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





SHOP CLASS As soulcraft

AN INQUIRY INTO THE VALUE OF WORK



THE PROVOCATIVE, PROFOUND, AND DEEPLY AFFECTING MODERN CLASSIC THAT HAS INSPIRED MILLIONS



THE ART OF MOTORCYCLE MAINTENANCE

AN INQUIRY INTO VALUES.

ROBERT M. PIRSIG

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"







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. Smits (FLUIDS)



Prof. Ju (COMBUSTION)

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.



INTEGRATED DESIGN

"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