TOUGH GUN X IS NOW TGX

TOUGH GUN X has officially become TGX. Beginning April 1st, you will begin to see the new logo being implemented on the various TGX guns, packaging and support material. Other esthetic improvements include charcoal gray handles and a black switch on the small handled torches.

IDENTIFYING TOUGH GUN CONSUMABLES

As a follow up to the announcement in December that we would be moving to a new trademark design, we would like to remind customers that as we begin to phase out our current trademark symbol and replace it with the words TOUGH GUN, both trademarks will be in circulation for a time until all product with is used up. Until then, you will see a mix of trademarks out in the field but all items are of current engineering design and covered under our warranty and return policies.

UPCOMING TOUGH GUN IMPROVEMENTS

Stop by Booth # 961 at this year’s AWS Convention in Detroit to see the newly designed manual air-cooled and water-cooled torches. The esthetic enhancements include a new look for the handles and switch housing. We are also upgrading our amperage ratings by 50 amperages. The changes are as follows:

- 300 – now 350 AMP
- 400 – now 450 AMP
- 500 – now 550 AMP
- 600 – now 650 AMP

TOUGH LOCK® TO BE STANDARD ON TOUGH GUNS

Effective June 1, 2003, all TOUGH GUNS will come standard with our patented TOUGH LOCK® Contact Tip System. This contact tip system has proven to increase contact tip life by locking securely into the retaining head to allow for better electrical and heat transfer. TOUGH GUNS can also be purchased with the original H.D. contact tip system if desired, by placing “R” at the end of the gun model number when ordering, i.e. 4015-45R.
CONVERTING TO TOUGH LOCK® NOW MADE EASY!

In order to assist our customers with converting their TOUGH GUNS to the patented TOUGH LOCK Contact Tip system, we have standardized the pricing of all our retaining heads.
404-20 and 404-30 now the same as 404-3.
404-20-25 and 404-30-25 now the same as 404-3-25.

TOUGH GUN ROBOTIC IMPROVEMENTS

There have been many improvements made to robotic air-cooled torches and peripheral items in response to customer feedback from the field. By working with our customers we were able to address issues such as gooseneck durability, ease of maintenance, spatter control, and overall performance improvement.

Torches – Better gooseneck durability, less opportunity for spatter build-up inside the housing.

Safety Clutch – Clutch more stable in static position, smoother motion during collision.

Reamer Spray Head – Adjustable spray head nozzle has been eliminated – possibility of clogging or damaging sensitive parts dramatically reduced.

Robotic Arms – Better rigidity and repeatability.

TECHNICAL INFORMATION DELIVERED TO YOUR IN-BOX!

To access detailed information about the latest robotic improvements and other TOUGH GUN technical information, sign up to receive the TOUGH GUN TECH CONNECTION. This valuable up-to-date e-newsletter will be sent to you every two months (PDF format). Simply e-mail techconnection@toughgun.com and type “subscribe” in the subject line. Please also provide your complete name and company contact information. Also available online at www.toughgun.com.

TOUGHGUN.COM GETS A NEW LOOK

Check out the newly designed TOUGH GUN Web site! www.toughgun.com Now with more of the information you want: frequent updates, links to technical data, and multimedia presentations.
Praxair was originally founded in 1907 when it was the first company to commercialize cryogenically separated oxygen. Since then, Praxair has been focused on helping customers become more profitable, efficient and environmentally friendly in industries as diverse as food and beverages, healthcare, semiconductors, chemicals, refining, primary metals and metal fabrication, as well as other areas of general industry.

With annual sales of $5.1 billion, Praxair, Inc. (NYSE:PX) is a global, Fortune 500 company that supplies atmospheric, process and specialty gases, high-performance coatings, and related services and technologies. They employ more than 24,000 people in 40 countries worldwide and in North America alone, Praxair Distribution has more than 330 stores with sales of $1 billion.

