

Structural Damage Equivalence of Selected Explosive Materials Based on the Response of Thin Circular Plates Subjected to Blast Loading

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Choose Explosive Material

Calculate Mass Factor (CHEETAH)

$$\alpha = \frac{E_{0C4}^D}{E_{0\text{Explosive}}^D}$$

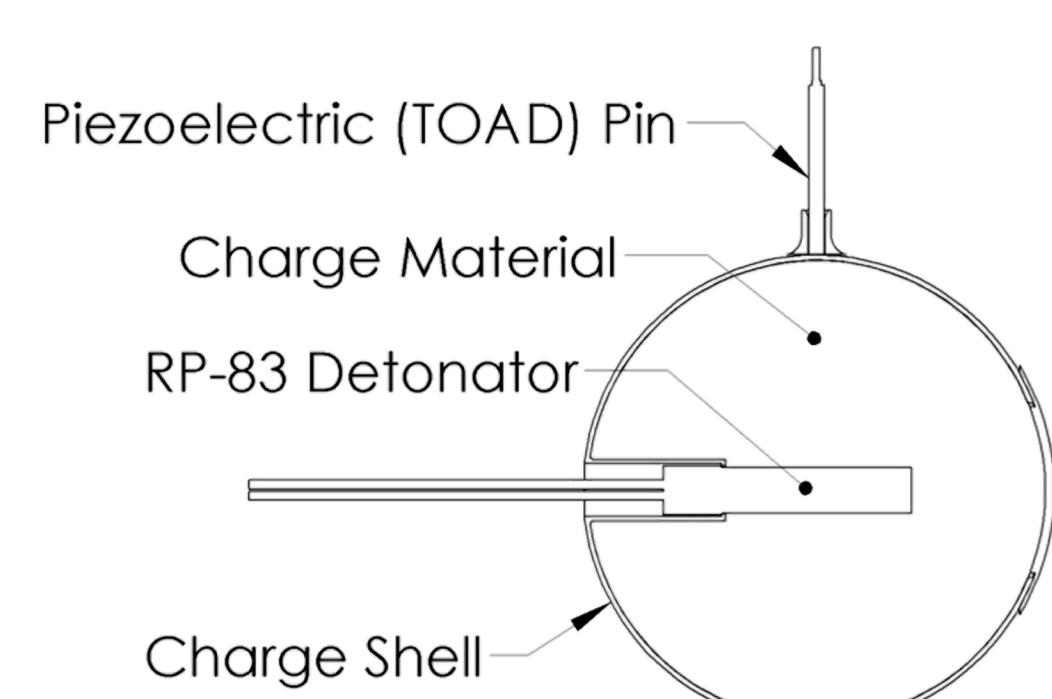
Use Mass Factor and Mass of Reference C-4 to Calculate Explosive Mass

$$\text{mass}_{\text{Explosive}} = \alpha \cdot \text{mass}_{C4 \text{ Reference}}$$

