This entrance was familiar to Alfred Barnard who visited the brand new brewery while compiling his Noted Breweries treatise in the late 1880s.

John Smith's is 250

A look at S&N's plant in Tadcaster

2008 was party time in Tadcaster for two of the town's three breweries were celebrating their 250th birthdays. The 1758 founding of the Backhouse and Hartley brewery is claimed by both John and Sam Smiths. The latter is a fiercely independent if somewhat secretive operation still run by the Smith family while John Smith's is now devoid of any family Smiths and is now part of the S&N network run from Heineken HQ in Amsterdam.

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by ***Roger Putman***

The John Smith's ale brand is the UK's largest at around 1.5 million barrels and the vast majority of it is still brewed in the town of its birth – the Newcastle Federation brewery at Gateshead is used as a strategic back-up. Celebrations included a day at York Races for employees and their families complete with betting money, charity runs to help the brewery's Lion Heart fund and a quest to find 250 Yorkshire John Smiths to come to a Cake and Ale party at the brewery at the end of the year. Five recent Head Brewers turned up at the races; Paul Vernon, John Miller, Nick Morton, Billy Mathers and Russell Brown. Their aggregate age was computed at a coincidental 250 years which probably indicates that present incumbent Russell is very young indeed!

There was a high profile in the pubs as well and some one-off cask beers. 800 firkins of Winners Tipple started the programme. Local experimentation began with 800 firkins of Final Furlong brewed for the race day with an astonishingly low colour of 8°EBC to be followed by another 800 of Finest Hour. This 4.6%ABV has a lovely hoppy nose and a lush mouthfeel not from the agency of exotic primings but

simply mashing at a higher temperature and the present gravity being 4–5° higher than John's usual rather drying 1006°. This beer is badged as John Smith's but majors on promoting the RAF – 90 years old and 58 years after the 'finest hour'. Every pint sold will put 10p into the RAF Association Wings Appeal. Such is the advance popularity that I was told there might be a second brew for Christmas and that might also end up in bottle.

These beers gave Head Brewer Russell Brown and his technical brewer John Berry an opportunity to show their imagination – provided that the materials were on site already and that they got it right first time so that the main flow of Fosters and San Miguel was not affected. In these mega-brand led times, it is not often that the biggest brewer in the land gives permission for such fripperies. So well done to Head of Manufacturing Gary Woodburn for letting the lads play and at the same time increase the reputation of John Smiths rather more than perhaps they had expected.

Before we look at this 4.5mhl plant perhaps we should finish the story of the last 250 years. Well

