TECHNICALLY SPEAKING WITH TETA

Stephen Spuhler, *Merril Hills Country Club*

John Deere Horicon Works

Nestled in a farming community of 3700 in South-Central Wisconsin lies one of the major underpinnings of John Deere's Golf & Turf division. Encompassing 214 acres and employing up to 1700 people, John Deere Horicon Works has a long and rich history of providing equipment for the residential and commercial consumer, for agriculture, and for the golf & turf industry.

A grain drill company owned by George and Daniel Van Brunt and built in the early 1860s, was bought by John Deere in 1911. In 1958, the name was changed to John Deere Horicon Works. In 1963, the first lawn tractor rolled off the assembly line. Recently, they passed the five million mark for lawn tractor production. From 1971 to 1984 snowmobiles were made at Horicon; that segment was then sold to Polaris. In the late 1980s, the facility came under the umbrella of the Commercial and Consumer Equipment division, where it remains today. In 1991, the "Reel Cell" was created, consolidating the manufacturing and assembly of all reels, reel cutting units, and the green and tee walkers.

I had the chance to tour the facility with my host Dick Thier from Engineering and with Jerry Hagen, who recently retired after 32 years at Horicon. Jerry probably gives the tours because he's one of the few around who knows every square inch of the 214 acres, as well as what went on in every nook and cranny of the facility for the last 32 years. Today was a "slow" day by their standards; the busy time usually runs from January to July.

The Reel Cell

As a separate area of the plant created in 1991, the first reel was made in late '91-early '92. The only thing on the reel itself that is outsourced is the center shaft. The machining of the center shaft ends, stamping of the spiders, and the reel blades themselves are all done in-house; as well as the robotic welding and heat treating of the reels. The welded and cast bedbars are machined by an outside supplier, but the bedknife/bedbar assemblies are finish ground here. The rollers are done in-house. The 18, 22, and 26 inch walkers are completely assembled here, as well as all the cutting units for the triplex and fairway mowers. The reels and bedknives are both ground prior to cutting unit assembly. The cutting units are then shipped to JD Turf Care in Fuquay-Varina, North Carolina, to be shipped with the traction units made there.

Paint

They use an electrostatic powder paint process which includes a "dip" or submersion in a bath. I was happy to see that. After working on various makes of equipment over the years, I found "if you just spray and bake; it's going to flake." Eventually, the paint comes off a cutting unit or deck in sheets. The submersion bath is the key. They've got nine miles of overhead track carrying parts on racks through the painting process, which takes eight hours from start to finish. For the hard to reach places on some parts, a robot is used to spray those areas. The robot is programmed for the specific part that's in front of it.

A Pressing Matter

Or as the rock group Queen would say…"Under pressure." Besides making all the decks for the lawn tractors, all the 7 IronII™ decks for Commercial and G&T are made here. The "7" refers to the 7 gauge steel used in the deck; it's the thickest currently being used by the Big Three for rotary decks. These decks are pressed out in one piece. The only welds are made for brackets for the anti-scalp rollers on the outside and the baffle chamber on the inside. It's a safe bet that they have the biggest, baddest press in the golf industry. It stands three stories tall and has 2000 ton capacity. That's four million pounds of force. And you might want to schedule your vacation for when you change the hydraulic fluid; the hydraulic tank holds 4000 gallons.

On The Line

Besides the reels, cutting units, and walkers, the X300, X500, and X700 series tractors for the consumer market are also made here; as well as the compact and heavy duty Gator™ Utility Vehicles with gas and diesel engines. Even though they may be the "new kid on the block" in the golf industry, their 100+

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years experience with manufacturing is very evident. They have AGVs and AGCs (auto-guided vehicles and carts) that roam the facility. AGVs have been in the auto industry for quite a while, but in my visits to three different manufacturing plants in the golf industry, this is the first time I've seen them used. The AGVs are all-electric and follow a wire buried in the floor. They pull up to a conveyor belt loaded with pallets of parts, the conveyor loads the pallet onto the AGV, and it takes off on it's merry way, headed to the station on the line where the parts will be used. I watched one pull up to a conveyor, get its parts, get on an elevator, go down one level, and head off to a station on a line there. If they have no further job assignments, they head back to their staging area or "corral" to await further instructions or get plugged in for a recharge. There are still forklifts, just a lot fewer of them. The main aisles are as wide as they were before in order to handle any forklift traffic; but these auto-guided things run next to the aisle like in a "carpool" lane. As one line was getting ready to start, I saw a whole bunch of the AGCs appear out of nowhere; lining up with the same distance between them and each carrying a complete rear end assembly; all headed to the same station on the line. The first time you see these things; you just stop and stare.

Each station on the line has a 19" LCD screen, which shows the assembly area for that station, lists the part numbers, their location, and the assembly sequence if needed. Those stations that perform multiple tasks have touch-screen capability to change menus.

All the air ratchets are calibrated to a specified torque; some stations can have six to eight of them hanging down. In each airline for each ratchet there is an electro/pneumatic sensor that detects how many times the ratchet was used, if at all. If something doesn't match up with the number of ratchets used or the number of times a specific one was used, the station automatically locks itself down and the unit being assembled cannot move forward to the next station until the problem is corrected.

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All engines, both gas and diesel, are run and tested on the line to make sure everything is working OK. Diesels are left with about a gallon in the tank so they don't have to be bled after purchase. For the gas engines an auxiliary fuel line is hooked up directly to the carburetor for starting. Jerry says they use a type of aviation gas in the engines so that when the fuel line is disconnected and the engine runs until it dies, any residual aviation fuel in the carburetor evaporates quickly and leaves no deposits.

Just in Time

John Deere and many others in the business of manufacturing products use the "Just in Time" model for stocking parts and making them available to the assembly lines. It is what it says. Parts arrive from vendors just in time to be used, usually a few days in advance. This eliminates not only the need for a massive warehouse and its associated maintenance costs, but also the need for excessive inventory that's just sitting around off the books.

The Horicon Works really knows how to put this model to the test. Remember I said this was a slow day? Jerry showed me one assembly line where they have the capability when fully manned to turn out over 400 lawn tractors per shift...about one every minute. There are lines making other tractors, Gators, cutting units, walkers and reels at the same time. In the photo you can see a bridge across some water and a road cutting through the facility. That road is the town's Main Street. To eliminate the problems of dealing with traffic and the weather (we do have winter in Wisconsin) they have a tunnel running underneath Main Street, so they can shuttle parts and product back and forth seamlessly. It takes a well-coordinated effort to keep the parts moving.

They may be the new kid on the block, but they've grown up quickly. **-OC**