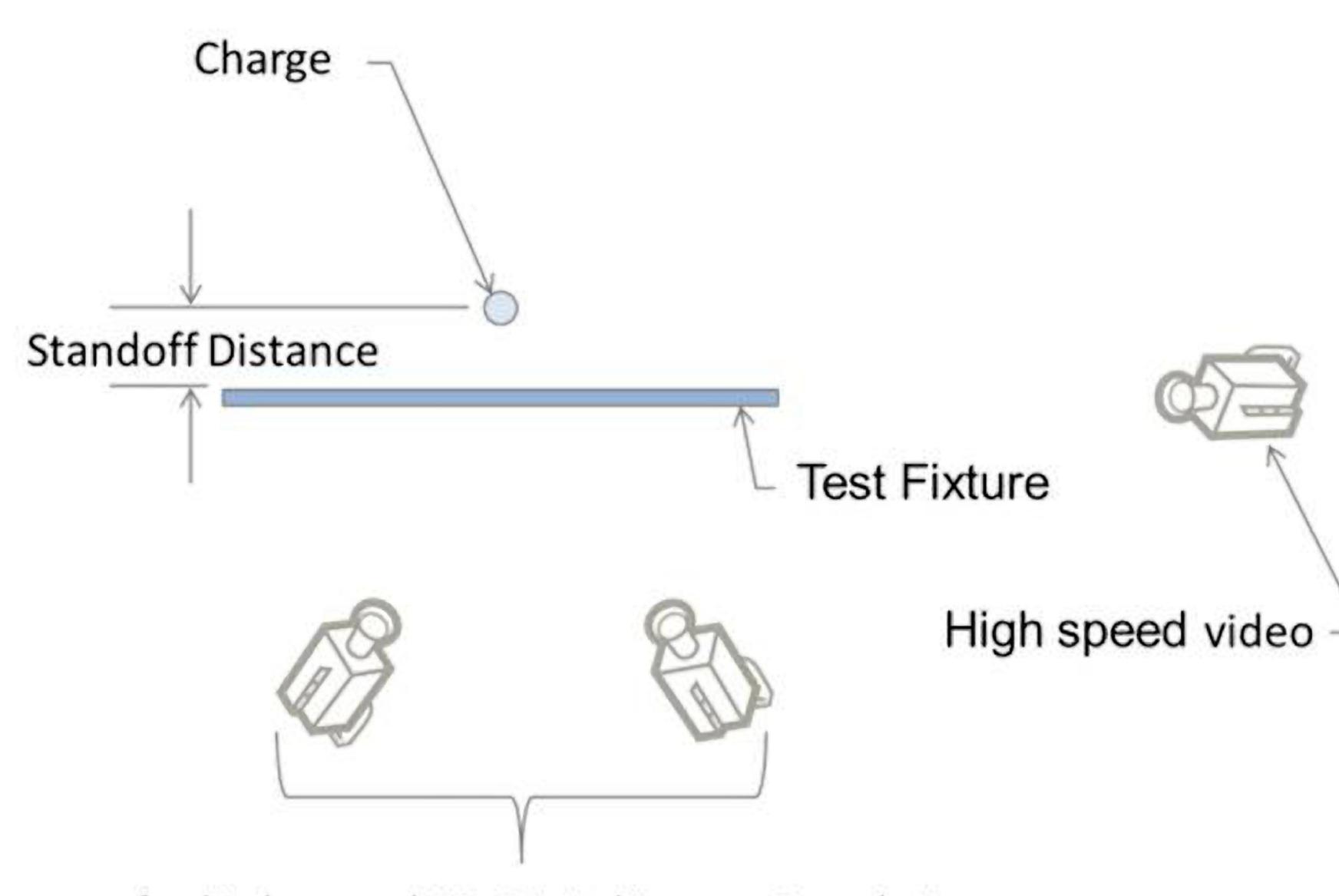
Inverse Mass Factor Gives C-4 Equivalence