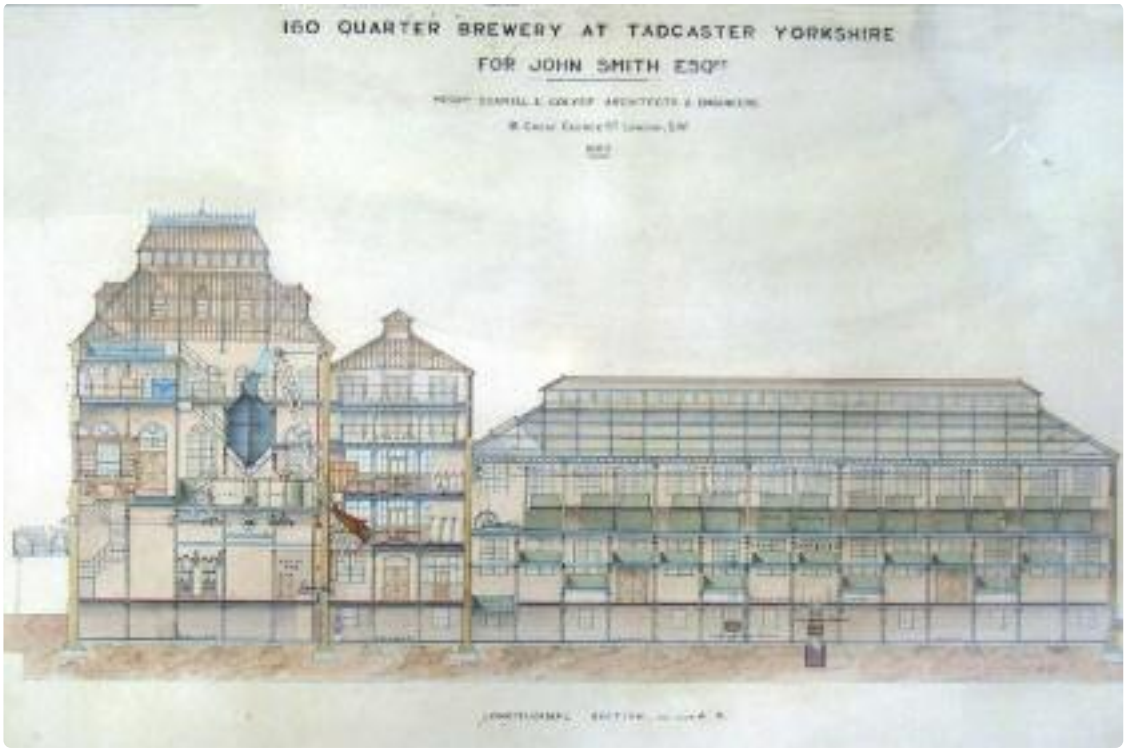
The old 1883 brewery buildings viewed from the Leeds Road.

before 1758, Tadcaster was a brewing town founded on gypseous water which allowed the fame of its products to spread. The earliest brewing references go back to 1341. The town was a convenient coaching stop with some 50 coaches passing through daily in 1750. Innkeeper David Backhouse and local postmaster John Hartley decided to build a brewhouse where the Angel and White Horse is situated today on Tadcaster High Street. Apparently the brewery was in a dilapidated state in the 1840s and was put up for sale.

Leeds butcher

Samuel Smith was a Leeds butcher and cattle dealer. His five children were well educated and in 1847 he bought B&H for his eldest son John who was then aged just 23 years. The advent of the railway saw Tadcaster's fortunes wane with the coaching activity but the brewery did well enough. With brewer Joseph Grimston, output rose to 2500 barrels a year. John had plans to build a new plant on the south west edge of town when he died suddenly in 1879. John Smith was a bachelor and left his business to brothers William (also unmarried) and Samuel. The brewery would then

This aerial view shows the old main road through Tadcaster at the top. John Smith occupies the left hand two thirds of the site to the south while Sam Smith is on the right. Note the roadway leading to Sam's bisecting John's operations.



The architects' plans for a 160 quarter brewery designed by Scamell and Colyer of London in 1883.

John Smiths brewhouse

Below left: Nice to see a Steel's masher in a modern plant.

Centre: View of the Briggs lauter tun in the foreground and the Steinecker lauter in the distance beside the wort heat exchangers with a pair of old wort gauging tanks in the far left.

Right: The whirlpool and two 1100hl coppers. Note the false ceiling to protect the wooden rafters of the building which used to be the 1883 fermenting hall.

revert to Samuel's children after the death of his brother. This will was the subject of some acrimony when William bought out Samuel's share after he died a year later but he had no desire to let his business pass to his deceased brother's heirs. He preferred his sister's children Frank and Henry who joined the business while still in their teens and were forced to change their surnames from Riley to Riley-Smith. William thus embarked on a £130,000 160 quarter brewery next door which was completed in 1883 and not subject to the conditions of his brother John's will. Samuel's children were forced to pick up the pieces at the 'Old Brewery' and Gary Woodburn told me that John still shares bricks with Sam's on the boundary and Sam's wagons exit their site using a public road which bisects S&N's property.