Over the near century of its existence, Praxair has remained a leader in the development of processes and technologies that have revolutionized the industrial gases industry. The company introduced the first distribution system for liquid gas in 1917, and developed on-site gas supply by the end of WWII. In the 1960s, Praxair introduced non-cryogenic means of air separation, and since then has continued to introduce innovative applications technologies for various industries. The company holds nearly 3,000 patents.

For more than 10 years Tregaskiss and Praxair have partnered together to achieve continued marketshare growth. "Over the years we have developed a strong alliance with Praxair that has resulted in them becoming our largest distributor while at the same time we’ve achieved Preferred Supplier status within the Praxair organization," comments Darren Grey, Director of Marketing/National Distribution for Tregaskiss. "Through such initiatives as ongoing training, joint marketing programs and focused sales strategies, Tregaskiss and Praxair have built a recipe for success."

One of the many innovative programs developed by Praxair is the Preferred Account Getter (PAG) program. PAG trucks stocked with product visit accounts to sell them the product they require immediately and it has been a resounding success. Building on that success, Praxair brought in the TGX product line from Tregaskiss. The TGX product’s modular approach integrated perfectly with the PAG program because of its versatility and minimal inventory requirements. The result has been increased sales of TGX for Tregaskiss and a competitive advantage for Praxair in the marketplace.

"The strength of this partnership is achieved not by simply agreeing to work together," comments Bob Gilmour, Director, - Global Hardgoods for Praxair, "it has taken a concerted effort using a very focused sales approach between Praxair and Tregaskiss. It’s that focus and commitment that have served both companies well and that will propel them into a prosperous future together."
The evaluation of suppliers is a regular ongoing process focused on ensuring that anticipated performance standards are achieved. Suppliers generally fall into three basic categories: "potential suppliers," "new suppliers," and "established suppliers." All three play a very important role in the success of any organization. Since no single evaluation strategy fits all three categories, this article will focus on the evaluation of "established suppliers" who, over the past, have proven to be reliable, excellent sources. Generally there are two basic approaches taken when evaluating suppliers. There is the informal and the formal evaluation process, both of which can be very effective when successfully implemented.

INFORMAL EVALUATION
The informal evaluation process generally takes place between the buyer and the primary contact at the supplier end. A knowledgeable buyer will have accumulated a wealth of information regarding the supplier performance, through informal communication with quality assurance, materials management and manufacturing team members who ultimately use the product for production purposes. This form of evaluation works most effectively when users and buyers are in daily contact and feedback on both satisfactory and unsatisfactory supplier performance is timely and efficient. In addition to regular ongoing communication, annual meetings are held to review the performance of key suppliers over the previous 12 months.

FORMAL EVALUATION
The formal evaluation approach, which we have implemented here at Tregaskiss, is a more comprehensive and detailed program. The first phase in the process is to ensure a supplier is approved. This requires a potential supplier to go through many states to achieve certified status. Once a supplier is approved, their ongoing performance will determine if they retain or ultimately jeopardize their good standing. The second phase of evaluation begins as products are received into our Tregaskiss environment. At this point they are immediately audited for key deliverables such as quality, quantity, product identification, on-time delivery and packaging so that performance can be measured and tracked as a function of time. When non-conformances are detected, corrective actions are initiated to ensure the supplier has contained the problem and implemented a satisfactory action plan to address the concern going forward. In some cases the problem may be so serious that it warrants an on-site visit from key members of our Tregaskiss team.

The third and final phase of the program requires the detailed performance information that has been gathered over time to be summarized and captured in a supplier performance evaluation report. This report is a weighted point system which allows us to measure a supplier's performance in the following critical areas: 1. Quality, 2. Delivery, 3. Cost Containment, 4. Customer Service and, 5. Technology.

Once completed, these evaluations are then sent out to our suppliers to review. In all cases follow-up communication between purchasing and the supplier occurs and, in some instances, follow-up meetings are scheduled to address present concerns and highlight key potential opportunities for improvement going forward. In addition to this, annual planning sessions are held with senior management to review the performance of major critical suppliers over the past year. These high level discussions will include topics such as future expectations, technological advancements, long-term plans and contract commitments.