$$C4 \text{ Equivalence} = \frac{1}{\alpha}$$

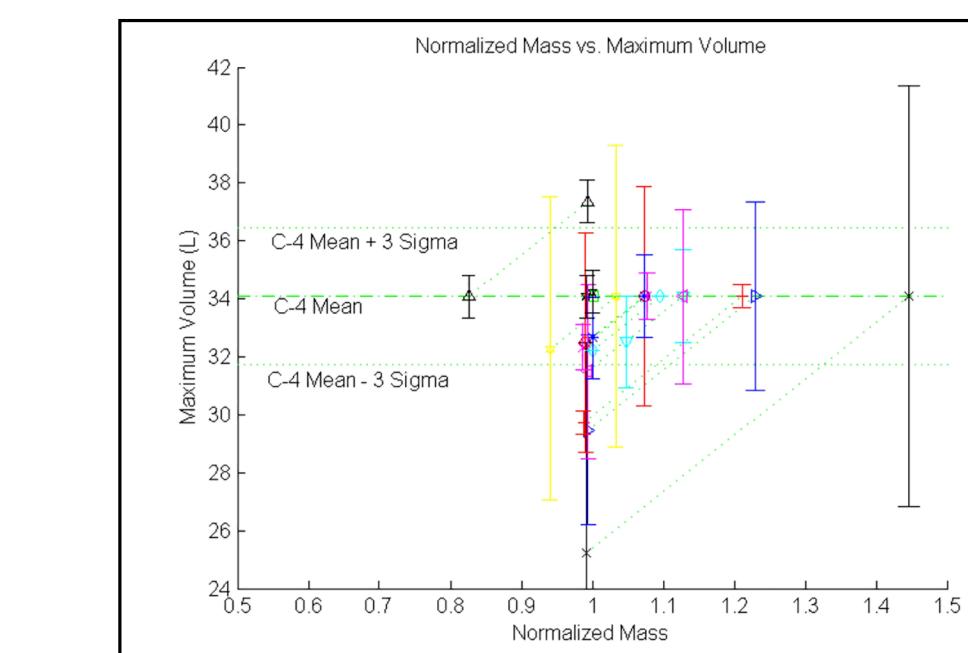
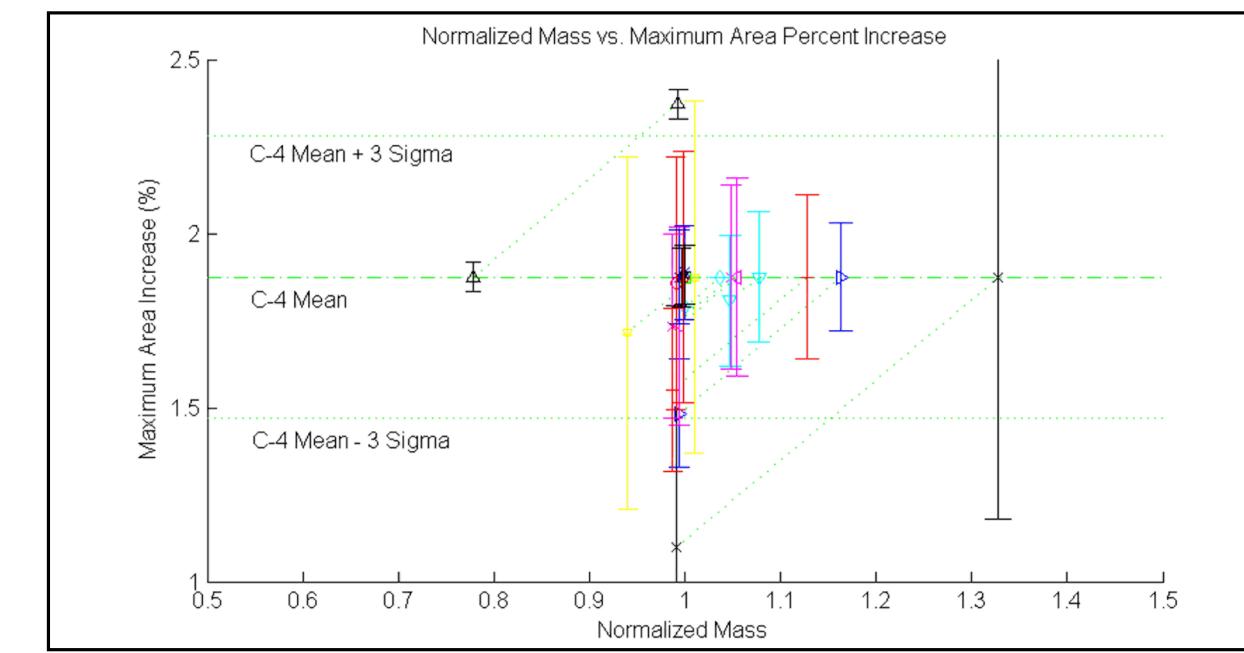
Form Material into Center-Initiated Sphere



