ESKDALE CORN MILL
MACHINERY REPAIR EVALUATION

July 2019

OVERVIEW

1. Project Background and Description

The Eskdale Mill & Heritage Trust has raised almost £1 million to support the conservation project at Eskdale Mill. The work includes the renovation of the Mill building and associated cottage, internal corn milling machinery repairs and improved visitor access, facilities and interpretation. This is a brief evaluation, reporting on the work by the specialist millwrights tasked with the machinery repairs to the mill.

2. Project Scope

Janes Ltd, Traditional Millwrights, were appointed to carry out the repair, restoration and conservation of the historic corn milling machinery at Eskdale Watermill. Work included, but was not limited to:

- Restoring the upper waterwheel
- Millstone and millstone furniture renovation
- Sack hoist restoration and line shaft reinstatement
- Grain cleaning and lifting equipment
- Restore the lower waterwheel and axle after 80+ years of being dormant

The work will aim to showcase the unique elements of the historic machinery and bring them to fully working state so they can be safely demonstrated to the public, allowing a new generation of operators to learn the skills in running and maintaining the large but intricate machinery.

<u>The following is a brief record of the works carried out by Janes Millwrights between August 2018 and June 2019, as part of the restoration of Eskdale Mill.</u>

1. Upstream Waterwheel

Works completed: Replace the bronze wheelshaft bearings. Replace six cast iron shrouds. Replace the sole boards, backboards and paddles with larch. Replace the oak spokes. Forge new iron fixings.

The upstream waterwheel has been completed to a high standard and to enable its continued use has had some new shroud plates cast from iron to replace brittle parts that could have failed over time. These parts will blend in very well and have a subtle date mark cast onto them. The new larch wood fits perfectly and the wheel works well.

2. Downstream Waterwheel

Works completed: Replace the sole boards, backboards and paddles with larch. Replace the oak wedges securing the wheel to the shaft. Supply new inner and outer bearing caps.

The repair to the lower waterwheel is fantastic and to a very high standard. This wheel has not been properly used for a century but is now visually and mechanically stunning.

3. Launder

Works completed: Rebuild and adapt the water controls in the launder and install supports and details (launder constructed by a separate contractor).

The new larch wood launder (above) was much needed and completed to a good standard and used a design tried and tested to overcome some shortfalls of the previous launder installed by Cumbria County Council over 3 decades ago. It now provides water to both working waterwheels with a new sluice gate arrangement designed to provide safe use of the machinery by staff and volunteers.

Janes Ltd, Millwrights made the necessary improvements to the new sluice gate arrangement. Their expertise and experience were put to good use once the renovated machinery was turning and they saw some changes were necessary. Above picture shows how they manufactured a sluice gate lever peg board from old parts of the waterwheel castings to give the operator accurate control of the water flow, again to a high standard.

3. Upstream Machinery

Works completed: Raise the runner stone and clean the stones. Replace the timber bearings in the bed stone. Repair the kiln chute and hopper. Repair the tun and shoe. Re-construct the millstone furniture. Install a new crook string. Overhaul the stone drive. Supply and fit new hornbeam cogs in the stone nut. Refix the stone drive disengaging arm. Overhaul the bridge box. Re-wedge the bridge tree.

To a first time visitor, the machinery of the upstream part of the mill may not look like it has had a lot of work done to it. But that is part of the point of the millwright's work. It retains the charm that made this mill special, but it is now very clean, safe and functional and had lots of work sympathetically carried out.
In addition to the mechanical and wooden parts overhauled are the additions of battens across the tun case above the rotating millstone. I suggested this to provide an extra potential safety barrier as it is expected more volunteers of different ages and abilities to be trained to run the mill.

Pictured above is a re-cogged stone nut and re-instated disengagement lever with new wooden bearings hidden above inside the bedstone.

4. Downstream Machinery

Works completed: Level, repair and re-dress the millstones. Replace the timber bearings in the bed stone. Repair, rebuild and fit the pit wheel. Replace a section of the curb around the millstone. Rework the new bridge tree. Refit the stone bearing in the new bridge tree (bridge tree supplied by the Main Contractor). Re-construct the stone drive. Supply and fit new hornbeam cogs in the stone nut. Re-wedge the bridge tree. Refit the runner stone. Repair the tun, horse, hopper and damsel. Construct a new shoe. Install a new crook string.

