Wheel research

Traction vs friction:

* Maximum friction possible between two materials is by using the same material for the wheels.
* Traction is different, having teeth on the wheel or having a soft material that squishes into the floor can increase traction

Two options: purchasing vs manufacturing in house.

Sumobot guy: <https://miscircuitos.com/how-to-cast-sumo-wheels-handmade/>

* Prefers custom silicone sumo wheels
* Sumo competition rules say wheels cant be too sticky: illegal if a piece of paper sticks to the wheel when it is driven over (normally)
* Softer wheels gives more traction but too little is too sticky and wears easily. ShoreA hardness between 20~30 is best, he likes [**VytaFlex**](https://www.smooth-on.com/)**20 Urethane Rubber**.
  + Can test traction using traction meter: <http://brooksbots.com/Exert-O'Meter.html>
* He makes his own wheel hub out of aluminum. Increasing surface area increases traction, larger radius and greater width is better. But we have to mind the torque decrease with wheel radius.
* Clean wheels with alcohol before races because dust getting on the wheels reduces traction.

From looking online, it seems like the sumo robot meta has settled on flat silicone tires being the best. I don’t think teeth would be better than making wheels ourselves.

**Options:**

Aluminum core silicone wheel -shore hardness 20. $12.95

<https://www.robotshop.com/products/js2622-aluminum-silicone-wheel-pair-26mm-diameter>

* Can be pretty easily made in house but not sure if it will be cheaper to manufacture or purchase

35x30mm robot wheel pair 64shore hardness. $26.5: <https://www.robotshop.com/products/jsumo-robot-wheel-35x30mm-pair-js3530>

* Harder tire, which makes it more durable. More expensive though.

Neoprene foam tire. 5.35$: <https://www.robotshop.com/products/lynxmotion-neoprene-foam-tire-nft-05>

* advantage is it squishes a lot so you get a large surface area.
* Can cover in latex to further increase wheel traction.

<https://www.jsumo.com/wheels-> manufacturer of sumo wheels.

**Manufacturing:**

* Can try casting the wheel on a metal file or sandpaper to increase the traction of the wheels.

Graphical user interface

Description automatically generated

**GECKO TAPE:**

* the worry is whether this works on rubber, or if dust on the wheels will affect the behaviour
* Can first cast a flat strip of gecko tape on the diffraction grating. Then can line this on the rim of the wheel and the remainder of the wheel
* Other option is to line the mold with the diffraction grating and casting the gecko pattern directly on the wheel.

**Manufacturing:**

Diffraction grating sheet 1ftx 6 in 1000 lines/mm. 11.19$

<https://www.amazon.com/Lines-Linear-Diffraction-Grating-Sheet/dp/B08Z7K3DDD?source=ps-sl-shoppingads-lpcontext&ref_=fplfs&psc=1&smid=A16HFTI7QCGYOB&region_id=373786>

[500 line diffraction grating;](https://www.amazon.com/Lines-Diffraction-Grating-Single-Linear/dp/B08Z6ZFF66/ref=sr_1_6?keywords=diffraction+grating+sheet&qid=1675790655&s=industrial&sprefix=diffra%2Cindustrial%2C77&sr=1-6)

Other option is casting it on a CD.

Or can cast it onto a microfilter. <https://www.amazon.com/AeroPress-Replacement-Filters-Pack-Microfilters/dp/B005UPSLX8/ref=sr_1_2?keywords=Microfilter&qid=1675791632&sr=8-2>

Wedge shaped gecko tape paper by Stanford: <http://bdml.stanford.edu/uploads/Main/Publications/DayPreprint2013.pdf>

* made using a cnc milling machine cutting a block of wax using a blade angled at 60 degrees.
* Silicone is then cast into the wax.
* This method is beyond us though…

Sticky gel tape? <https://www.amazon.com/Reusable-Removable-Washable-Traceless-Clear-16-5ft/dp/B07VHB291T/ref=sr_1_4?crid=3O9BDI8K2HOGT&keywords=gecko+tape&qid=1675791803&s=industrial&sprefix=gecko+tape%2Cindustrial%2C77&sr=1-4>