.

When selecting a foundry, items such as capabilities, time frame for task completion, number of years in business, price and cus-

tomter satisfaction were all considered. As the selection process moved forward, Beaver Valley Alloy Foundry in Monaca, Pa., became the front runner. They have been in business nearly 100 years and are more than capable of pouring the large and intricate driver castings. Beaver Valley was very interested in the 5550 Project and the Trust quickly saw they were going to be the right partner.

By the summer of 2015, it was time to select a pattern maker. Liberty Pattern in Youngstown, Ohio, has been making wood patterns for the foundry industry since 1917, and was put forward by Beaver Valley Alloy.

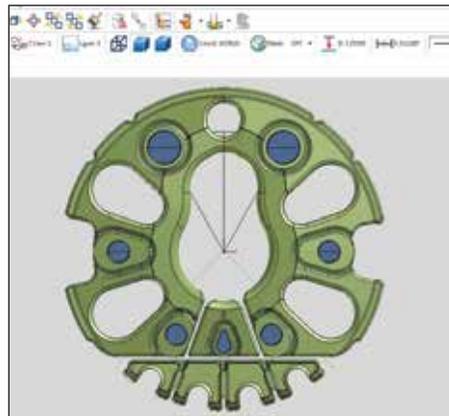
The team at Liberty Pattern studied our CAD model of the No. 4 wheel set. They converted the 3D digital drawing into a casting pattern, an amazing art in itself. It was decided to make the counter weight as a dry-fit so that 3/4 of the pattern could be used for all eight drivers. This will save a tremendous amount of money in the future. The first pattern being made can be used for four of the wheels. Then, with a new section fit into place, the same pattern can be used again for the remaining wheels.

Liberty Pattern also had to design core boxes to form all the sand that goes in the internal cavities of the wheel. This is a very complicated and precise art. Once all the cope (outside surface of wheel), drag (inside surface of wheel) and core boxes (inside cavities) are complete, they are mounted on large 96"x96" boards and sent over to the foundry to start the casting process. When complete, the finished cast wheel center will weigh nearly 2,500 lbs. and measure 6 feet in diameter. The application of the 4 inch thick steel tire brings the total wheel diameter to 80 inches.

Crowdfunderaiding, Sponsorships, Estate Giving

In July 2015, we appealed to railfans from around the globe for support in making the pattern. Building a modern steam locomotive requires modern fundraising efforts. Fortunately, we have a few more tools at our disposal than our friends at A1 Steam Locomotive Trust had when they began their work on the *Tornado* in 1994. The online crowdfunding website Kickstarter was chosen to help raise the initial \$20,000 needed for the pattern. After the campaign was launched, we raised \$22,577 over the course of 30 days. With funds in hand, the patterns were completed at the end of October 2015.

This fundraising process will be repeated



This CAD drawing (ABOVE LEFT) represents the hollow parts of the Boxpok wheel. Baldwin Locomotive along with General Steel Castings developed the Boxpok driver with a high strength to weight ratio making it perfect for high-speed operation. The cope and the drag are the two primary components for any wood pattern. The completed drag wood pattern (ABOVE RIGHT) is made 2% larger than it needs to be to allow for shrinkage when steel is poured into the sand mold.

for hundreds of parts on the finished locomotive. As part of the Kickstarter campaign the we offered a full-size replica bronze keystone number plates made by Chuck Blardone. The keystones were offered as premiums for donations of \$5,000 (If you would like to obtain your own 5550 keystone please email info@t1trust.org).

The headlight that will adorn No. 5550 has been sponsored and built by Gary Bensman of Diversified Rail Services using original PRR blueprints provided by The T1 Trust. As part of our "Sponsor A Part" program, Founders Club member Eric White made a generous \$1,500 donation to sponsor construction.

The 5550 Keystone Society is a group of PRR T1 Trust supporters who have made an enduring pledge to railroad preservation by offering a charitable life income gift to the PRR T1 Trust or by naming the Trust as a beneficiary in their estate plans.

Members of The 5550 Keystone Society, receive exclusive benefits and confidential details about the efforts of The T1 Trust. 5550 Keystone Society members receive our quarterly newsletter *The T1 Trail Blazer* which contains news and special features describing design and construction efforts to date. Society members also receive a personalized certificate of membership suitable for framing, a full size print of the 5550 launch painting, the PRR T1 Trust's annual report, and invitations to special events.

Bringing No. 5550 Closer to Reality

Over the next few years, engineering work will continue and simulation testing will be conducted. More components will be built and the PRR T1 Trust will proceed with its fundraising efforts. It will be through the support of volunteers, railfan donors, foundations, grant makers, corporate donations, and legacy giving that PRR T1 5550 will ultimately come to life in steam. Once the project is farther along, we will be able to better answer the exciting questions like, "Where will it run?" and "When will it be done?"

Whether or not you are a fan of the Pennsylvania Railroad or mainline steam, this is an exciting new project that will certainly leave its mark in the preservation world for generations to come. For more information about our efforts to date, to become a member, or a donor, please visit our web site at www.prrt1steamlocomotivetrust.org.



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