

The background is an abstract composition of overlapping geometric shapes, primarily triangles and polygons, in various shades of green and teal. The colors range from a bright lime green to a dark, almost black teal. The shapes are layered to create a sense of depth and movement, with some shapes appearing to recede into the background while others come forward.

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)

Whitworth thread sizes ^[4]				
Whitworth size (in)	Core diameter (in)	Threads per inch	Pitch (in)	Tapping drill size
1/16	0.0411	60	0.0167	Number Drill 56 (1.2 mm)
3/32	0.0672	48	0.0208	Number Drill 49 (1.85 mm)
1/8	0.0930	40	0.025	Number Drill 39 (2.55 mm)
5/32	0.1162	32	0.0313	Number Drill 30 (3.2 mm)
3/16	0.1341	24	0.0417	Number Drill 26 (3.7 mm)
7/32	0.1654	24	0.0417	Number Drill 16 (4.5 mm)
1/4	0.1860	20	0.05	Number Drill 9 (5.1 mm)
5/16	0.2414	18	0.0556	Letter Drill F (6.5 mm)
3/8	0.2950	16	0.0625	5/16 in (7.94 mm)
7/16	0.3460	14	0.0714	Letter Drill U (9.3 mm)
1/2	0.3933	12	0.0833	Letter Drill Z (10.5 mm)
9/16	0.4558	12	0.0833	12.1 mm (0.4764 in)
5/8	0.5086	11	0.0909	13.5 mm (0.5315 in)
11/16	0.5711	11	0.0909	15 mm (0.5906 in)
3/4	0.6219	10	0.1	16.27 mm (0.6406 in)
13/16	0.6845	10	0.1	18 mm (0.7087 in)
7/8	0.7327	9	0.1111	19.25 mm (0.7579 in)
15/16	0.7953	9	0.1111	20.75 mm (0.8169 in)
1	0.8399	8	0.125	22 mm (0.8661 in)
1 1/8	0.9420	7	0.1429	
1 1/4	1.0670	7	0.1429	
1 1/2	1.2866	6	0.1667	
1 3/4	1.4939	5	0.2	
2	1.7154	4.5	0.2222	
2 1/2	2.180	4	0.250	

Graphic from Wikipedia

https://en.wikipedia.org/wiki/British_Standard_Whitworth, <https://www.boltdepot.com/fastener-information/.../tpiandpitch.aspx>, <https://www.quora.com/What-is-the-difference-between-a-bolt-a-screw-and-a-stud>

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.

Inserts

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



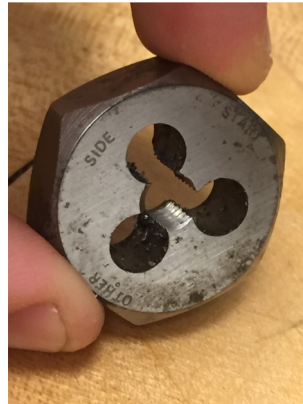
Threading Fasteners

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)



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?

