Clutch Group Final Project

By Aynslie, Emily, Hala, Zane

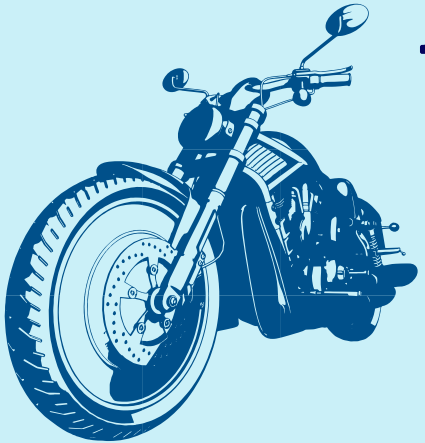


Table of continents

What is a clutch?

- Disconnects the engine from the gearbox.
- Allows for the changing of gears without stopping the engine.
- Consists of an outer basket, the inner hub, friction and steel plates, springs.

Exploded view of a clutch

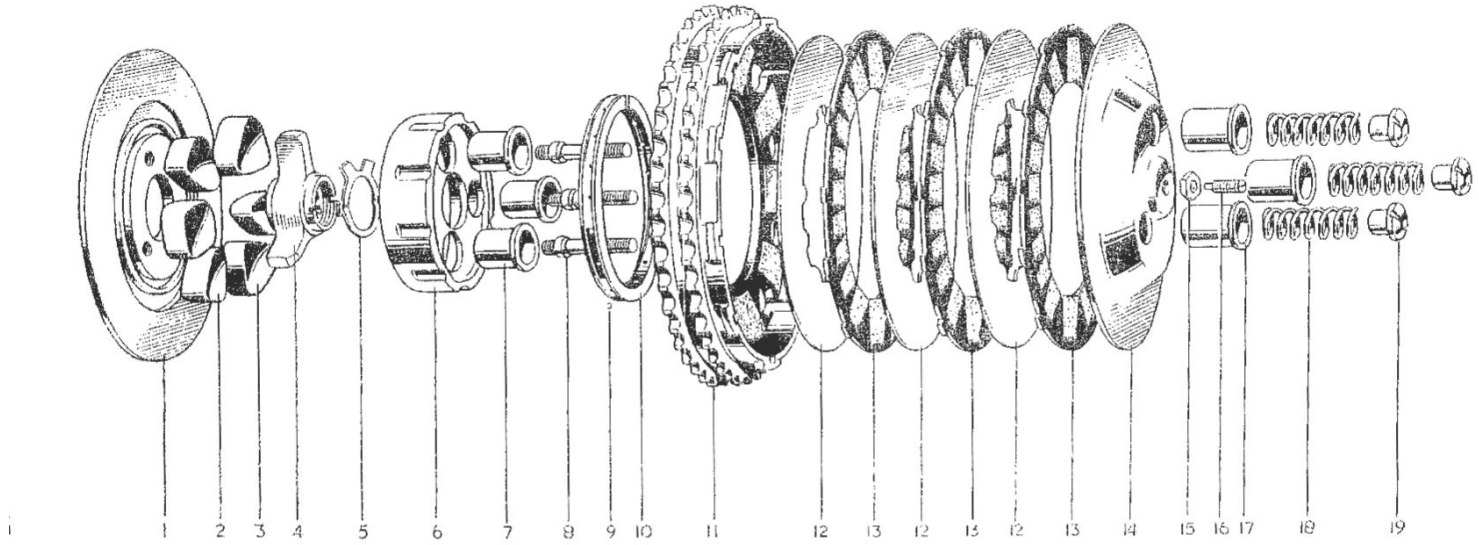
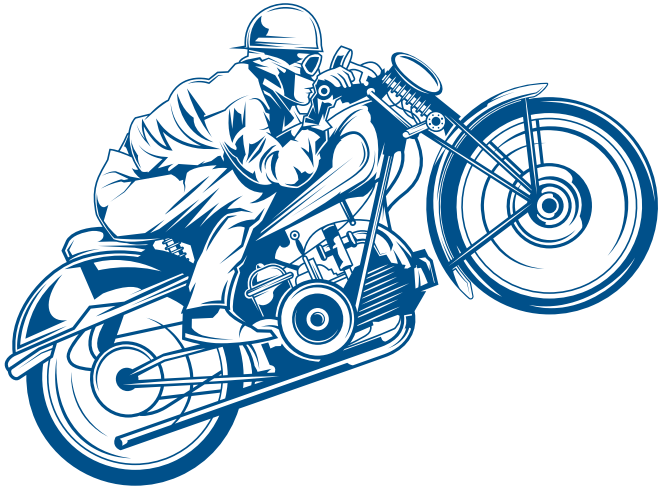


FIG. 3. CLUTCH AND SHOCK ABSORBER UNIT.

