

AAE 440

Lecture 2: Initial Sizing

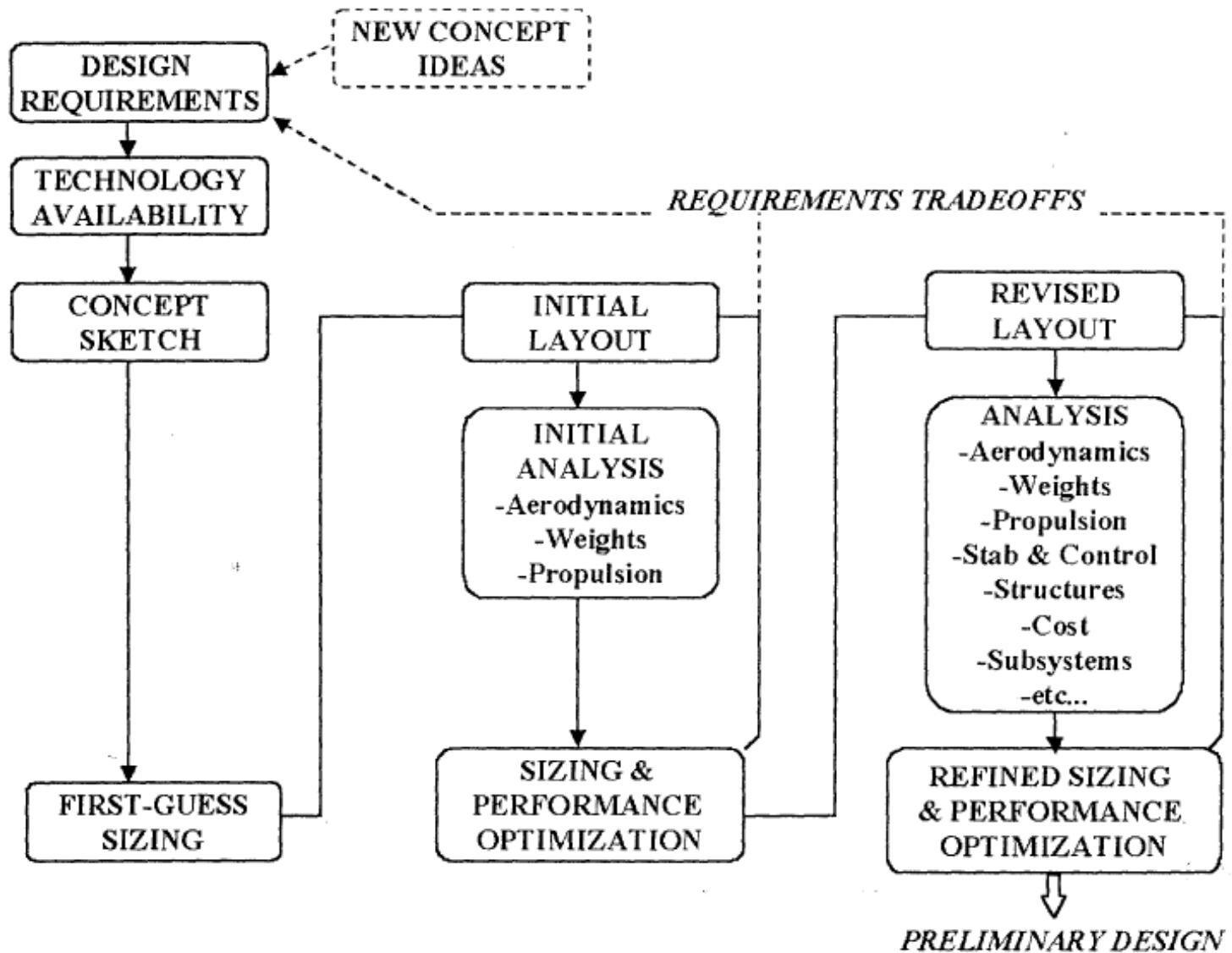
Eric Loth

Sept. 2 & 4, 2008

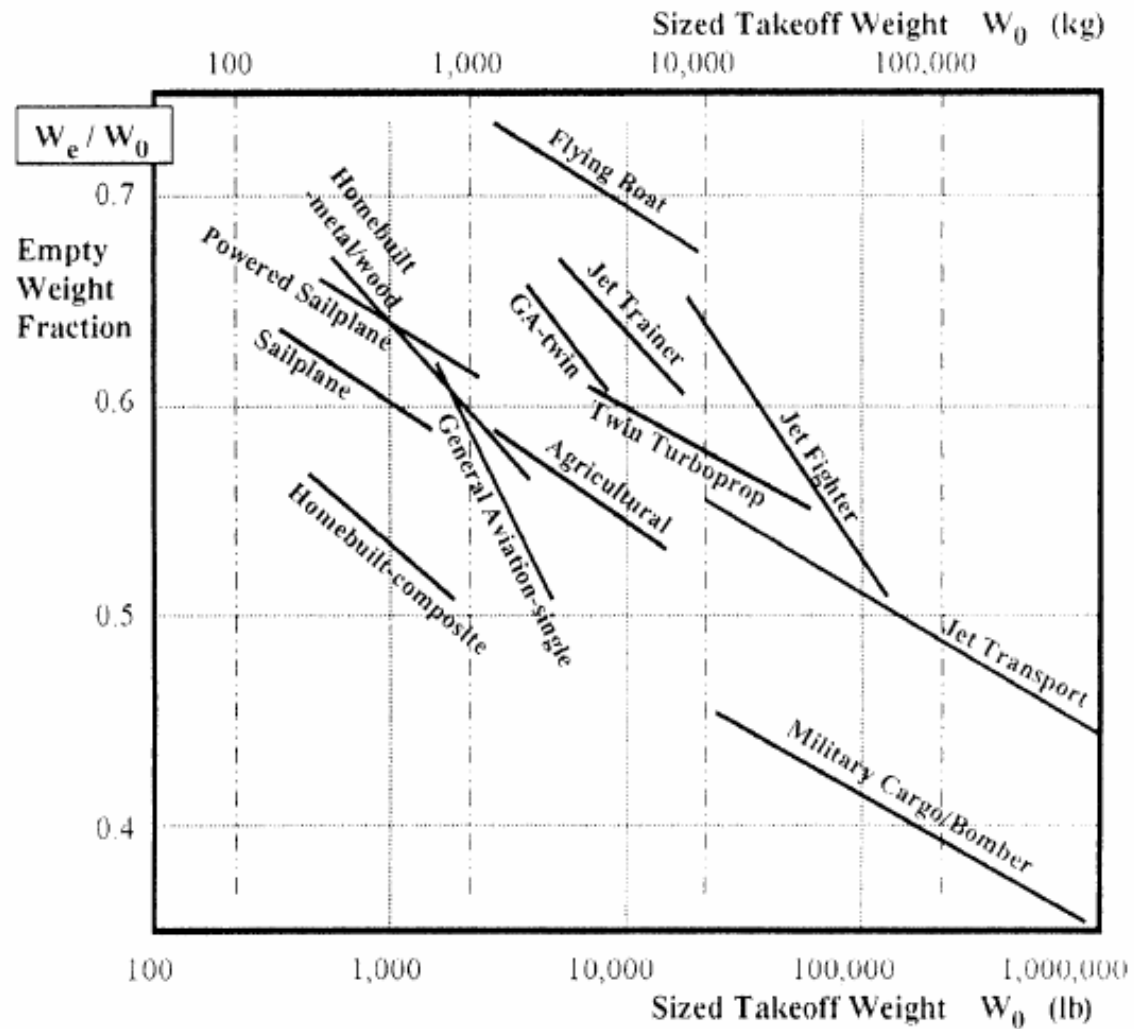


AAE 440 AIC

Conceptual Design Process



Empty Weight Fraction



Empty Weight Fraction Coefficients

Table 3.1 Empty weight fraction vs W_0

$W_e/W_0 = AW_0^C K_{vs}$	A	{A-metric}	C
Sailplane—unpowered	0.86	{0.83}	-0.05
Sailplane—powered	0.91	{0.88}	-0.05
Homebuilt—metal/wood	1.19	{1.11}	-0.09
Homebuilt—composite	1.15	{1.07}	-0.09
General aviation—single engine	2.36	{2.05}	-0.18
General aviation—twin engine	1.51	{1.4}	-0.10
Agricultural aircraft	0.74	{0.72}	-0.03
Twin turboprop	0.96	{0.92}	-0.05
Flying boat	1.09	{1.05}	-0.05
Jet trainer	1.59	{1.47}	-0.10
Jet fighter	2.34	{2.11}	-0.13
Military cargo/bomber	0.93	{0.88}	-0.07
Jet transport	1.02	{0.97}	-0.06

