Freshman Seminar: The Art and Science of Motorcycle Design

2009-10 (FRS 108) ; 2010-11 (FRS 102) ; 2011-12 (FRS 104); 2012-13 (FRS 102); 2013-14 (FRS 108)
Tiger Cubs were in production from 1954 – 1968. It was a very popular learner bike and off-road bike that was not subject to road tax.

Triumph: TIGER – TERRIER – TIGER CUB
.... In the beginning
A motorcycle is an engineering system.

| STRUCTURE | - | Frame |
| MACHINE   | - | Engine |
| NETWORK   | - | Spark  |
| PROCESS   | - | Combustion |

And all elements work together
-- Motor vehicles integrate industries
CRITICAL COMPARATIVE ANALYSIS

Tiger Cubs have 200cc 4-stroke engines, but 1958 is 10 Hp and 1965 is 14 Hp. Why? – Ans: better breathing and higher angular speed
Tubular frame, swing-arm rear suspension, front fork suspension, and single “lung” 4-stroke engine
Take it apart, inspect for wear, clean and repair everything
FRS 108 “Clutch Team”
CLUTCH

Kristyna Smith
Megan Skalbeck
Victoria Cadiz
Casey Cortes

FRS 108
March 3rd, 2010
"I've a set of instructions .... They begin 'Assembly of Japanese bicycle require great peace of mind' ... (T)here's a lot of wisdom in that statement." ZAMM p.164
Artistic View of Transmission – FRS 102 “Trans” Team
“Top End” Team
“Frame, Fork, and Wheel” Team
Mid-semester interlude
– learn how to drive a Model T
In the Ford kitchen... this little trial engine sputtered into life.
Ask the experts ...

Prof. Arnold
(MATERIALS)

Prof. Ju
(COMBUSTION)

Prof. Smits
(FLUIDS)
Re-Assembly
“Vigorous writing is concise. A sentence should contain no unnecessary words, a paragraph no unnecessary sentences, for the same reason that a drawing should have no unnecessary lines… This requires not that the writer make all his sentences short, or that he avoid all detail …, but that every word tell.”

- William Strunk, Jr.
“Vigorous design is concise. An assembly should contain no unnecessary parts, a system no unnecessary assemblies, for the same reason that a drawing should have no unnecessary lines... This requires not that the designer make all his assemblies compact, or that he avoid all complexity ..., but that every part perform.”

GAS TANK HOLDS FUEL AND HAS STRUT TO STRENGTHEN FRAME
Ready to Roll
Start your engines – not so easy
Rides around the Parking Lot

"... pistons and wheels and gears all moving at once, massive and coordinated" ZAMM p.87
FRS 102 Bike (1963) before Restoration
FRS 102 Bike (1963) after Restoration