



Friends of
Windmill Hill Windmill
Newsletter

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Re-cogging the brake-wheel at the windmill at Windmill Hill

It was 2017. The milling machinery of the windmill at Windmill Hill had been restored and the team was beginning to get to grips with milling. Suddenly there was a tremendous vibration and cogs were chipping and braking. Once the mill was stopped it became apparent that the brake-wheel had vibrated along the wind-shaft and disengaged itself from the stone-nut.

The wedges that hold the brake-wheel to the wind-shaft appeared to be tight so why had the brake-wheel moved? The problem was not instantly identifiable, until it was spotted that there was a gap between the thin end of the wedge and the brake-wheel canister. On closer inspection we discovered that the wedges were only holding

by no more than 33%, if that! New wedges were made and fitted.

The next task was to address the shape of the cogs. These cogs had been made and fitted during the first phase of the restoration of the windmill and (to be fair) at that time it was not envisaged that the windmill might become operational. Now, there was only one solution. Every one of the 104 cogs would have to be replaced.

Initially we thought that the new cogs might be made in a CNC machine but, as we removed the old cogs, it quickly became apparent that this would not work — and that this was going to be a longer task than we had anticipated. The reason being that the mortises were hand cut and so all totally different. Each of the tenons on the 104 cogs would have to be separately cut to fit each individual mortise.

'Windmills and Millwrighting' by Stanley Freese suggested that the job would take an experienced team (working full-time) about three weeks

top left: Cog coming out of mesh.

bottom left: Marking the upper/inner profile.

below: Shaping the cogs for the leading and following angles.





*top: Checking the centres & spacing.
right: Profiling the outer face.*



to complete. We were a team of nine volunteers able to work on the mill for half a day a week (although some extra time was put in subject to availability). What's more, the work would usually be done in a workshop while the brake-wheel was lying in a horizontal position – but we had to install all the roughs with the brake-wheel in situ. This was very time consuming because of the need to periodically turn the brake-wheel by hand. It would be a long job!

For each cog, we started with a blank that had been roughly shaped. To ensure a tight fit, each tenon had to be shaped individually to fit each individual mortise, (75% by sander and 25% by hand) and individually identified by a number. The fit was continually tested by knocking the cog in from the front, with a second person behind knocking them back out, until the cog goes home with a nice tight fit.

Once all 104 cogs were fitted it was necessary to find the centres. Again, this normally would have been done while the brake-wheel was horizontal in the workshop by walking round all 104 cogs with calipers to ensure that, when cog number 1 meets cog number 104, the centres are within an acceptable tolerance of 2 or 3mm. With the brake-wheel in situ, this was more complicated because it involved

turning the brake-wheel by hand and running around in sections.

After having re-checked a couple of times, we profiled six cogs to run through the stone-nut to check that the run-in and out were satisfactory. Once we were happy, templates were produced.

All cogs had been successfully replaced by the end of August 2018. The final test was to run the cog through the stone-nut by wind-power. This was 95% successful with the shape of just one or two cogs needing to be tweaked with a rasp.

At last, the team could start (again) to commission the machinery and become millers.

comparison between the new and original 100 year old cogs



National Mills Weekend 2019 Sunday 12th May

The theme of National Mills Weekend is 'our mill, its history in pictures', so we will have an exhibition of photographs in the windmill. Visit us between 11:00 and 4:30pm – stalls, tours, music, stationary engines, teas, cakes, BBQ.

Special Evening Opening for Friends of the Windmill Wednesday 26th June

All Friends of the Windmill Hill Windmill are invited to a special open evening from 7 – 9pm on Wednesday 26th June. Enjoy an exclusive evening tour of the windmill followed by a glass of wine in the roundhouse. We look forward to seeing you.

Front cover photo:

The Mill in summer,
Adrian Gates

100 club prize draw *The recent prizewinners:*

August 2018	October 2018	December 2018	February 2019
1st Brian Holdstock	1st Alan Mead	1st Paul Frost	1st Ursula Beeny
2nd Rhys Clatworthy	2nd Shirley Price	2nd Ray & Sylvia Burlton	2nd June Axon
3rd Shirley Price	3rd John Bishop	3rd Marian Harding	3rd Brian Holdstock

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We now have a VirginMoneyGiving page so that donations can be made on-line. <https://uk.virginmoneygiving.com/charity-web/charity/finalCharityHomepage.action?uniqueVmgCharityUrl=windmillhillwindmill>

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