FlashPoint

Volume:4, Number 1, • August, 2011 • International Newsletter
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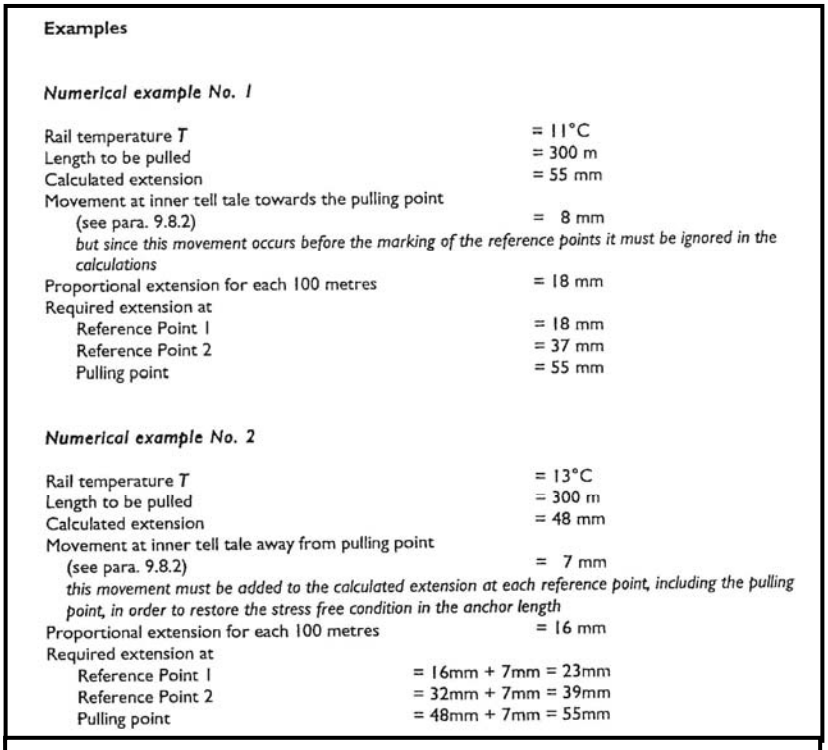
Advances in Flash Butt Weld Management for Tension Welding

A key factor in the successful installation of continuous welded rail is the ability of the railway or railway contractor to install the rail at the neutral (stress free) rail temperature at a given geographical location. If not done correctly, decreased rail life and increased maintenance costs will result. The ability to do this is complicated by climatic differences and other factors. Some railways identify this as the neutral rail temperature (NRT) while others call it stress free temperature (SFT).

The NRT can only be achieved by working in ambient conditions that are equal to or lower than the NRT. When the ambient condition of the rail is lower (cooler) than the NRT, the rail will be shorter at the working temperature versus the NRT. To adjust the rail to the NRT, railways expand or stretch the rail by heating it or through the use of specialized welderheads that have been designed for the combined stretching and welding of the rail. For many years now, the most prevalent method for stretching the rail is to apply a longitudinal pull force to the rail using hydraulically driven equipment variously called tensors, stressors, or pullers. These pullers are used in conjunction with flash butt welders to accomplish the setting of the NRT. Holland was actually a pioneer in the development and application of puller technology for flash butt welding applications almost 20 years ago.

Using the same basic material property formulas, all railways have established pulling tables to guide their work crews in expanding (heating) or stretching (pulling) the rail to the desired neutral rail temperature. These tables provide an operator the information required to establish the rail gap necessary to achieve the NRT. Having the data of the NRT, the ambient rail temperature, and the rail length to be pulled, the operator uses the table to calculate the required rail gap**.**



Examples

Numerical example No. 1

Rail temperature *T*	= 11°C
Length to be pulled	= 300 m
Calculated extension	= 55 mm
Movement at inner tell tale towards the pulling point (see para. 9.8.2)	= 8 mm
but since this movement occurs before the marking of the reference points it must be ignored in the calculations	
Proportional extension for each 100 metres	= 18 mm
Required extension at	
Reference Point 1	= 18 mm
Reference Point 2	= 37 mm
Pulling point	= 55 mm