The machinery to the downstream part of the mill building has undergone major refurbishment. Parts of the machinery that were with the mill but not in place when restoration started were found to not fit. After 40 years of thinking these were from this mill some of them may have been salvaged from other nearby mills as they closed. We know that the downstream machinery hasn't operated since the 1930's and may have needed new parts. The millwrights came across issues with the mis-matched parts but made a suitable plan to adapt them and spent the extra time to make them work flawlessly.
Pictured above is a rare stone foot bearing supporting the millstone spindle. It is fitted into a new bridge tree that the main site contractor supplied and finished off by the millwrights to make it fit in with the ancient woodwork surrounding it.

Above and below are details of the re-built tun casing and mill furniture that provides an opportunity for the milling process to be demonstrated and is designed to be cleaned out to negate the risk of contamination by rodents or insects.

5. Jog-Scry

Works completed: Clean and repair the jog scry. Repair the support rods and eyes. Reinstate the drive belt.

The millwrights have showed their multi-skilled talents by producing replacement iron mongery to match the traditional fixtures and fittings on the jog scry. The parts cannot be bought new and have to be hand made specifically for this setup. It is now in working order and will operate when the millstones are turned and can be easily viewed and heard by the visitor.

6. Sack Hoist

Works completed: Replace the wedges securing the drive drum to the wheelshaft. Overhaul the sack hoist components. Supply and fit a new drive chain. Replace the operating cord and sack rope. Provide new hardwood toggles.

Again, work is finished to a high standard but not at first obvious to the eye, the sack hoist is now safe and secure with new rope and chain, whilst new wooden wedges secure it to the waterwheel shaft. The sack hoist is sure to be a popular feature as it can be demonstrated live to the public pulling sacks of grain through the trap doors in the floor.

7. Layshaft driven by upstream pit wheel

Works completed: Overhaul the components. Machine a new shaft. Cast a new bearing cap and upper bearing. Re-cog the drive gear. Reinstate the layshaft.

Work undertaken here was beyond what that of the planned outcome. Additional spending was needed to complete a satisfactory job and close inspection show some existing components had suffered with the long period they had been left unused and un-loved on the mill floor. This included new bronze bearings being cast and a new metal drive shaft been fabricated. However, they have provided and new authentic working feature to the mill for visitors to see and ties in with the item below.

8. Overhead layshaft

Works completed: Splice a new section of timber into the shaft. Supply and fit a reclaimed journal. Make and fit a new collar. Refit the layshaft in the bearings and reinstate the layshaft drive.

Now a live working part of the mill, the millwrights have demonstrated their capable skills in woodwork and engineering to provide a overhead layshaft belt driven from the waterwheel.

9. Dressing Machine

Clean and repair the dressing machine on the ground floor.

The dressing machine has been thoroughly cleaned and the woodwork made secure whilst the bearings have been cleaned and lubricated. Originally expected to have a new drive belt system turning this, again we have been unfortunate to find the parts of the mill thought to be original and just need refitting were not up to the task. Some could not be refitted without extensive alterations as parts of the mill have changed over the past 80 years as the use of the mill changed from grinding locally grown oats to generating electricity and then to a museum. However, this could be a task undertaken in the future should funds allow and the current situation gives the opportunity for the machinery to be turned by the hand of the miller.

Summary round up

Overall I, as the writer and adviser for the mill machinery, am greatly pleased with the outcome of the millwright work. Janes Ltd have shown their highly demanded skills were put into practice within this mill in everything they did. Their attention to detail is too much to explain here in writing and their commitment unwavering. I look forward to seeing many visitors pack the mill and enjoy the experience their work will give.

Thank you to the National Lottery Heritage Fund, Eskdale Mill Heritage Trust and the many donors and supporters for the opportunity to work on this project as part of a widely skilled and passionate team.

Stuart Hobbs July 2019