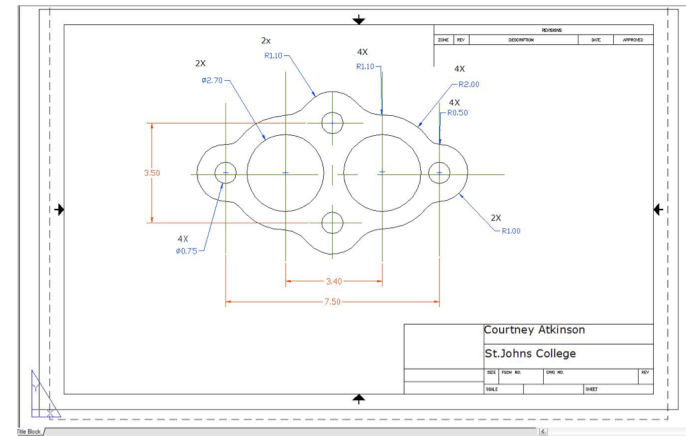
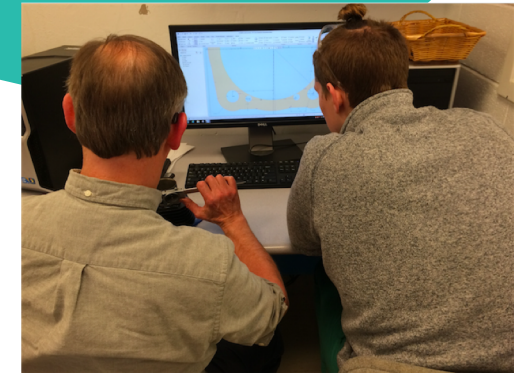
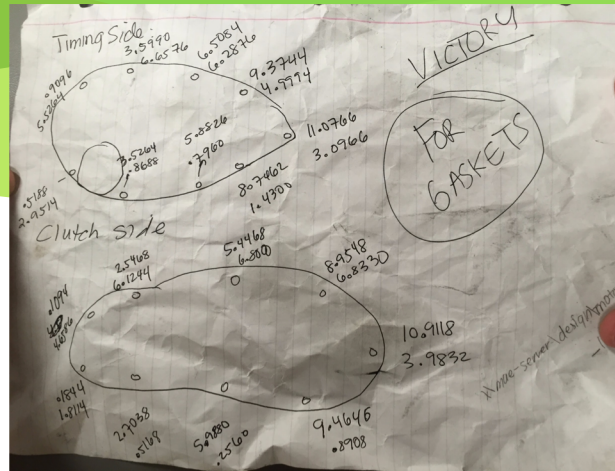
- ◆ Rubberized paper, teflon, metals (copper), silicone, fiberglass

Function?

- ◆ To create a seal between an imperfect mating pair (so that fluids won't leak)

Creation

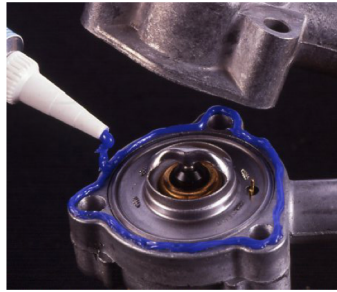
- ◆ A common method is to cut a design from a larger sheet of material
- ◆ We designed our gaskets using the CAD system, and used a laser cutter to cut it



Many thanks to Ms. Courtney Atkinson of St. John's College for this image.



The final product!



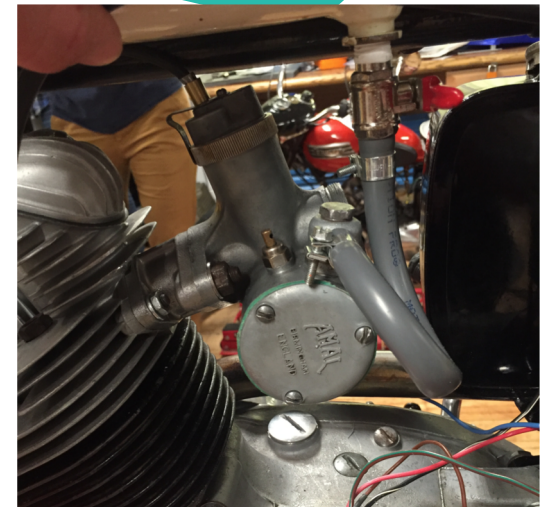
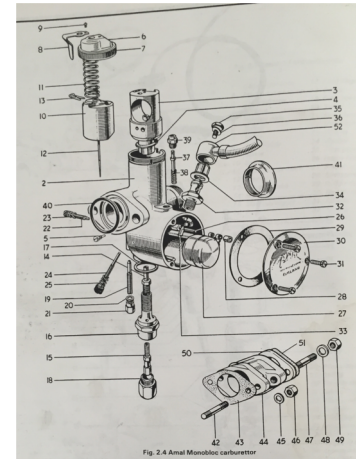
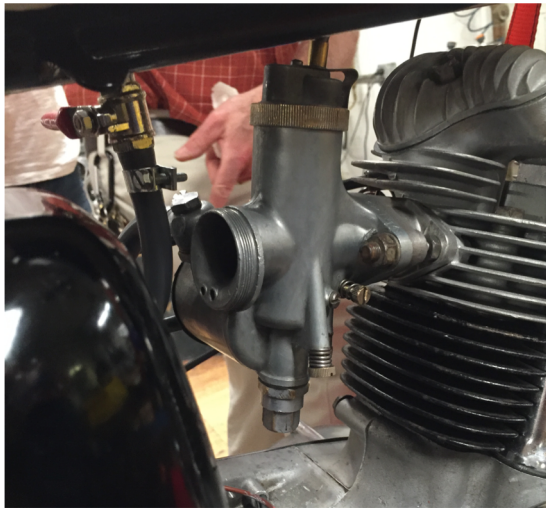
Other gasket methods?