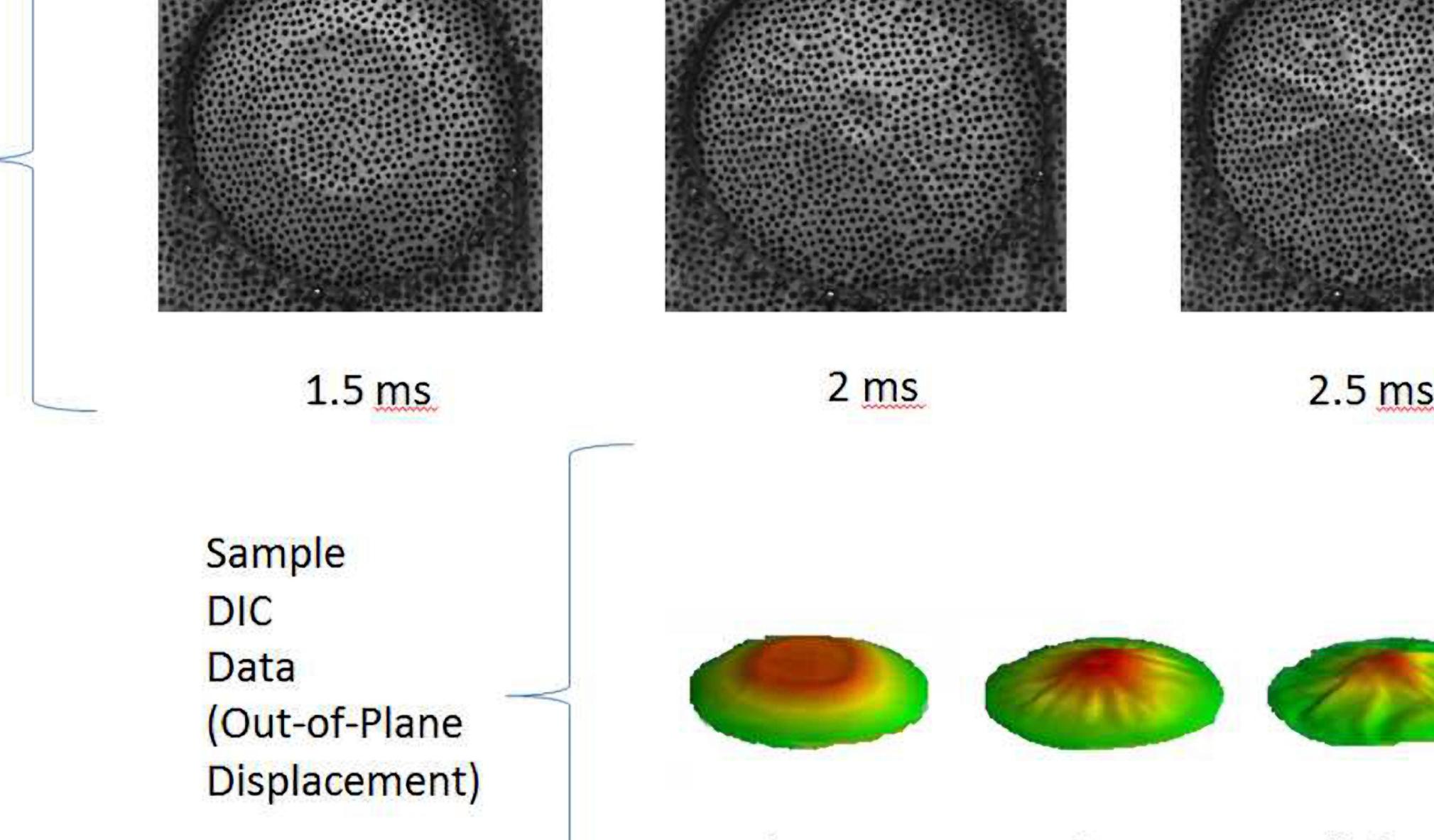
Test Using SNL Circular Plate Method



Determine Experimental Damage Equivalence Based on Material Data, C-4 Data and Numerical Simulation Using C-4 Equation of State Data