Numerical example No. 2

Rail temperature *T*	= 13°C
Length to be pulled	= 300 m
Calculated extension	= 48 mm
Movement at inner tell tale away from pulling point (see para. 9.8.2)	= 7 mm
this movement must be added to the calculated extension at each reference point, including the pulling point, in order to restore the stress free condition in the anchor length	
Proportional extension for each 100 metres	= 16 mm
Required extension at	
Reference Point 1	= 16mm + 7mm = 23mm
Reference Point 2	= 32mm + 7mm = 39mm
Pulling point	= 48mm + 7mm = 55mm

Typical examples of destressing calculations

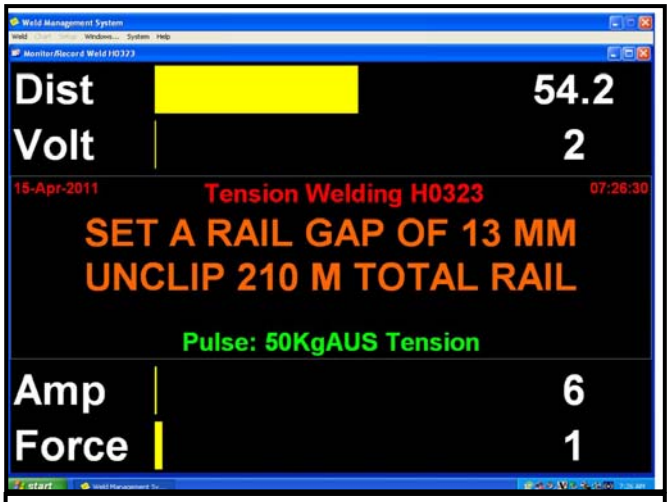
Most often these tables have been established for thermite welds. When flash butt welds are being used, other factors must be considered in the application of these tables in conjunction with the setting of the NRT, specifically, the *weld consumption* during the flash butt welding process and the resulting *forge upset distance are critical to the process of laying the rail at the NRT*. This often requires another calculation, which must be added to the standard railway NRT table. All of this requires special training and generally only the person in charge is qualified to perform such calculations.

Further, with flash butt welding, other factors (rail weight, required pull forces, the machine stroke and the available force) must be considered before initiating the rail welding and stretching process.

While railway tables and charts are absolutely essential to the proper setting of the NRT, like all other paper record keeping systems, they have several drawbacks: working with paper media in inclement weather conditions, handling the paper charts with greasy hands or hands enclosed in heavy work gloves, carrying of charts in pockets (which tends to deform them), along with the issues of long term protection and storage.

But now, all of that has changed, as Holland has set the new standard for the operator interface, recording and management of tension welds! Utilizing the weld management computer, the Holland hardware and software systems eliminate the paper record data and the paper rail pull chart. All parameters associated with the weld are entered into the on-board weld management computer.

Holland's weld management system prompts the operator for the necessary inputs, confirms the welding machines and/or puller machines ability to perform the weld, calculates the necessary rail gap and displays the values for the operator to confirm before allowing the weld process to continue.



Holland Weld Management Screen

After the weld is completed, the actual rail consumption during the welding process and the actual amount of rail gap that was set by the work crew are used to calculate and display the achieved NRT. All weld inputs are recorded into the individual electronic weld file and are included on the electronic weld printout (or paper record, if required).

What are the benefits of the Holland Weld Management system? It saves time in the weld set-up, reduces operator error, overcomes the limitations of only certain individuals being qualified to perform weld set-up, eliminates the use of paper charts and records that can suffer from someone's illegible handwriting or printing, all while providing a permanent electronic record and individual weld history. These records are easily retrievable by the operator, the field supervisor or headquarters' managers. Of course, these electronic files are invaluable for quality control purposes.

Holland is committed to leading the rail welding market with modern, high efficiency flash butt welding machines that are controlled by the most up-to-date hardware and software. And one example of this is Holland's Weld Management System. It is the most advanced system in the industry.

From Tea Plantation To Smooth Roads to Quiet Continuous Welded Rail.

Several generations ago, the members of the Agarwala family were primarily traders of engineered goods and the owners of a tea plantation. Today, they still own the tea plantation, but they have vastly expanded their business interests in India.