K_{vs} = variable sweep constant = 1.04 if variable sweep
 = 1.00 if fixed sweep



Missions

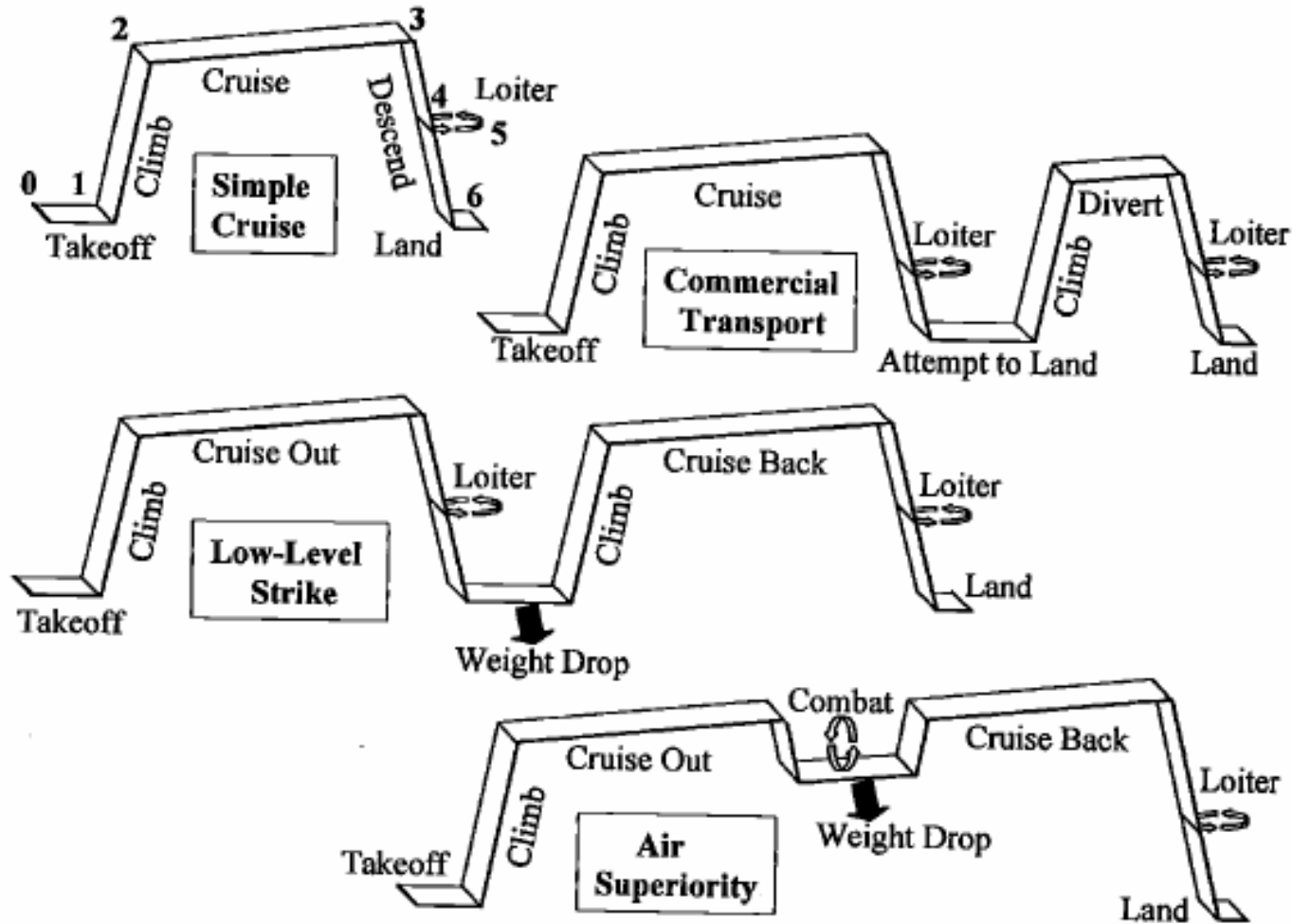
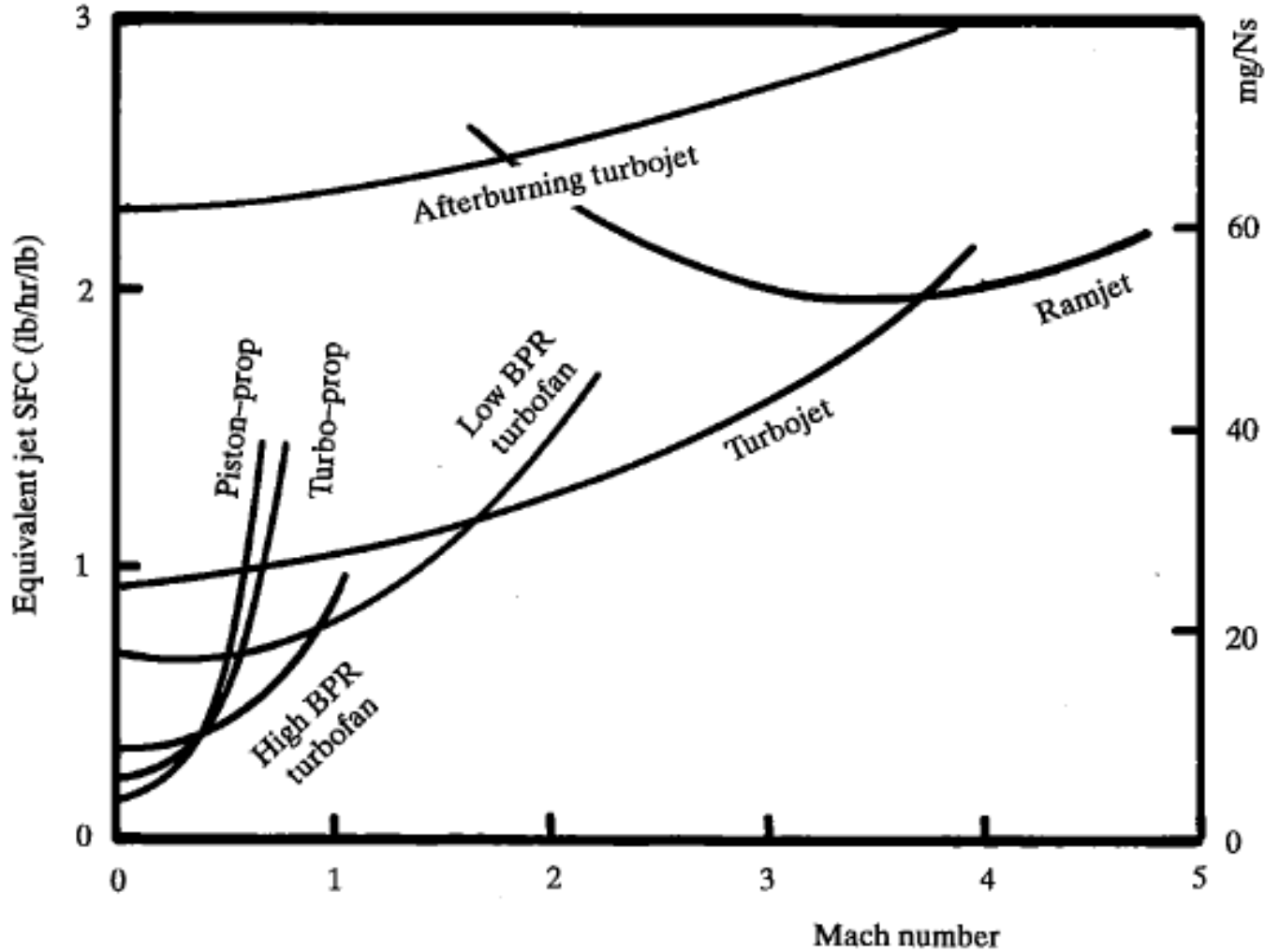