Material	C-4 Equivalence	Experimental Damage Metrics		Calculated Equivalence Metrics
		Normalized Area Increase	Normalized Volume	
HMED0	0.30	0.21	30.0 (30.0)	0.21 (0.21)
HMED1	0.44	0.33	30.0 (30.0)	0.33 (0.33)
HMED2	0.45	0.33	30.0 (30.0)	0.33 (0.33)
HMED3	0.45	0.33	30.0 (30.0)	0.33 (0.33)
HMED4	0.46	0.33	30.0 (30.0)	0.33 (0.33)
HMED5	0.46	0.33	30.0 (30.0)	0.33 (0.33)
HMED6	0.47	0.33	30.0 (30.0)	0.33 (0.33)
HMED7	0.47	0.33	30.0 (30.0)	0.33 (0.33)
HMED8	0.48	0.33	30.0 (30.0)	0.33 (0.33)
HMED9	0.48	0.33	30.0 (30.0)	0.33 (0.33)
HMED10	0.49	0.33	30.0 (30.0)	0.33 (0.33)
HMED11	0.50	0.33	30.0 (30.0)	0.33 (0.33)
HMED12	0.51	0.33	30.0 (30.0)	0.33 (0.33)
HMED13	0.51	0.33	30.0 (30.0)	0.33 (0.33)
HMED14	0.52	0.33	30.0 (30.0)	0.33 (0.33)
HMED15	0.52	0.33	30.0 (30.0)	0.33 (0.33)
HMED16	0.53	0.33	30.0 (30.0)	0.33 (0.33)
HMED17	0.53	0.33	30.0 (30.0)	0.33 (0.33)
HMED18	0.54	0.33	30.0 (30.0)	0.33 (0.33)
HMED19	0.54	0.33	30.0 (30.0)	0.33 (0.33)
HMED20	0.55	0.33	30.0 (30.0)	0.33 (0.33)
HMED21	0.55	0.33	30.0 (30.0)	0.33 (0.33)
HMED22	0.56	0.33	30.0 (30.0)	0.33 (0.33)
HMED23	0.56	0.33	30.0 (30.0)	0.33 (0.33)
HMED24	0.57	0.33	30.0 (30.0)	0.33 (0.33)
HMED25	0.57	0.33	30.0 (30.0)	0.33 (0.33)
HMED26	0.58	0.33	30.0 (30.0)	0.33 (0.33)
HMED27	0.58	0.33	30.0 (30.0)	0.33 (0.33)
HMED28	0.59	0.33	30.0 (30.0)	0.33 (0.33)
HMED29	0.59	0.33	30.0 (30.0)	0.33 (0.33)
HMED30	0.60	0.33	30.0 (30.0)	0.33 (0.33)
HMED31	0.60	0.33	30.0 (30.0)	0.33 (0.33)
HMED32	0.61	0.33	30.0 (30.0)	0.33 (0.33)
HMED33	0.61	0.33	30.0 (30.0)	0.33 (0.33)
HMED34	0.62	0.33	30.0 (30.0)	0.33 (0.33)
HMED35	0.62	0.33	30.0 (30.0)	0.33 (0.33)
HMED36	0.63	0.33	30.0 (30.0)	0.33 (0.33)
HMED37	0.63	0.33	30.0 (30.0)	0.33 (0.33)
HMED38	0.64	0.33	30.0 (30.0)	0.33 (0.33)
HMED39	0.64	0.33	30.0 (30.0)	0.33 (0.33)
HMED40	0.65	0.33	30.0 (30.0)	0.33 (0.33)
HMED41	0.65	0.33	30.0 (30.0)	0.33 (0.33)
HMED42	0.66	0.33	30.0 (30.0)	0.33 (0.33)
HMED43	0.66	0.33	30.0 (30.0)	0.33 (0.33)
HMED44	0.67	0.33	30.0 (30.0)	0.33 (0.33)
HMED45	0.67	0.33	30.0 (30.0)	0.33 (0.33)
HMED46	0.68	0.33	30.0 (30.0)	0.33 (0.33)
HMED47	0.68	0.33	30.0 (30.0)	0.33 (0.33)
HMED48	0.69	0.33	30.0 (30.0)	0.33 (0.33)
HMED49	0.69	0.33	30.0 (30.0)	0.33 (0.33)