Joe Shaheen
Vice President Operations
(519) 737-6966 ext. 243
Be a part of THE MAIN EVENT!

Detroit, Michigan, Motor City – The granddaddy of all welding shows, hits North America’s automotive capital this year. The 2003 AWS Welding Show is coming to Cobo Hall on April 8th to 10th.

Round # 1: Tregaskiss will be exhibiting its complete line of TOUGH GUN® and TGX® semi-automatic and robotic MIG guns and peripherals. See many upgrades to the TOUGH GUN product line including cable Compression Connection System, new two-piece handle and introduction of Extended Life TOUGH LOCK® consumables, displayed in our newly enhanced booth. The TOUGH GUN® calendar models will also be on hand to give away autographed calendars.

Round # 2: Where We Put the Tough Into Tough Gun!
Tregaskiss plant tours are available on Tuesday, April 8 and Wednesday, April 9. Tour times are 9:30 a.m. to 12:30 p.m. and 2:00 p.m. to 5:00 p.m. Round trip transportation will be provided from Cobo Hall. A guided tour includes our manufacturing process and R&D lab in Windsor, Ontario, Canada. To book a tour (if you haven’t already) call 1-800-787-6966 ext. 249.

Round # 3: An Evening with an Event in Every Corner!
Join us ringside at Casino Windsor on Tuesday, April 8 and Wednesday, April 9. Our guests will enjoy amateur boxing, cigars and our rhythm and blues lounge.

Tough Gun and TGX – The Best One-Two Punch in the Welding Industry! What makes Tough Gun and TGX so tough? If you’ve gotta ask, stop by Booth #961.
THE “BIG THREE” ARE USING PPAP – SHOULDN’T YOU?

THE PRODUCTION PART APPROVAL PROCESS EXPLAINED

What is meant by the term PPAP? Who is responsible for developing this process? What is its purpose?

What systems have been implemented by the Quality Assurance Team at Tregaskiss to ensure supplier compliance?

At the outset, let me begin by saying that the requirements for meeting Part Approval have been around for many years. However, in 1993 the specific procedure for PPAP was developed by the Quality and Part Approval staffs at Chrysler (now known as DaimlerChrysler), Ford and General Motors.

Basically, the term PPAP is meant to ensure that any proposed changes from the initially quoted and approved production tooling, gauging, processes, materials, operators, environment and process parameters must require a resubmission of sample parts with supporting documentation prior to final production approval.

The PPAP process must be followed for all new production components and assemblies and for any engineering changes made to existing production parts.

The purpose is to determine if all requirements are fully understood by the supplier and that the process has the potential to meet these requirements during actual production. This applies to all external supplier sites of production materials and production or service parts. A supplier of standard catalogue parts may be formally waived of the PPAP requirement by the customer.

Depending on the circumstances and critical nature of the components as well as historical background information, the PPAP process may be lengthy.

In October 2000 the Tregaskiss Quality Assurance Team conducted a Supplier Day. During the Supplier Day copies of our Supplier Quality Assurance Manual (S.Q.A.M.) were distributed to suppliers.

The purpose of the Supplier Quality Assurance Manual is to communicate to the supplier Tregaskiss minimum requirements to assure the quality of supplied parts along with assuring Tregaskiss meets our customers, quality expectations.

The Tregaskiss Supplier Quality Assurance Manual is based on the PPAP principles that were developed by the “Big 3” automotive companies.

In order for Tregaskiss to obtain a certain level of confidence in addition to meeting our customers’ expectations it is necessary that our supply base comply with these requirements.

Additionally, production part suppliers to Tregaskiss are required to meet one of the following criteria:

- QS9000 Registered
- Accreditation to ISO9000 or National Equivalent
- Have completed and submitted to Tregaskiss the results of a Self Assessment (Self Audit).

