Why do my gears skip?

By Shaun of VRC 7682 - Wingus & Dingus

For the RECF Team Educational Video we decided to address the issue of gear skipping which can result in damaged parts, lost matches and repair time you probably don’t have before your next match. Newer teams may be oblivious to the real cause of the problem and just de-rate their lifting mechanism so the gears don’t skip anymore.

Gears are used to transmit rotational motion and also change speed/torque to suit what the mechanism needs. In VEX we have standard gears and high strength gears but both of them are subject to the same skipping problem we are highlighting in this educational video. You might think using high strength gears will fix a gear skipping problem but actually this is unlikely. They will fix a gear breakage problem for sure since they are so much stronger but they’ll probably still skip if that was your original problem.

One important thing we learnt during our first few scrimmages were how weak VEX axles are. They seem to be made from steel but not high strength steel which means they can bend quite easily. Like any part the longer it is the easier it is to bend so keeping your axle lengths to a minimum is super important even when difficult to achieve. Our educational video shows an extreme case with way too much space between the axle supports but this helps highlight what is actually happening.

Unknowingly we explored the limits of lifting using just 1 axle with an early robot lift design and although it could lift 18 sacks, mainly because we made sure the axle supports were very close together, it still ended up skipping gears when overloaded. You can check if an axle is bent by placing it on a flat surface such as a steel ruler and pressing down on 1 end (see demo in our video). Our solution to this was to add more axles and lift arms so the load was spread and that way we could easily lift > 25 sacks and at our last event didn’t need any repairs at all.

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| **Narrowly spaced axle supports** | **Widely spaced axle support** |
| * Only minimal axle bending under load * Can take more load and stalls motor before skipping gears | * Axles bend like bananas! * When under high load the gears skip well before the motor stalls. |

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