Fasteners, Gaskets, and Carburetor Team!

Jim and Micah
Why are fasteners important? 
Consider this:

Picture yourself in a grand theatre. You are seated in a sumptuously comfortable red velvet chair. You are dressed to the nines in fine evening wear. You look to your left; seated next to you is your date, who looks absolutely stunning. You settle in, relax, and spend the next two hours of your life taking in a magnificent performance. There are actors, dancers, singers, musicians. It’s all quite grande. But, in a moment of big picture consideration, you realize that none of what you just saw would have been possible without the hard working men and women that designed the costumes, built the sets, did the makeup, and perfected the lighting. These people are the heart and soul of the performance; they hold it all together. Likewise, the fasteners are the heart and soul of the motorcycle.
Section 1: Fasteners

“a hardware device that mechanically joins or affixes two or more objects together.”
Fastener Buzz Words!

**Whitworth:**
- created by Joseph Whitworth in 1841
- first national screw thread standard
- before it, the only standardization was from individuals and companies

**Thread Count**
- number of threads per inch, measured along the length of any fastener with threads

**Stud**
- A headless fastener that is threaded on the outside

**Spacer**
- Create space to properly position two fasteners (used to mount oil tank)

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<table>
<thead>
<tr>
<th>Whitworth size (in)</th>
<th>Core diameter (in)</th>
<th>Threads per inch</th>
<th>Pitch (in)</th>
<th>Tapping drill size</th>
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<tr>
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Graph from Wikipedia

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Some Fastener Properties

**Toughness:**
- a material’s ability to absorb impact or shock loading

**Torsional Strength:**
- Torsional strength is a load usually expressed in terms of torque, at which the fastener fails by being twisted off about its axis.

**Fatigue Strength:**
- maximum stress a fastener can withstand for a specified number of repeated cycles prior to its failure.

**Common Materials:**
- The vast majority of fasteners (and all of the ones we used) use carbon steel because it is strong and relatively inexpensive. Stainless steel and alloy steel are also used.
What’s an insert?

Aka threaded bushing, an insert is a fastener element that is inserted into an object to add a threaded hole.

Why would you need an insert?

When the threads of a hole are stripped (or never existed in the first place) an insert can be used to make the hole useable again.

How is an insert installed?

To install an insert, simply partially thread through a bolt, tighten with a jam nut, square up the piece with the hole, and drill it in.

Threading Fasteners

What do you need?

- **Drill a hole first!**
- **Tap:** used to cut or form the female portion of the mating pair (ex. a nut or a hole)
- **Die:** used to cut or form the male portion of the mating pair (ex. a bolt)

[Internal link to Wikipedia page on Tap and Die]

[Graphics from Google Images]
Section 2: Gaskets

“a shaped piece or ring of rubber or other material sealing the junction between two surfaces in an engine or other device.”
Gaskets!

Material?
- Rubberized paper, teflon, metals (copper), silicone, fiberglass

Function?
- To create a seal between an imperfect mating pair (so that fluids won’t leak)

Creation
- A common method is to cut a design from a larger sheet of material
- We designed our gaskets using the CAD system, and used a laser cutter to cut it

https://en.wikipedia.org/wiki/Gasket

Many thanks to Ms. Courtney Atkinson of St. John’s College for this image.
The final product!

Other gasket methods?
- alternative materials
- Instant Gasket: a liquid rubber material that can be used in the absence of another option (or in the case of unexpected obstacles) *cough* Jaime O'Leary *cough*
Section 3: Carburetor

“A device in an internal combustion engine for mixing air with gasoline.”
Lots of pieces to clean...a fasteners team’s dream!
What is a Carburetor’s Function?

- controls engine power by adjusting air intake flow according to command of the rider (throttle)
- maintains the air/fuel ratio at optimal values
- homogenize the mixture of air and fuel to enable the subsequent combustion
- all happens by reducing the air pressure, that pulls in gasoline
- Venturi effect: reduction of area and decrease in pressure creates suction as the air enters the carburetor
- Bernoulli’s principle: as velocity increases, pressure falls

Info from Dr. Martinelli’s presentation to our class
Acknowledgements

Professor Littman, Glenn, Noel, Al, John, Dr. Martinelli

The whole class--thanks for an unforgettable semester!
What have we learned?
#rememberthefasteners