Individual Reflection:

- ILO1: I met this ILO as before starting any work on the project with my group, we all discussed what we would like the machine to do, we assessed the problem and based the machine specifications on this. I then helped my group write the PDS that encapsulated all these desired/required features of the machine design.
- ILO2: I achieved this ILO as me and my group each created several initial concepts and ideas for the machine using the “Crazy Eights” method. Once we all had eight ideas, as a group we together voted for a few that were realistic and would more obviously meet the PDS and the design driver of speed. Once we reduced the number of concepts that we had to the better ideas, we then used a Pugh’s comparison matrix to compare the remaining ideas and decide on the idea we wanted to take forward based on how each compared to each other while referencing the PDS
- ILO3: I achieved this ILO as when I wrote the discussion section for the group report, I wrote the comparisons for different manufacturing processes when creating the base plate for the cart. I also achieved this ILO during the creation of the machine when I was designing the frame which the gears sat into and 3D printing it after I compared the feasibility of other manufacturing processes in the creation of this piece.
- ILO4: I obtained this ILO as I worked on the gear train for the traversing mechanism that drove the cart that sat on the structure of the crane across the length of the table. I also integrated nautilus gears into the gear train which resulted in the rest of the gear train having to be designed to give the minimum torque while one revolution of the nautilus gears rotated the wheels exactly enough times that resulted in the cart traversing the table. This required calculations for the gear train and understanding of why introducing nautilus gears could be beneficial in the context of the speed design driver.
- ILO5: I reached this ILO as during the construction of the main structure of the gantry crane, I helped my team build it using maker beams which used brackets and M3 nuts to fasten all the parts together. I also can work with mechanisms as most of my work on the project was on the traversing mechanism of the cart on the gantry crane in which I worked on and designed the gear train that drove the cart forward.
- ILO6: I achieved this ILO as for the group report I wrote the discussion section which included points on things that were affecting the environmental impact of the machine.

I believe overall me and my team worked quite well together. At the start of the project, we all signed a team charter that agreed on the way individuals would act in the team. For the most part I believe we stuck to the charter, doing things like ensuring work was

done on time and letting the team know if a member would be absent for a meeting. We also organised our work and tasks quite well by; having a WhatsApp group chat for clear and easy communication, dividing the work on each subsystem to individual members and by having a shared google drive document that we all put our work into if it wasn't already in the WhatsApp group.

However, I think some things could've been improved within the team, I believe we all took too much time in the prototyping stage and could've organised our time better. The absence of this resulted in us still prototyping during build week and evidentially led to us not having enough time to fix problems that came up with the machine during build week, resulting in the machine not working. I think everyone, on the team, including myself, got very fixated on the idea of using Lego joints/bores, which resulted in us using a lot of Lego parts. In the final machine, the Lego pieces caused a lot of issues: gears were un-meshing, and the Lego axel through the wheel bent too much, if we weren't so fixed on the idea of using Lego connectors, then perhaps we would've used other materials – completely preventing the critical issues that arose from this. The critical issue with the machine was that the gear connected to the motor kept un-meshing from the rest of the gear train, which caused it to stop moving. I believe if we made it so that the motor was slightly closer to the gear train and that it was more rigid, as well as not using Lego gears then we would've avoided the issue.

Personally, I think I worked well with my team and on the project itself. I think I could've made more of an effort to get my team mates to help whenever I got struck, rather than getting arrogant and trying to fix issues all by myself. I feel that this also made it so sometimes when my teammates had less work to do, it stayed like that, instead of delegating some tasks to them and making the most of my team as a resource. This likely also contributed to our timing issue.

For future projects, I will ensure that I don't get so fixed on ideas even while I'm working on one to allow myself the ability to pivot in a direction that is best for the project, I'll do this by consistently asking myself "is this the best thing to do right now? Or is there another path?". I'll also make sure that I create and follow strict deadlines with extra time for stages where issues may arise (prototyping and final building for example) during the project and try to establish them with the team so that they follow it also. I will also make sure that I ask for help from my team when I begin to struggle/get stuck on problems and utilise my team as a resource to their fullest ability. I will have to make sure that I don't overuse them and push them past their limits.