How does it work?

Mechanical Advantage

- The amount of force applied to the clutch lever versus the force exerted on the clutch pressure plate.
- MA in the clutch allows the user to put in less work resulting in a large output.
- The mechanical advantage is used to squeeze friction discs (one or several) together to transmit torque.

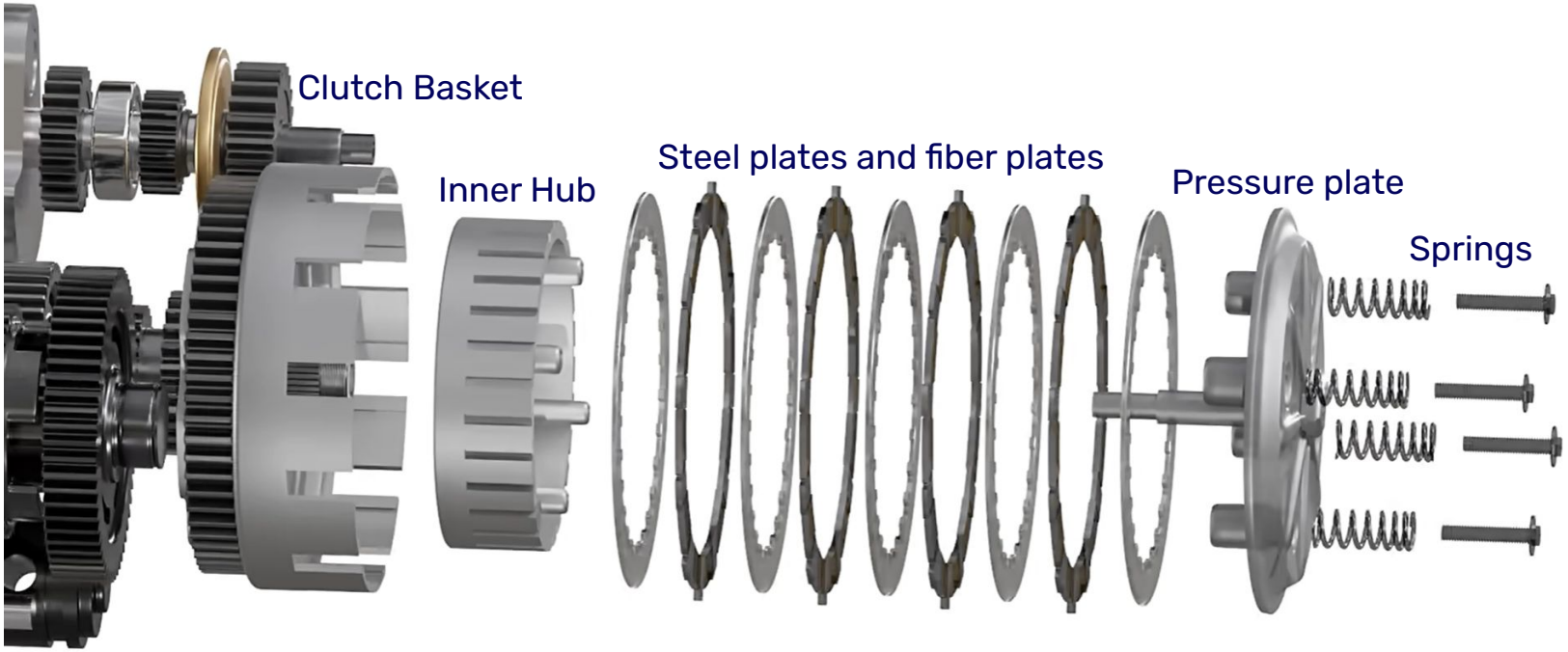


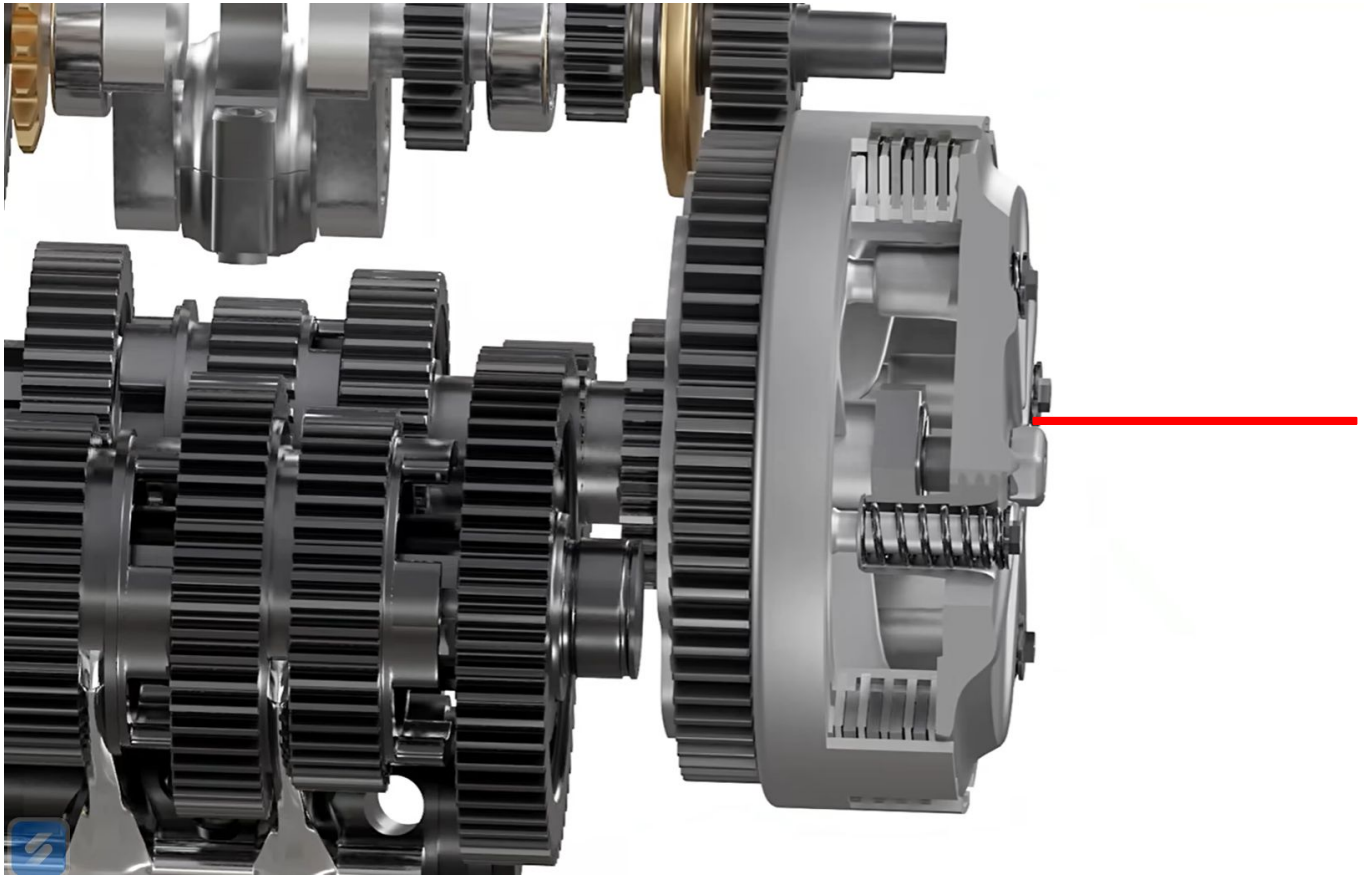
Law of Friction

- Amonton’s laws & Coulomb's law
- Frictional force is directly proportional to the normal load
- $f = \mu * N$
- Static friction f_s
- Kinetic friction f_k

Friction in a clutch

- Clutch basket & Inner hub
- Plates: friction & steel
- Pressure plate & springs
- Pressure → normal load → high friction
- Locked plates = static friction
- Sliding plates = kinetic friction


Clutch Basket
Inner Hub
Steel plates and fiber plates
Pressure plate
Springs



Issues with our motorcycle

Slipping

The motorcycle had trouble started because the clutch disc would not fully engage with the flywheel.