The nephews took over in 1886 and by 1890 output was around 120,000 barrels a year. Grimston won medals at Amsterdam, Paris, Antwerp and London for his beers in the 1880s. John Smith's became a limited company in 1892 and the Magnet trademark dates from 1911. The twentieth century was one of expansion by the acquisition of local firms and Whitworth, Yates, Barnsley and Warwick & Richardson further afield. It merged with Courage in 1970 and found its way into S&N in 1995.

The twenty-first century has seen a £50 million spend on increasing brew capacity, a Till rotary kegging line relocated from Fountain in Edinburgh, two new Simonazzi bottling lines, conversion to 202 can ends which virtually replaced all the old line with the installation of a patent widget facility. Currently the plant brews 4mhl and packages 4.5million, the difference being some Kronenbourg from Royal in Manchester and Bulmers cider shipped from Hereford. There are two keg lines (the other a 14-head Centrimatic), a can line and two bottling lines. John Smith's stopped cask racking in Tadcaster in 2007. 61% of output is John Smith's followed by Fosters and San Miguel (both at 12%) with smaller volumes of Kronenbourg, Theakstons Best Bitter, Newcastle Brown (for export kegging) and McEwans brands. Around 1 million hl are output in both bottle and can with the reminder being tanked away or kegged. There are a total of 125 SKUs and

Tadcaster manages operations at Dunston (Gateshead) and Caledonian in Edinburgh. This network is of course going to change with the closure of the Berkshire plant in 2010 and the views of new owners Heineken about its overall UK set up.

Safe, trained, capable

There is a Veolia operated anaerobic effluent treatment tower which supplies methane to the boilers or a biogas engine to generate electricity. It was the first UK brewery to be accredited to IPPC standards and has introduced a 40hr annualised scheme with a 'Safe, Trained and Capable' philosophy. Teams work anywhere between zero and 60 hours a week. Technicians and craftsman work under the same team leader. Training is the underpinning enabler with a target of 80 hours each year for each person. Eight operators were training to take the next IBD General Certificate examination. 13 of the 16 teams have successfully completed a six-stage process which introduces Team charters, focuses on capability, understands 5S (housekeeping) and Kaizen (continuous improvement) tools and has completed both workplace and community challenges. With the support of three full time Operations Improvement experts, each team is expected to deliver six improvement group outcomes each year. With all this going on, absenteeism is at a commendable 2.5%, a number of teams have progressed to being able to run themselves if the team leader is not present and with only a four level organisation chart a healthy proportion of both team leaders and senior managers were once team members.

2009 will see the commissioning of a 5MW Wartsila biomass burner (which will burn the spent grains and imported wood chips), new refrigeration, a new mash vessel and possibly a CO_2 recovery scheme but with a lot of output being nitrogenated ale, the sums need to be right first – otherwise costs will be incurred in exporting it. There is already a nitrogen generator on site operated by Air Products. 2009 will see ongoing line efficiency target increases, particularly in canning, driven by improvement groups using root cause analysis and reliability centred maintenance regimes. Safety continues to take centre stage amongst the site's 310 employees. Safety is top of the agenda in all meetings and the Tuesday morning 'prayer meeting' of senior staff spends the first 30 minutes on safety matters. Reportable accidents totalled eight in 2007 but the safety culture has reduced minors to 80 with increased highlighting of hazards and strict reporting of 'near misses' and inappropriate safety behaviour.

Grade II listed

So that is S&N Tadcaster in a nutshell. What is it like on the ground? My guide for the day was Alistair Dickson, the site's Quality Improvement Manager and is the most recent past Chairman of our Great Northern Section. The first impression is the solid brewhouse tower and fermenting room which is Grade II listed and is still just as

Fermenting at John Smiths

Left: The older rooms of conical FVs are coupled up with flexible hoses....

..while (above) the new rooms are hard valved.

Below left: Mine host Alistair Dickson puts on a cask of John Smith's Bitter for....

