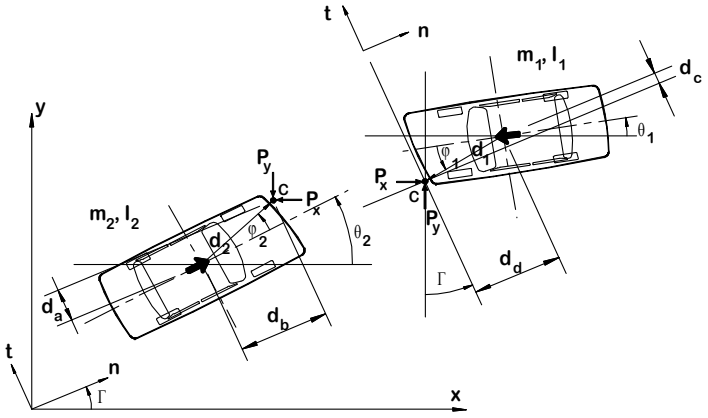
impact.xls
ver 3.2
9/16/2012

Analysis of a Planar Vehicle Collision

			Vehicle 1			Vehicle 2
5280/3600	1.467		105.00	mass, m	lb-s²/ft	105.00
g	32.174	ft/s²	2000.00	inertia, I	ft-lb-s²	2000.00
			5.00	distance, d	ft	5.00
e	0.000		10.00	angle, ϕ	deg	10.00
μ (% μ_0)	100.0		0.00	angle, θ	deg	0.00
μ	0.099					
μ_0	0.099					
Γ	0.000	deg				
				INITIAL Velocity		
			-14.67	v_x	ft/s	14.67
mbar	52.500		0.00	v_y	ft/s	0.00
k_1^2	19.048	ft^2	0.00	ω	deg/sec	0.00
k_2^2	19.048	ft^2	14.67	v	ft/s	14.67
q	0.983		-14.67	v_n	ft/s	14.67
v_m	29.345	ft/s	0.00	v_t	ft/s	0.00
v_{tn}	0.000	ft/s	-14.67	v_{cn}	ft/s	14.67
r	0.000		0.00	v_{ct}	ft/s	0.00
η_1	0.000	deg				
η_2	0.000	deg		FINAL Velocity		
d_a	0.868	ft	Vehicle 1			Vehicle 2
d_b	4.924	ft	-0.25	V_x	ft/s	0.25
d_c	0.868	ft	1.42	V_y	ft/s	-1.42
d_d	4.924	ft	16.57	Ω	deg/sec	16.57
d_e	0.382	ft	1.45	V	ft/s	1.45
d_f	0.382	ft	-0.25	V_n	ft/s	0.25
A	1.040		1.42	V_t	ft/s	-1.42
B	0.224		0.00	V_{cn}	ft/s	0.00
C	1.273		0.00	V_{ct}	ft/s	0.00
D	2.273					



Initial speeds

Vehicle 1		Vehicle 2
10.0	mph	10.0

Final speeds

Vehicle 1		Vehicle 2
1.0	mph	1.0

|ΔV|

Vehicle 1		Vehicle 2
9.9	mph	9.9
14.5	ft/s	14.5

System Kinetic Energy, ft-lb

Initial	22,604.6	
Final	386.9	
Loss	22,217.7	98.3%

Normal (Crush) Energy Loss:
22,217.7 98.3%
Tangential Energy Loss:
0.0 0.0%
Total System Energy Loss
22,217.7 98.3%

Impulses, lb-s

P_x	P_y	P
1514.2	149.5	1521.6
P_n	P_t	P
1514.2	149.5	1521.6

PDOF, deg

Vehicle 1	Vehicle 2
-5.6	-5.6

|ΔV| Components, mph

Vehicle 1		Vehicle 2
0.97	$\|\Delta V_{lat}\|$	0.97
9.83	$\|\Delta V_{long}\|$	9.83

Brach Engineering
VCRware™
Vehicle Crash Reconstruction Software
www.brachengineering.com

Unit Conversion

US

SOLVER BLOCK INSTRUCTIONS

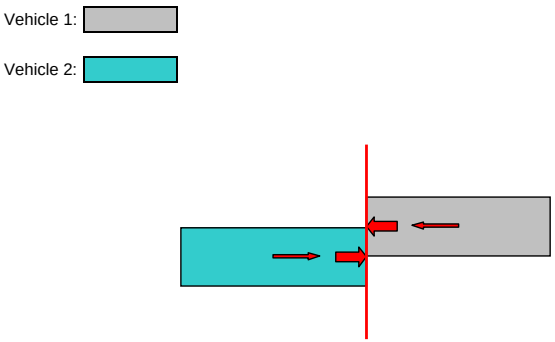
Enter all cell references as an absolute reference without an equal sign: C5.
To Maximize: put a 1 in cell Q10, a 0 in cell S10 and 0.000 in cell U10.
To Minimize: put a 0 in cell Q10, a 1 in cell S10 and 0.000 in cell U10.
To optimize to a Value: put a 0 in cell Q10, a 0 in cell S10, and the numerical value to optimize to in cell U10.
Enter multiple Change Cells separated by a comma without spaces: C3,D5
Constraint Relation can be only: >=, =, or <=.

Solver Block

Target Cell: I13
Equal to: **Max:** 0 **Min:** 0 **Value of:** 11.000
By Changing Cells: G13, B8

Subject to Constraints:	Left Side	Relation	Right Side
Constraint #1:	B8	>=	0.00
Constraint #2:	B8	<=	0.20
Constraint #3:			
Constraint #4:			
Constraint #5:			
Constraint #6:			
Constraint #7:			
Constraint #8:			
Constraint #9:			
Constraint #10:			

Run Solver



VEHICLE COLOR CHANGES ARE UPDATED ON THE NEXT GRAPHICS REFRESH