Swanage Railway cranes

A railway's infrastructure is largely made up of things that are very big and very heavy. When they have to be moved, as invariably all things do, simple muscle power, however willing, is not enough and a crane is needed. Fraser White tells the story of Swanage Railway's two cranes.

The crane is working! That is to say, Swanage Railway's first crane is back to its old self again after a protracted period of repair and refurbishment. Known affectionately as FBC1 or 'F#@!"#g Big Crane No.1' it has done more than its fair share of service and has been due for a holiday, which is now well and truly over.

This crane is one of two on the SR that were built to work in the Southampton docks in the late 1940s and early 1950s by Stothert and Pitt of Bath. FBC1 came first to the SR in 1983 and has relayed all of the track from Herston through to the connection with Network Rail at Motala, a distance of over five and a half miles. It has also been used to install sidings, bridges, signals and has assisted with all manner of works associated with locomotives, carriages and other rolling stock. While FBC1 has been a familiar sight for a long time on the SR I was surprised at how little I knew about it, but all that has now changed.

I got a call from Stuart Ward of the Signal and Telegraph Department one evening. He tried to convince me that he was very ill and was unable to complete a task he had started. The task in question was to assist Derry Thompson, the SR crane engineer, to install a 3 phase rectifier circuit so that the Stothert and Pitt 15-ton crane could be powered from a portable three-phase generator. Stuart asked if I could help out.

I already had enough S&T projects to keep me busy on the SR, but Stuart assured me that this work was very important, for not only was there a list of about 20 jobs queued up awaiting the crane, but some of them were for the S&T Department and it was essential they were carried out soon. At this point there was a bit of deja vu and I remembered my first invitation to join the SR project back in 1978 when I offered to pop down occasionally only to find that I had been sucked in, never to escape.

FBC1 in all its glory, showing the first lift with new hoist resistor installed.

Derry Thompson and John Stockley position No.2 engine and generator after its removal from FBC1.

With all my knowledge of the SR I should have wisely said "no" to this new challenge, but the task sounded straightforward and so I agreed to help out.

I made contact with Derry who I had known from our joint sorties on to BR in the early days of SR in our quest to obtain S&T equipment notably from Taunton, Exeter and Dorchester West.

Derry filled me in on the problems with the crane and most significantly he explained that it had developed a fault with the engine that was now removed and away for repair, leaving the crane without a power source. There were a number of solutions to the problem, but speed was of the essence.

Background

In about 1947 Stothert and Pitt commenced the build of three types of rail-mounted, self-propelled, diesel-electric cranes with lift capacities of five tons, 10 tons and 15 tons. One of each of the three types was delivered to Southampton docks.

After many years of service, the cranes were declared redundant and in 1983 the SR had the opportunity to purchase one. Mark Campbell, Geoff Pitman and Alan Rigler (Bish) visited the docks to inspect the 15-ton crane and considered it to be ideal for the SR and FBC1, as it became, was acquired for £1,600.

The 10-ton crane (later christened FBC2) was built around 1952, had already been transferred to Barry docks where it suffered some damage after a protruding rail punctured the casing of one of the bogie travel motors. This damage was repaired and the crane was operated at Barry for a further two years before being purchased by the Gwilli Railway.

The five-ton crane which, unlike the other two cranes, did not have a bogie truck, ended up at Tyne dock where the jib was damaged then repaired, but eventually this crane was cut-up.

Some time later, Paul Mays, who was on holiday in Wales at the time, was asked by Derry to have a look at FBC2 to satisfy his curiosity about the similarities between it and FBC1. As a result of this initial contact, the Gwilli Railway contacted the SR, having decided that the crane was of no further use to them, saying they were proposing to cut it up. However, they wondered if we would be interested in buying any of the parts for use as spares on our own crane.

Although on the SR the cranes are known as FBC1 and FBC2, just for the record, the Stothert and Pitt official works numbers for these cranes are CB5968 No.1, and CC1011 No.1 respectively.

FBC2 had many parts identical to those used on FBC1 and so it was very fortunate that the Gwilli Railway had made contact with the SR when they did. Tony Andrews, head of the PW Department, was informed of the opportunity and he contacted Derry who in turn started discussions with the Gwilli Railway. In time, and on Derry's recommendation, the SR agreed to buy the complete crane for £1,500.

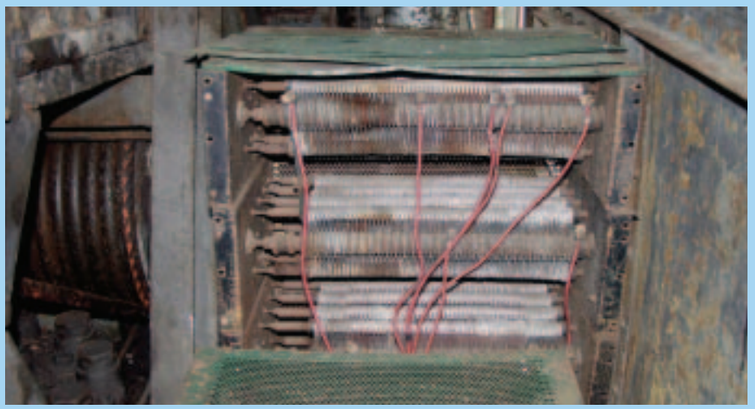
It was only recently, after I had become involved with this new project, that I became aware of how similar both cranes were to each other. It is pleasing to know that the motors, engine, generators, control equipment and much of the running chassis are the same on the 10-ton crane as on the 15-ton crane.