Pitted plates

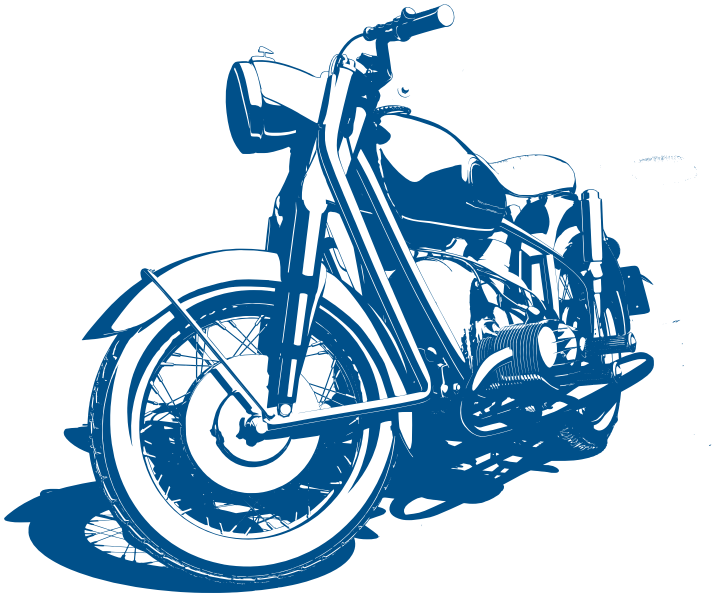
The clutch plates had been warped by heat. Some were slightly bent and/or pitted, causing problems with friction.

Clutch stop

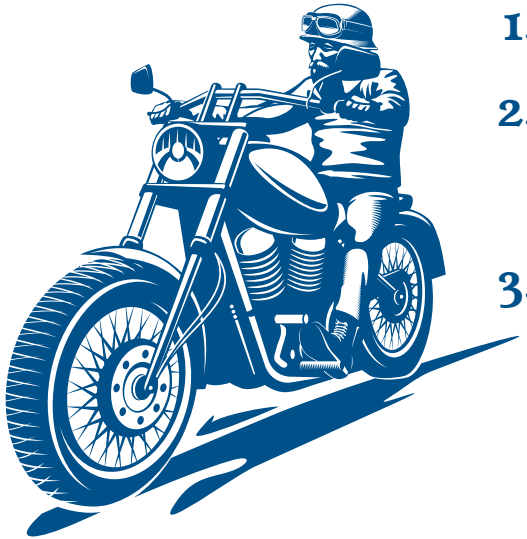
The previous owner had 3D-printed a piece that created tension in the clutch table. We had to engineer a new one from scratch.

How did we approach the issues?

1. Review *Tiger Cub Bible*
2. Grind down plates… failure…
3. Refurbished old plates
4. Re-assembled the clutch… the plates fell out
5. Springs with specific tool and lever
6. Multiple attempts with plates falling out

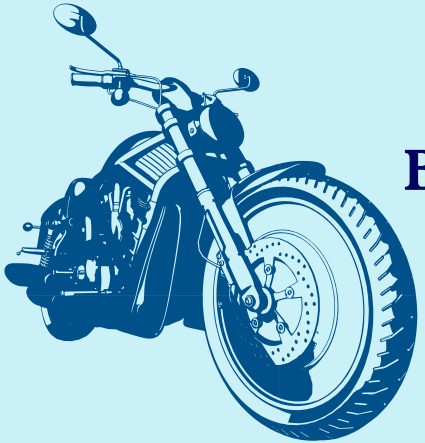


Final Results



1. The motorcycle can start.
2. It is hard to stop it because the clutch has trouble disengaging.
3. The clutch cable is probably either too tight or too free. Next steps would be adjusting the slack.

Thanks!



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Thank you Prof. Littman and John, Ford and Raj, and everyone in the class!

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Works cited

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