- ◆ 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!



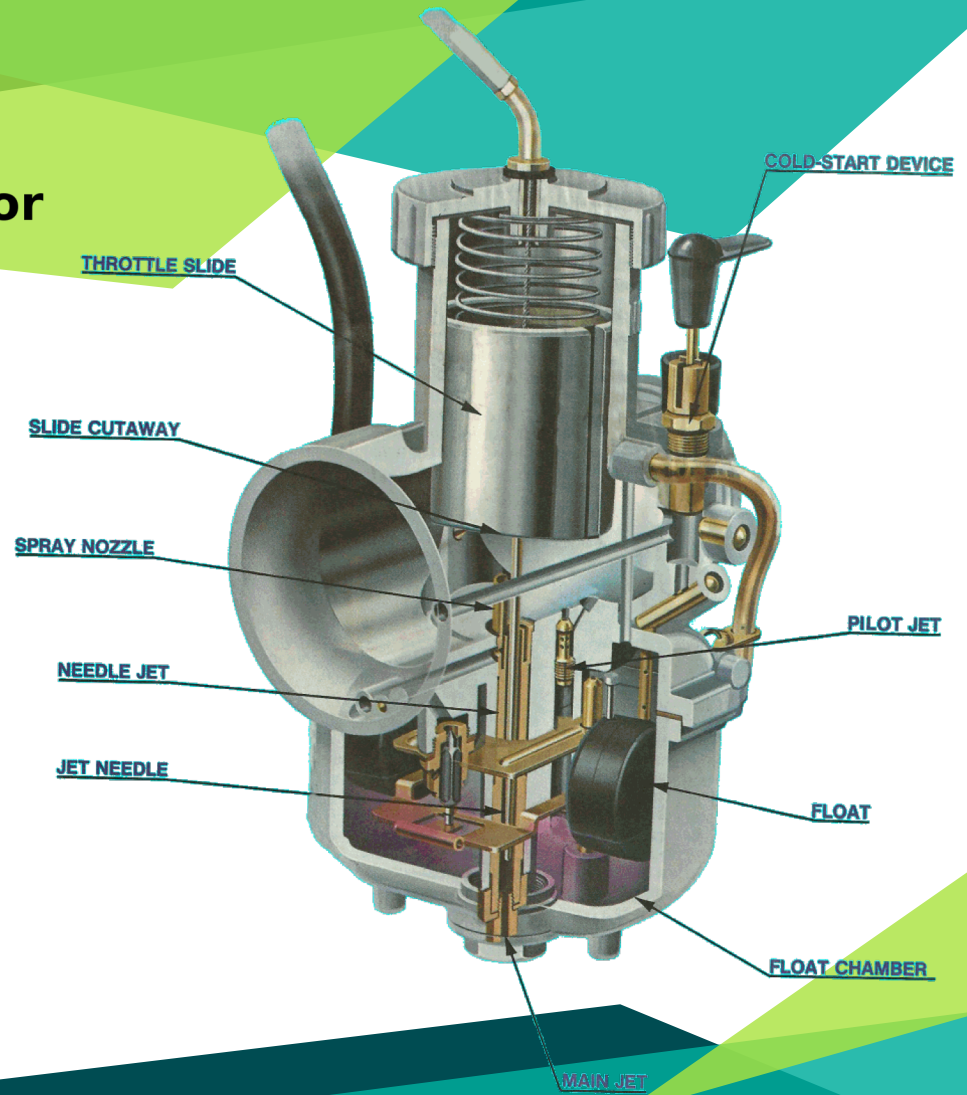