In addition to this fortuitous state, Derry had served his apprenticeship at Stothert and Pitt and gained some very valuable knowledge about the design and construction of their cranes and knew some of the people who built them. Further to this, he has spent a number of years in the Merchant Navy, during which time he has maintained ships' generator engines which, though somewhat larger, were similar in design and operation to the ones in the SR's cranes.

The three cranes were unique and although it is unfortunate that the five-ton crane was cut up, it is none-the-less a great asset, operationally and historically, for the SR to have two of them. In fact, it is worth noting that the 15-ton crane was used during the Falklands war to load naval ships at Southampton docks prior to them sailing to the conflict. It is understood that it was during this period of time that the hoist motor burned-out, which eventually resulted in the docks making the decision to dispose of FBC1 to the SR.

There was always a lot of conjecture about the weight of the crane and there were various estimates of between 70 and 90 tons. It is most likely that its true weight, if known, would have been over the permissible axle weight limit for the SR in those early days. What I do remember though was seeing the unloading rails slowly disintegrating as the crane descended from the lorry onto the shed road at Swanage.

The story did not stop when FBC1 had been delivered to the SR because the hoist motor had to be refurbished and a considerable amount of the internal wiring needed to be replaced; much of this work fell to Mark Campbell who was instrumental in giving the crane its new lease of life.



The inside of FBC1 crane with the old hoist resistor prominent.

So back where I came in

FBC1 engine was unserviceable and had been sent away for repair so it was thought that the engine from FBC2 could be used in its place and so it was installed into FBC1 crane.

Almost immediately the motor showed symptoms of a serious problem in the form of a huge oil leak in the vicinity of the dynamo drive shaft. This meant that the engine would have to be taken out again and so another plan was hatched with the idea that the crane could be converted to operate from an existing three-phase generator, which could be mounted onto a following flat wagon. So with Stuart's design and with Derry's assistance I joined the project and work commenced.

Now, because the intention was to effectively use what is known as a 'shore supply', the power has to get to the top rotating part of the crane by means of pick-ups from fixed circular rings mounted on the centre post. If this was not done then the supply cable would wrap itself around the centre post after a few rotations. The existing slip rings for the original 480v DC supply could be used, but as this was DC there were only two rings, one too few for the three-phase supply. However, as the motors, which allowed the crane to be self-propelling, had been disconnect because of faults in the system a spare slip-ring was available for the three-phase interface.

While my training back in the 1970s included heavy electrical power including DC motors and three-phase supplies, I had been insulated from this type of work (excuse the pun) by moving to the electronics industry – a somewhat more genteel use of electricity. However, the principles are the same though this project seemed to be more challenging.

The three-phase rectifier was installed on its heat-sink, which in turn was fitted to the crane control box. With the new wiring installed, insulation were tests carried out and an enormous connector fitted to side of the crane into which the new three-phase shore supply cable would connect.

So after several weeks the work was completed. Tony Andrews took up his place in the cab, the three-phase generator was started and the crane controls were moved. The jib went up and down and the hoist (hook) lowered, but when it came to raise the hook again the system faltered. The three-phase generator coughed issued black smoke and then stopped. All controls were put back to neutral and a few checks were carried out and the system tried again with depressingly similar results.

Inside the crane are many large resistor banks arranged in series with the motor supply. As was already well known, these resistors were at an advanced stage of ageing and it was suspected that the insulation was breaking down and causing some of the power to be lost in a short circuit. Just to confirm this, Derry watched the resistor banks as the hoist was being raised and the amount of arcing visible confirmed our worst fears. Probably the new DC supply was not very smooth and possibly with higher voltage peaks this might also be contributing to the problems, but it looked like there was not going to be a quick way to get the crane operational.

A view inside the hoist controller of FBC1.

Back to the drawing board

So was the crane on its last legs? It was decided to push forward to get the original FBC1 engine properly overhauled, including fixing the big-end bearing that had failed, and at the same time have the hoist motor control resistor bank replaced. Getting the engine overhauled was a known quantity, but the resistor replacement was not. It consisted of four banks of metal fins, which combined to give a total series resistance of 20ohms and had to be capable of dissipating over 22kw for up to five minutes. Conversion to thyristor control was considered, but while this seemed initially quite attractive, it would have involved considerable rewiring and the cost was very high. The overall character of the crane would be lost, not to mention the advantage of utilising the spares from the other crane.

However, through Derry's contacts at Stothert and Pitt we were recommended to use a company in Wisbech called TPR, which was one of an ever decreasing number of companies that could still make new resistance banks similar to the type we required.