...below: the Tasting Cellar where staff meet daily to check samples and undergo a short flavour training session three days each week.

imposing, with its golden Tadcaster limestone, as on the day it was opened in 1883. The brewhouse has moved into the end of the old FV block which used to house 57 196-barrel Yorkshire slate squares but the tower still houses some liquor tanks. The squares were last used in 1975 but two of them survive preserved behind a glass screen – although the plant no longer receives parties of visitors. Hidden away from all but the most determined of the visitors they do get, is a whole floor of yeast slates which would have been below the squares and above the racking backs with cask racking below that. An alarmingly low headroom, perhaps indicating that brewers were even shorter than I am back in 1883!

All but the most recent conical FVs and MVs are surrounded in unobtrusive brown-clad buildings and the shiny newest are hidden from public view close to Sam Smith's boundary. The rest of the sprawling 24 acre site comprises low-rise packaging buildings and extensive trailer parks. There is a little parcel of spare ground before you reach the busy A64 bypassing the now sleepier town. The water main from the Grimston bore passes under the highway and those from the London Road well come in from the west. The brewery is self-sufficient for water but London Road was close to its upper extraction limit providing RO treated water. With the closure of cask racking in 2007, the liquor balance was upset as a use for hard hot water disappeared so that now the hard Grimston water previously only used for brewing ales is now similarly RO treated and, as in Burton itself, burtonising salts are added to the mash and a bit more to the copper. The water:beer ratio is around 4:1.

Packaging at John's

A view across the canning hall.

Bottling under the prominent brand posters.

One of the three carousels making up the KHS Till keg washer racker.

Malt silos

Out of sight of the brewhouse are 30-tonne malt silos filled by Simpsons and Muntons from local maltings and a pair of six-tonne-per-hour six-roller Bühler dry mills. In Scottish ale brewing fashion there is a separate stream with a four-roller Boby for grinding the roast barley finer than the rest of the grist in order to extract maximum flavour. It is also used for the black malt which gives John Smith's its colour but with a smaller weigher does lend more accuracy to coloured malt stocks. There is a single mash conversion vessel which will not pass its next insurance inspection so there will be an inconvenient four-week break in brewing next year to install a new unit. Unusual for today, the grist is hydrated using a Steels masher but they were still all the rage when the brewhouse was installed in the early 1980s. The mash then feeds a 1985 Briggs 10m-wide lauter or a 1996 Steinecker unit. There are two 1100hl coppers with external calandria and it is back to a single stream again for the whirlpool. This is the rate determining step and to hasten operations there is a decanter centrifuge taking wort from the base of the whirlpool to clarify it so that when the vessel is empty there is no trub to be scavenged and the next cast can follow without delay. It takes 80 minutes to cool the wort which means that ten 17.5 tonne mashes can take place each day with eight different wort streams.

Wort is collected at 1068° with on-going work to use 1072° – collection

gravities are a lot lower for the franchised Kronenbourg (now on a 50-year contract from Carlsberg which picked up the French part of the S&N empire) and San Miguel (contracted from Mahu in Spain). John Smith's is fermented at 18°C with a top heat of 21° to 6.5%ABV and diluted to 3.8% for large pack and 4.0% for can. The brewery employs five yeast strains – Fosters, Kronenbourg, San Miguel, Theakstons and S&N ale. The old Yorkshire strain was discontinued several years ago after careful trials; the driver was to decrease the fluffiness of the yeast residues to save transfer losses. Fermenting capacity in rooms 1 and 2 totals 89,000hl in 58 vessels plus another 17 maturation vessels in Rooms 3 and four totalling 46,000hl (11 of them were relocated from Websters at Halifax). Most vessels are dual purpose but are not used as unitanks. Treatments are added between FV and maturation including SHG, finings, auxiliary, hop extract and oil.