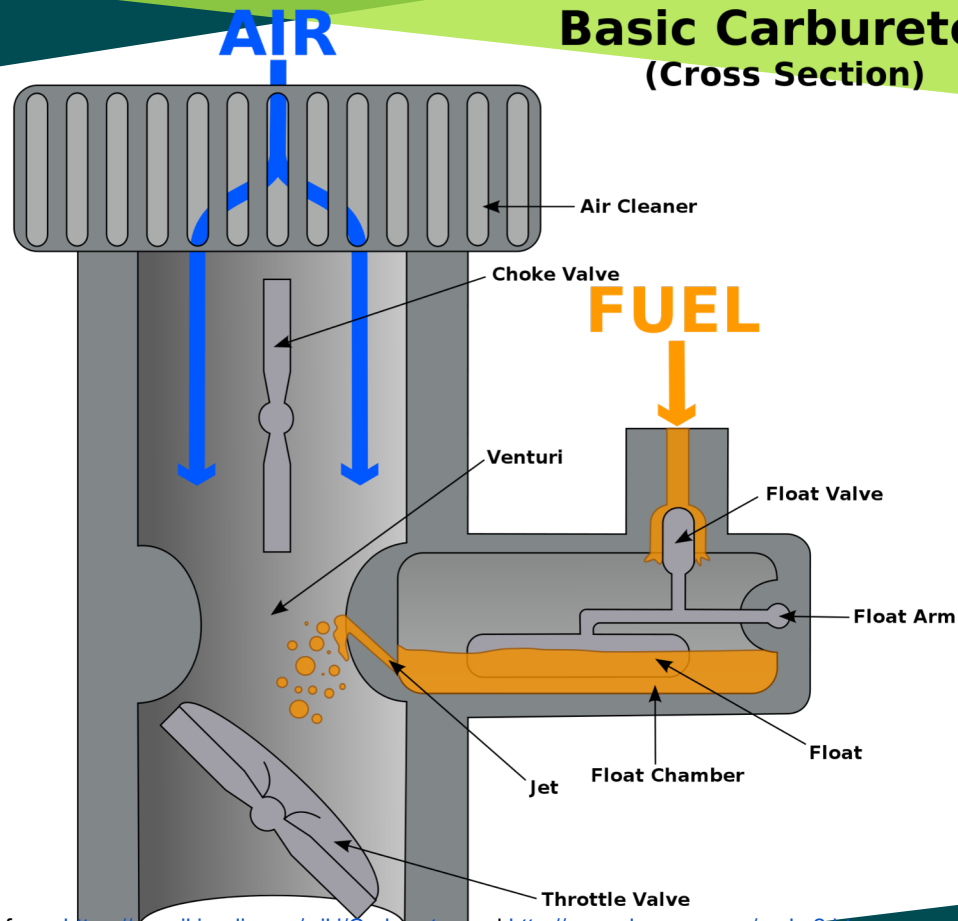
Fluid Dynamics: Remember Martinelli?