As it turned out, TPR were quite sympathetic to our need and quoted us £1,700 for a new resistor bank. It would not be to an identical design as the old one and it would be slightly bigger, but it would still fit in the space envelope available when the old resistor bank was removed.

The decision was made and the order was placed with TPR and preparations commenced. At about this time the refurbished No.1 engine became available, but this is when life became complicated, as the SR had no crane to carry out the lift. At this time, Bob Payne's negotiations to procure an Atlas rail-mounted, heavy-duty, hydraulic lifting arm were beginning to bear fruit, but not soon enough. However SR supporters Guppy and Sons offered their assistance to collect the engine from Antells, deliver it to site, lift out No.2 engine and replace it with the refurbished one.

The next stage was to remove the roof over the engine compartment and this, thankfully, was a job familiar to Derry and he duly undertook the task of laboriously removing about 100 nuts and bolts to allow the daylight in. In due course, the refurbished engine arrived and, with assistance from John Stockley from the P-way team, the engines were swiftly swapped over within a day.

Before very long, the engine was fired up and seemed fine except that the battery used to start the engine was not being charged. This appeared to be down to the 12v dynamo.

By now of course I was well and truly sucked into the project. Being an electrical problem I was nominated to work in the very confined space of the engine compartment to dismantle the oil feed system and then remove the Dynamo. Having removed it, peering inside there was an ominous smell and ashen look to it, but we had a spare on the No.2 engine.

Soon, the replacement dynamo was installed, the engine was started and its speed adjusted to give 480v DC from the generator. The new dynamo charged the 12v battery at 13 amps and all looked well.

While all this was going on the resistor manufacturer, TPR, had been busy. Soon the unit arrived to be fitted, but unfortunately while it was relatively easy to remove the four banks of the old resistor through the access hatch, installing the new single piece resistor involved removing half the roof. This task meant another 100-150 bolts for Derry to free-off and extract, but as all this was going on Bob Payne had the Atlas crane inspected and signed-off as fit for use.

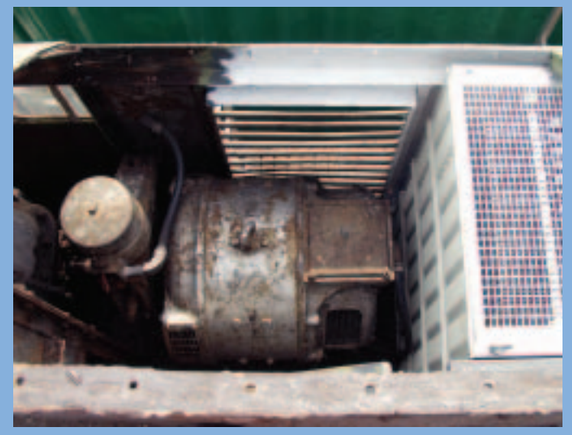
Eventually, FBC1 was ready to accept the new resistor bank and on a pleasant summer's day at Eldon's sidings the Atlas crane, operated by Bob Payne, lifted the unit delicately into place. In the following week, there was a concerted effort to connect up the resistor and replace the roof before the weather turned and within a couple of weeks the crane was up and running, having been out of use for nearly 14 months.

There is still a lot to do to bring the crane back up to its original specification, but I have developed a great respect for it and the work it has done for the SR over the many years that it has operated with minimal maintenance.

A budget has now been prepared so that regular maintenance can be carried out and costs to complete the work of restoring the crane to its original glory have also been prepared.

In the meantime with the No.2 engine removed, it became clear that at some stage during a previous rebuild, the dynamo shaft

FBC1 has received a new hoist resistor and the first roof support has been installed.



The new resistor bank is fitted next to the hoist motor and brake of FBC1.

oil seal flange had not been refitted and hence the reason why there were copious quantities of oil coming out. As it is not known where this flange is, a new one has been drawn-up and will be manufactured soon. Also, following a visit to the Beaulieu autojumble, another dynamo has been obtained along with oil seals, horns and another regulator box, most of which will be held as spares.

The future

Hopefully, the crane will see much use and the huge list of tasks it is required to perform will get done quickly without the need to hire in expensive cranes to do the work. Already, trackwork has been removed from Herston and moved to Motala and a container, which has been hogging the Dolphin wagon, has been off-loaded onto the bank at Herston. Numerous other tasks are also in progress.

Meanwhile, No.2 crane is in very good condition, considering the time it has been laid-up, and it is hoped to also get this operational in due course, although more as a test bed for the spares, so ensuring that the 'big-un' can carry on doing what it does best.

FRASER WHITE

Appeal for assistance

Crane maintenance is an around the year activity and would benefit from the assistance of skilled and non-skilled personnel. If you would like to help, please contact Derry Thompson on site at Norden most Sundays or contact Fraser White on 01202 573081. Also, if you have any updates or corrections concerning this article I would be pleased to hear from you so that the history of the SR cranes can be adequately recorded.

The new resistor bank for FBC1 is lifted by the Atlas rail-mounted, heavy-duty, hydraulic lifting arm at Eldon's sidings.