

RECF Team Educational Video

TecnoBots Team 2263B

Middle School: Hogar Colegio La Milagrosa, Arecibo, Puerto Rico

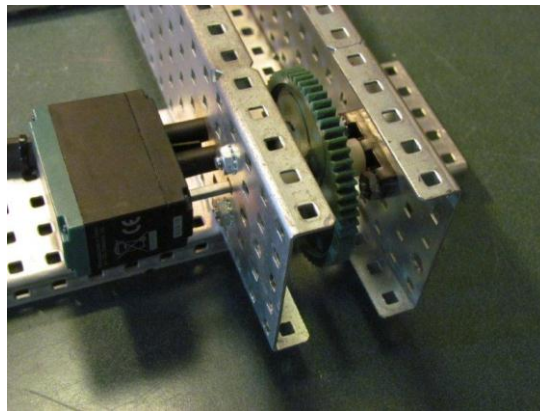
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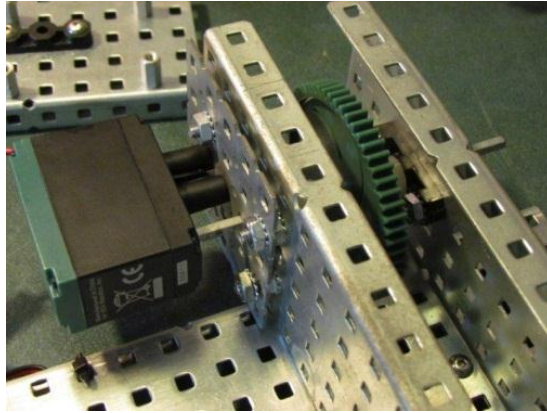
Quick-Change Motor Mechanism

This presentation will show how to construct a mechanism that will help you change motors without having to disassemble critical parts of your robot. This will save you time and avoid problems in case you need to replace a defective motor in competition between matches.

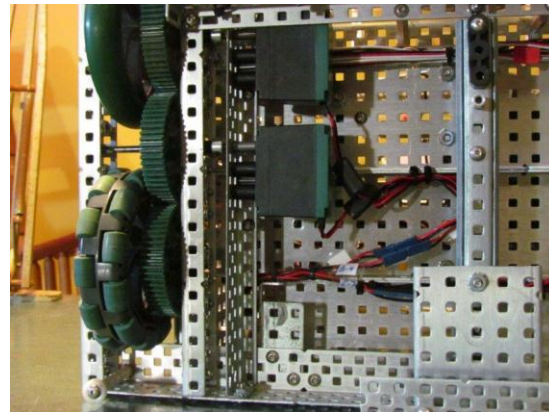
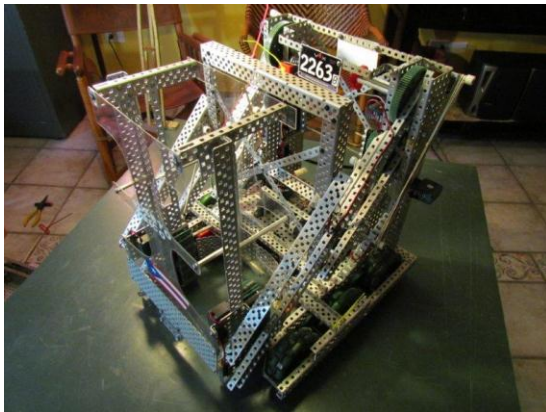
We have constructed a mock-up showing on this side a typical motor attached to the chassis with one gear and axis. The 2-wire cable will also be attached to the chassis. In the event of a motor failure, you will need to remove this side of the chassis, remove the gear and remove the tie wraps of the cable in order to remove and replace the motor.



With a chassis or fixture, you can attach the motor to it. You can use screws as studs or standoffs. You will also attach a 2-wire cable extension from the micro controller up next to the motor. Then, if you need to remove and replace the motor, you just need to remove the hex nuts holding the chassis, remove one tie wrap holding the 2-wire cable and you will then have access to change the motor. All the remaining components of your assembly remain untouched. Have another motor attached to a spare chassis to speed up the process.



This concept can be seen on our robot. You can see that the wheels and transmission is assembled and that the motors are attached to a chassis. In the event of a motor failure we only need to remove these three screws, remove the tie wraps holding the cables and the motors can be easily removed. All the remaining assembly, gears, axis and wheels remain untouched. Reverse the steps with your spare chassis and you will be back in the competition in no time.



Background: This concept was learned from Single Minute Exchange of Die, which is also known as Quick-Changeover and has been in use by the manufacturing industry for quite some time. The definition and its concept is explained in Wikipedia:

“SMED is one of the many lean production methods for reducing waste in a manufacturing process. It provides a rapid and efficient way of converting a manufacturing process from running the current product to running the next product. This rapid changeover is key to reducing production lot sizes and thereby improving flow.” (1)

Our mentor noticed that when we needed to change a motor it was taking too much time and he then challenged us to think of a way to reduce the time for the change of the motor. Now, whenever we are designing a mechanism, we are also thinking on how we will repair it (and how to make the changeover faster) in case something is damaged in the field.

1. Reference: http://en.wikipedia.org/wiki/Single-Minute_Exchange_of_Die