Pat Tricarico
Quality Assurance Manager
(519) 737-6966 ext. 272
TOUGH GUN welding torches are an integral part of the gas metal arc welding process in thousands of applications. Although Tregaskiss Ltd. does not produce power sources, feed systems or welding wire, it’s important to have a clear understanding of how all these systems are integrated with the TOUGH GUN in order to achieve the GMAW process. One of the critical concerns with the MIG welding system is the wire feeder, and specifically, drive roll pressure.

Incorrect drive roll pressure can be the cause of several symptoms that can potentially result in gas metal arc welding process failures. Some of the common signs of over-tightened drive rolls are reduced contact tip life, reduced wire feedability, premature liner failure, debris build-up in the feeder and consumables. Below are explanations for each common sign of over-tightened drive rolls.

1) Reduced wire feedability: Over-tightened drive rolls will change the cast of the weld wire. In some cases the weld wire cast is reduced to a very small diameter with a very large helix. (Average cast for .045 weld wire is 35 to 55” with a 1” helix.) This condition can cause increased drag and wire flip, affecting weld position and quality.

2) Reduced consumable life: Over-tightened drive rolls can disfigure the shape of wire creating a cutting edge. As the wire passes through the torch the newly formed edge can wear both the liner and contact tip resulting in premature failure.

3) Debris may build up in the feeder and/or consumables: As over-tightened drive rolls deform the wire, small metal flakes build up in the feeder. This debris can be dragged through the torch, eventually clogging the liner, and contact tip. Typically this failure is first noted after the liner is clogged to the point of causing the wire to burn back into the contact.

The potential result of each of these symptoms can result in poor weld quality, increased consumable costs, and downtime.

If it has been determined that there might be a drive roll pressure issue, the problem can be rectified by following a series of simple steps listed below.

1) Release drive roll tensioners and pull on welding wire to check for drag. If there is significant drag on the wire, this needs to be addressed before attempting to properly set drive roll tension.

2) Inspect the feeder. Pay close attention to drive roll condition – damaged or worn drive rolls need to be replaced. Wire guides should be free from debris build-up. Any accumulated debris should be cleaned from the feeder.

3) To set the drive roll pressure, tighten adjustment tensioner until wire starts to feed. For most feeder models an additional half turn provides sufficient pressure to ensure consistent feeding of the wire.

To prevent the symptoms of over-tightened drive rolls, regular inspection and maintenance should be performed. The cost involved for preventative maintenance is always far less than the costs associated with production downtime. Proper drive roll pressure will ensure that the life of your TOUGH GUN consumables is maximized.

Marc Belanger  
Technical Services Representative  
(519) 737-6966 ext. 248
To design a “tough” welding gun, engineers need to carefully consider every detail of the components and their combination as a whole torch. Improper selection of one part not only results in early failure of itself, but also shortens the service life of other parts. Figure 1 shows a typical inner surface of a used contact tip. At the region close to the inlet, silver colored particles were present. These particles are believed to be generated inside the liner and brought to the contact tip by the electrode wire. The presence of these particles increases the feeding force and clogging tendency of the electrode wire. It also results in high contact electric resistance, abnormal voltage drop, needle arcing (local arc and asperity melting inside the contact tip), and unstable welding arc. Therefore, when a liner is selected, a design engineer needs to be concerned with not only the feeding friction, the anti-wear properties and the bending recovery of the liner, but also with the aspects of the liner that could relate to flake generating which will create problems in other components like contact tips.

**Feedability**

The feeding force, in a large extension, is defined by the friction between the liner and electrode wire. The coil wire of the liner is therefore required to be smooth and free from defects such as seams, pits and die marks. Besides this, various cross sectional shapes can be found for the coiled wire of plain carbon steel liners, as shown in Figure 2. This ensures smooth feeding for various kinds of solid and flux-cored wires. These shapes include round, flat, flat on ID (inner diameter) or OD (outer diameter) and double D. Non-circular coil wires are preferred for liners used for large gauged electrode wires so that the liner can fit into the limited space in the power cable, without significantly decreasing its rigidity.

![Figure 2. Various cross sectional shapes of coil wires.](image)
Anti-Wear

The major failure mechanism of the liners was found to be wearing by the electrode wire. As shown in Figure 3, excessive wear and fracture occurred at the bending position inside the gooseneck.