HMED50	0.70	0.33	30.0 (30.0)	0.33 (0.33)
HMED51	0.70	0.33	30.0 (30.0)	0.33 (0.33)
HMED52	0.71	0.33	30.0 (30.0)	0.33 (0.33)
HMED53	0.71	0.33	30.0 (30.0)	0.33 (0.33)
HMED54	0.72	0.33	30.0 (30.0)	0.33 (0.33)
HMED55	0.72	0.33	30.0 (30.0)	0.33 (0.33)
HMED56	0.73	0.33	30.0 (30.0)	0.33 (0.33)
HMED57	0.73	0.33	30.0 (30.0)	0.33 (0.33)
HMED58	0.74	0.33	30.0 (30.0)	0.33 (0.33)
HMED59	0.74	0.33	30.0 (30.0)	0.33 (0.33)
HMED60	0.75	0.33	30.0 (30.0)	0.33 (0.33)
HMED61	0.75	0.33	30.0 (30.0)	0.33 (0.33)
HMED62	0.76	0.33	30.0 (30.0)	0.33 (0.33)
HMED63	0.76	0.33	30.0 (30.0)	0.33 (0.33)
HMED64	0.77	0.33	30.0 (30.0)	0.33 (0.33)
HMED65	0.77	0.33	30.0 (30.0)	0.33 (0.33)
HMED66	0.78	0.33	30.0 (30.0)	0.33 (0.33)
HMED67	0.78	0.33	30.0 (30.0)	0.33 (0.33)
HMED68	0.79	0.33	30.0 (30.0)	0.33 (0.33)
HMED69	0.79	0.33	30.0 (30.0)	0.33 (0.33)
HMED70	0.80	0.33	30.0 (30.0)	0.33 (0.33)
HMED71	0.80	0.33	30.0 (30.0)	0.33 (0.33)
HMED72	0.81	0.33	30.0 (30.0)	0.33 (0.33)
HMED73	0.81	0.33	30.0 (30.0)	0.33 (0.33)
HMED74	0.82	0.33	30.0 (30.0)	0.33 (0.33)
HMED75	0.82	0.33	30.0 (30.0)	0.33 (0.33)
HMED76	0.83	0.33	30.0 (30.0)	0.33 (0.33)
HMED77	0.83	0.33	30.0 (30.0)	0.33 (0.33)
HMED78	0.84	0.33	30.0 (30.0)	0.33 (0.33)
HMED79	0.84	0.33	30.0 (30.0)	0.33 (0.33)
HMED80	0.85	0.33	30.0 (30.0)	0.33 (0.33)
HMED81	0.85	0.33	30.0 (30.0)	0.33 (0.33)
HMED82	0.86	0.33	30.0 (30.0)	0.33 (0.33)
HMED83	0.86	0.33	30.0 (30.0)	0.33 (0.33)
HMED84	0.87	0.33	30.0 (30.0)	0.33 (0.33)
HMED85	0.87	0.33	30.0 (30.0)	0.33 (0.33)
HMED86	0.88	0.33	30.0 (30.0)	0.33 (0.33)
HMED87	0.88	0.33	30.0 (30.0)	0.33 (0.33)
HMED88	0.89	0.33	30.0 (30.0)	0.33 (0.33)
HMED89	0.89	0.33	30.0 (30.0)	0.33 (0.33)
HMED90	0.90	0.33	30.0 (30.0)	0.33 (0.33)
HMED91	0.90	0.33	30.0 (30.0)	0.33 (0.33)
HMED92	0.91	0.33	30.0 (30.0)	0.33 (0.33)
HMED93	0.91	0.33	30.0 (30.0)	0.33 (0.33)
HMED94	0.92	0.33	30.0 (30.0)	0.33 (0.33)
HMED95	0.92	0.33	30.0 (30.0)	0.33 (0.33)
HMED96	0.93	0.33	30.0 (30.0)	0.33 (0.33)
HMED97	0.93	0.33	30.0 (30.0)	0.33 (0.33)
HMED98	0.94	0.33	30.0 (30.0)	0.33 (0.33)
HMED99	0.94	0.33	30.0 (30.0)	0.33 (0.33)
HMED100	0.95	0.33	30.0 (30.0)	0.33 (0.33)



Collect and Analyze Digital Image Correlation Data