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




Basic Carburetor (Cross Section)

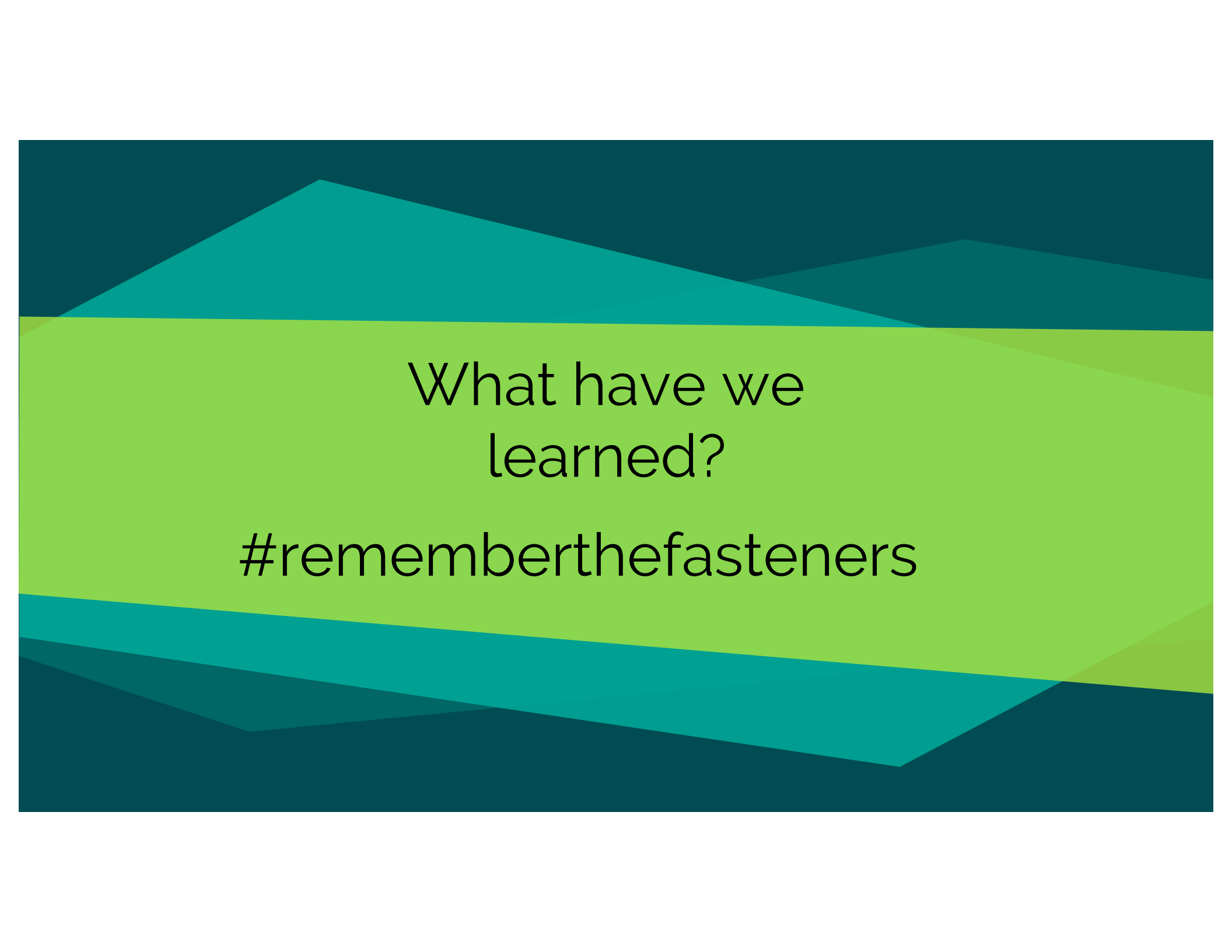


Images from: <https://en.wikipedia.org/wiki/Carburetor> and <http://www.dansmc.com/carbs2.htm>



Acknowledgements

- ◆ Professor Littman, Glenn, Noel, Al, John, Dr. Martinelli
 - ◆ The whole class--thanks for an unforgettable semester!
- 



What have we
learned?

#rememberthefasteners