Since the lubrication application is restricted in the liner, the anti-wear properties are mainly determined by the hardness of the coil wire – the harder the wire, the less it will be worn. In practice, however, it should be noted that the hardness may be the primary concern but definitely not the only concern. Almost all of the plain carbon steel liners are made from ASTM 228 music spring steel wire. Table 1 lists the ASTM specifications for this wire. It is shown that upper limits of hardness and tensile strength are given. This is to ensure the proper toughness and fatigue strength of the wire, even though this material can be made much harder and of higher strength.

Figure 4a shows that cracks are present at the cross section of an over-strengthened (over-hardened) 1.4 mm OD coil wire with a tensile strength of 2440 Mpa. Cracks were generated due to too much drawing and improper heat treatment. These cracks result in stress concentration and brittle split fracture of the wire, as shown in Figure 4b. This can be compared to the rough fracture surface of the properly treated coil wire in Figure 4c. Cracks are also extremely harmful to the fatigue property of the material.

In mechanics, the term “fracture toughness” \( K_{IC} = \sigma \sqrt{a} \) (where \( \sigma \) is the average stress and \( a \) is the length of the crack) is used to demonstrate the threshold value of stress intensity that a material can be sustained without fracture. It is noted that the larger the crack size, the smaller the average stress the material can withstand.

![Figure 3. A failed liner shows excessive wear at the bending position of the gooseneck.](image)

![Figure 4. Over-hardened coil wire shows (a) cracks in the cross section and (b) split fracture. (c) The normal fracture surface of the coil wire without pre-existing cracks. Rough fracture surface indicates higher breaking toughness.](image)

<table>
<thead>
<tr>
<th>Chemical compositions (% wt)</th>
<th>Hardness (HRC)</th>
<th>Tensile Strength (MPa)</th>
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</thead>
<tbody>
<tr>
<td>C</td>
<td>Mn</td>
<td>P</td>
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<td>0.70-1.00</td>
<td>0.20-0.60</td>
<td>&lt;0.025</td>
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Bending Recovery

The bending properties of a liner are determined by the elastic elongation limitation of its coil wire. Theoretically, the more that a wire is work-hardened (cold drawn), the higher the strength, hardness and the bending recovery will be. But again, this is based on the precondition that the wire should be defect free.

Flake Generating

There are two mechanisms of flake generation when electrode wire is fed through the liner: the electrode wire or its cooper coating is cut / plowed by the liner; or, the surface debris and coating of the liner (if it is coated) is peeled off. These are related to the two kinds of surface defects of liners: rough coil wire surface like die marks in Figure 5a, and poorly bonded coating (in Figure 5b).

In the market, some of the liners are coated for corrosion protecting. The coating can be one of Zn, Sn, or Sn-Zn, Fe-Zn and Ni-Zn alloys, offering surface inert layer or cathodic protection to the steel liner. Coating is usually conducted by hot dipping (from 30 to over 100 mm thick) or electro-plating (7 – 15 mm). Various processing defects can result in bad bonding between the coating and the matrix wire, like dirty wire surface, before coating and improper setting of the coating parameters. So, as the flake generation is concerned, the coated liner is not preferred.

As a matter of fact, the protection coating is desired at the applications in corrosive atmospheres like tropic and seashore areas. Otherwise, the liner is usually inside the torch and protected by the shielding gas during the welding. Thus, the concern of the surface roughness of the wire is of much higher priority than the coating, when a liner is selected. Figure 5c shows the smooth surface of a Tregaskiss liner.

Note that most of the flakes, after generated, are attached to the inside of the liner before they are transported to the contact tip. Blowing compressed air through the liner periodically is very helpful to keep a clean liner and smooth feeding.

Figure 5. Various surface conditions of coil wire: (a) smooth surface, (b) die mark, and (c) coating debris and peel off.

Tiejun Ma

Research Assistant

(519) 737-6966 ext. 239