



Re – Setting of Pit Wheel

at

Eling Tide Mill

Winter 2022/2023

Work carried out by Miller and Volunteer Millers after conversations with Ian Clark Restorations.

During 2022, it was found that the pit wheel was moving on the waterwheel axle after having lost a number of locking wedges. The wheel had been installed new in 2012. The Miller deemed that the movement in the wheel was detrimental to the safe operation of the Mill and called a halt to the running of the Mill whilst investigations took place. On review it was decided to re-set the pit wheel.

In 2018 the pit wheel had also become loose. A remedial arrangement of wedges and angle iron was used to stabilise the wheel on its axle

It was decided by the Miller that a better arrangement of fixing was required. Consequently the decision was made to take the pit wheel back to an 'as new' fitment that would secure the pit wheel until it needed to be removed or replaced at some future time.

There had been a wedge and angle iron arrangement put in around 2018 to stabilise the pit wheel. Angle iron has been used to 'square up' the hexagonal axle. The angle iron was welded to the axle and to the wedges. A set of twelve wedges have been used across the flats, three to each flat, plus a mix of wedges in the corners. On closer examination, however it was found that up to five wedges had been welded on top of each other. This fix did not work as throughout 2021 /22 the wedges were working loose on the east side. A temporary clamp bracket was installed in 2022 to stop the wedges from moving the angle iron retainers that were part bolted and part welded to the angle iron and welded to the axle. This worked for a short time until more internal wedges began moving.

In November 2022 work started to remove the angle iron in order to replace the wedges and reset the wheel. The method used was to involve mild steel spacers being used to 'square up' the hexagonal axle. These spacers would be held in place by two sets of folding wedges on each flat of

the square. These new wedges would be of a larger size to enable the folding wedges to work correctly

During November 2022 work was carried out to facilitate removal of the angle in order to take measurement for the manufacture of new spacers and wedges.

On the 18th November the removal of the earlier repair angle iron began. It is believed that this axle dates back to the 1890's and was not replaced when the water wheel was rebuilt in the 1970's. These thoughts are from observations of the axle as no notes from the 1970's rebuild of the wheel were available at the time.

Initial clean-up of the axle was completed on the 2nd December. Some minor damage had occurred during the welding process but it should not affect functionality of the axle.

The wedges and spacers were ordered from a local engineering company to sketches produced by the miller

On December 15th, one side of wedges were removed from the pit wheel. It was found that some of the wedges had been tack welded to each other, as well as the axle and the spacer / angle that is running through the hub of the wheel.

Spacers and Wedges were delivered to schedule and work commenced to fit these on Monday 16th January 2023.

Once it was tried to remove the old spacer from the axle, it was found that the spacers had been welded to the axle. As far as I was able to tell these spacers are welded fully along their length and were most probably fitted before the wheel was fitted. The angle iron spacers therefore could only be removed by removing the pit wheel. I decided not to remove these spacers at this time. We will have to carry out work on adjacent supports in the near future which will mean that the pit wheel will have to be removed, or at least moved. As the angle spacers are corroding and are not really suitable for the long term, removal will happen at this time.

We continued grinding the welds off the old wedges. We found that there were up to 5 wedges on top of each other, some with small blocks of steel below them, all welded together. These were also welded to the angle iron spacers and the main axle.

The Axle is not centrally through the hub of the wheel which is tipped slightly on the hexagonal of the axle. In order to centre up the axle I turned the wheel through 180 degrees and took the second side of wedges out. I was then able to centralise the shaft with the use of crow bars, but could not eliminate the slight twist of the hub.

Four sets of new wedges were positioned and tapped up firm, but not driven home

After a break due to unhelpful tides work resumed on Monday 30th January. The wheel was turned through 90 degrees and the old wedges removed. Two new sets were installed and the wheel turned to grant access to the last set. Again, the old wedges were removed and the new placed in position and tapped up. The wheel was now ready for alignment.

Alignment was initially done by eye, then with use of a spirit level and measuring off from the wall. Care was taken on the meshing depth of the wallower and the pit wheel. Adjustment was made by loosening wedges and repositioning them. The wheel was then turned by hand to check on the alignment. Once correct, the wedges were driven home with a copper mallet.

The following day we moved to powered trials. With a small high tide at 3.7-m we lifted the sluice gate at a head of 1.2m. The wheel began to turn smoothly with no adverse noise or vibration. On observation the wheel appeared to be running fairly true, with none of the wallower teeth bottoming out on the pit wheel. The wheel was run for approximately one hour at various speeds between half and full milling rate. The faster speeds were not planned but occurred as the tide fell. After shutting the sluice gate. I checked the tightness of the wedges by tapping with the mallet. All appeared tight and no movement was detected. Consequently, the trial was deemed a success.

The mill has subsequently run again and resumed milling operations.



Figure 1 Work Under way



Figure 2 Job Completed. Wedges left log pending future repair work to adjacent structure

Pete Ramm

Miller

Eling Tide Mill