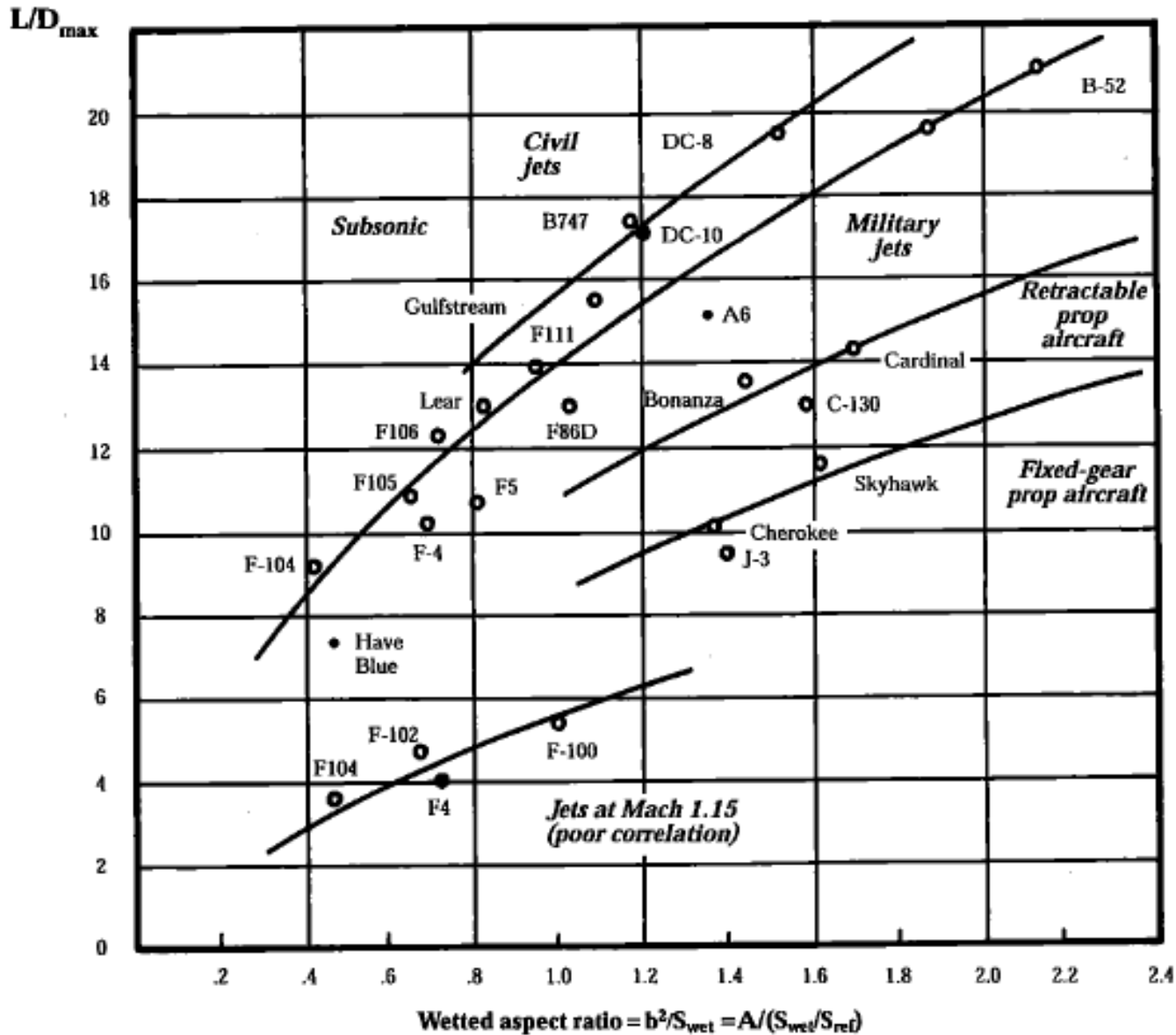
Fig. 3.2 Typical mission profiles for sizing.



Specific Fuel Consumption



Maximum Lift/Drag Ratios



First-Order Weight Analysis