Filtration is through three 400hl per hour Seitz Orion plate and frame units and two of the streams are linked to PVPP treatment via Filtrox equipment. John Smith's for canning gets a dose of proteolytic chillproofer but no PGA is used anywhere. John Smith's is nitrogenated to 43ppm using in line Hach Ultra monitoring equipment. Packaging areas have their own BBTs and can also off-load tankers, dilute, blend in deaerated dilution liquor and carbonate locally but increasingly bright beer is packaged from a central bank of twelve (1000-1400hl) tanks which are easier to operate.

Kegging involves a 14-head Centrimatic which operates on a morning shift mainly filling Newcastle Brown for export while the three-carousel Till machine works around the clock filling 50 litre kegs at 1000 pieces per hour or 100 litre containers at 550. The split is around 60:40 with more 100 litres. The first stage will deullage, prerinse and circulate the first detergent. Five litres remain inside to soak the extractor tube ports while the keg moves to the second machine where the circulation continues to be followed with an acid detergent. The kegs are steamed and sterilised before the final filling operation. The kegs are tared before the filler and weighed afterwards. Paper labels are applied on a two head labeler each with a different sequential number series before capping and palletising on a KHS fully automatic machine.

Patented widget

The can line is substantially by Krones with a 2004 volumetric filler. Much of the output is nitrogenated John Smith's with a floating widget. This is an adaptation of the Diageo principle which is well tied up in patents. Not giving too many secrets away; the spherical white plastic widget which is slightly smaller than a ping pong ball is put in the empty can, the can is gently evacuated and purged with nitrogen, gas enters the widget. Then enough liquor to float the widget is injected. The widget is weighted so that the orifice points downwards retaining the internal gas and the cans are conveyed to the rinser. Special bars retain the widget, the water is emptied out and the can filled as normal but with a drop of liquid nitrogen before the end is seamed on. To avoid peaking in the pasteuriser, the head space pressure is critical as it is higher than with a conventional fill, the cans are pressure checked post capping. The presence of a widget is confirmed by X rays at the final level check stage. There is also a similar design of black lager widget for the use of CO_2 and called 'Scuba' in Fosters and 'Dynamo Systeme' in Kronenbourg. The filler works at 1100 cpm on widgets and 1500cpm conventionally. Final packing is into 24 tray and shrink or else a versatile Mead carton packer which can cope with collations from 6–24 cans. It was producing 10 fridge packs during my visit.

The bottling hall is virtually all Simonazzi (now Sidel) and was installed in 2003/4. There are two fillers – red and blue which share the double-deck pasteuriser filling sizes from 250 to 660ml bottles. While I was there, 300ml bottles were being filled at 50,000bph on each line. Each line has three packing machines; a Kister wraparound, Kister tray and shrink or a Mead basket /sleeve or carton machine collating 4s to 24s. No fork-lift trucks are allowed in the bottling hall so goods not moved by Elettric 80 laser-guided vehicles must be shifted by hand pallet truck. I never knew that there was so much technology in getting the caps from Pelliconi's huge cardboard demountable storage bins to the crowner. S&N use a magnetic conveyor which is reversed for changing brand and they are supposed to fall off back down the riser conveyor. However inspection is essential to avoid the odd one being overlooked and turning up later as a quality complaint.

Most packaging stock is whisked off immediately to Kuehne and Nagel's regional distribution centre at Wakefield some twenty odd miles away.

Interestingly, although it was early days yet, the lads at Tadcaster felt that S&N and Heineken cultures were similar. Although a lot more complex with 119 plants worldwide, the Dutchmen use a series of KPIs, have three-year capital plans with continuing pressure on performance improvement and cost cutting. So with an efficient site close to the motorway network, a phenomenal track record for heritage and loads of expertise from a long-serving experienced workforce, there is land adjoining for expansion so John Smith would be proud that what he started off 161 years ago is looking forward to another 161 with Heineken.

Above: The site effluent plant managed by Veolia Water.

Left: The site nitrogen generation plant run by Air Products.

"John Smith would be proud that what he started 161 years ago is looking forward to another 161 with Heineken."