Left to Right: Mr. Rahul Rastogi, Mr. VN Singh, Mr. GK Agarwala, Mr. Shashank Agarwala, Mr. Raju Agarwala, Mrs. Gayatri Devi, Mr. SK Agarwala, Mr. Rohit Agarwals, Mr. SS Khadria

In 1971, Phoolchand Agarwala (known as P.C.) and three of his brothers started Speedcrafts, manufacturers and sellers of road paving equipment. In 1987, P.C. went out on his own and started Phooltas Harsco. This company was formed and owned by a combination of investors: 40% Speedcrafts, 40% from Harsco, a major U. S. player in the design, production and sales of railway maintenance equipment, and 20% from a private investor. Today, Phooltas Harsco is Holland's sales agent for India.

The featured product of Phooltas was a tamping machine initially produced in the USA and, later, in India. The business has expanded over the years to include the sale of road/rail maintenance of way equipment. This equipment includes track-laying equipment, gang cars, ballast hopper cars, utility vehicles, and flash butt welding machines, utilizing Holland's unique family of flash butt welders on locally produced road/rail vehicles.

Today, P.C.'s son, S. K, is Chairman of Speedcrafts; his other son, R. J. (Raju) entered the business in 1975, becoming the primary person responsible for the engineering, sales, and marketing of Phooltas products. Today, Raju handles all business development and technical aspects of the business. At this point, the next generation of family members have begun to take leadership positions in the company. One of those next generation leaders is Rohit Agarwala who is responsible for daily operations, projects and international marketing.

Not only has Phooltas expanded its product offering of equipment, but it has added contracting services, too. Today, Phooltas does rail grinding, ultra-sonic flaw detection, and track construction and maintenance, and it enjoys several annual maintenance contracts for Indian Railways. In fact, Phooltas has become a leader in contract flash butt welding; during a four-year period, it made 1,050,000 welded joints, both in stationary and road/rail modes.

India's economy is one of the world's fastest growing economies. Indian Railways (I.R.) is growing rapidly and has helped fuel the growth of Phooltas. The future for Phooltas looks bright. Phooltas' annual growth rate over the last four years is 25-30% per year, and they project a continuation of this rate in the future. 100% of this growth is derived from domestic business. Their goals are to increase their contracting business as well as expanding their product offerings from 4-wheel to a line of 8-wheel rolling stock vehicles.

Phooltas' success derives from two sources: its excellence in design, and the in-house manufacturing of its products. Also, its highly educated, fully trained and skilled workers give them an edge in the price and quality aspects of the products they produce. They are ISO 9001 certified.

Indian Railways, which has its own engineering and manufacturing divisions, develops new products that will meet their needs. This concept forces independent suppliers to offer unique products at highly competitive prices. According to Raju, "Phooltas will partner with world class foreign manufacturers and contractors to bring sophisticated track-laying equipment to the Indian market." He goes on to say, "We take a concept that is used overseas and sell that concept to I. R. In this way, we do not compete directly with I. R. companies, but add value through new and better methods and equipment for track construction and maintenance."

As for the philosophy for this vibrant company, Raju stated, "We will remain a family business with very active family members taking key positions within the company." Holland is proud to be represented by Phooltas. We look forward to being part of their growth in the years ahead.

Ask the Service Department
Answers to Your Frequently Asked Questions

Maintenance • Service • Training

Question #1: What is a flash butt welding Operator Certificate?

Answer: The Operator Certificate is a document that confirms that the person named has completed training in Flash Butt Welding. It certifies that the person is competent to operate the equipment and to produce welds according to the appropriate rail welding specification.

Question #2: Does Holland issue Operator Certificates?

Answer: Yes, Holland provides training for your operators. At the completion of the training, Holland issues the Certificates. Company personnel who receive the certificate will be qualified to operate Holland manufactured equipment.

Question #3: For what period of time is the Operator Certificate valid?

Answer: The Certificate is valid for one year. Extensions are possible on a case-by-case basis.

Question #4: What is required to extend the validation of the operator certificate?

Answer: Holland, in agreement with the equipment owner, arranges a Holland service visit. The Service Trainer will monitor the operator's performance, provide additional training as needed, and issue an extended certificate.

Question #5: Is a site visit necessary in order to extend a Certificate?

Answer: Holland recommends arranging such a visit. During the visit, the condition of the welding machine will be observed so that any corrective action, such as re-calibration, may take place. The additional operator training and the re-calibration of the equipment are important steps in continuing to produce quality welds.

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