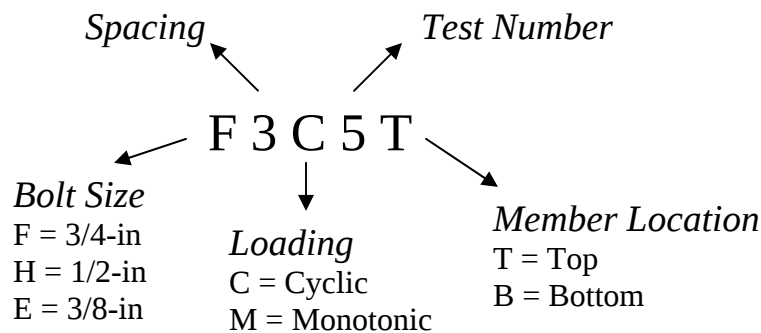


Appendix B - Cyclic Connection Test Data

Data presented here is for all the cyclic tests performed for this study. Results for all parameters are tabulated and included as well as generated charts and calculated material properties. Note that the reported values of the parameters are the average of the positive and negative results.

Naming of each specimen consists of five digits. The first digit refers to the bolt size used in the test and is either a “F”, “H”, or “E”. A “F” refers to three-Fourths inch bolts. A “H” refers to one-Half inch bolts and an “E” refers to three-Eighths inch bolts. The next digit refers to the spacing between the bolts. Therefore, a 3 would refer to the 3D spacing, a 5 refers to the 5D spacing and so forth. The third digit refers to the type of loading. A “M” is used for monotonic loading tests and a “C” for cyclic loading tests. The fourth digit is the number of the test. Ten cyclic tests were performed so the fourth number ranges from 1 to 10 for cyclic tests. Three monotonic tests were performed so the fourth number ranges from 1 to 3 for monotonic tests. The final digit is either a “T” or a “B” and refers to whether the specimen is the member affixed to the top or bottom fixture respectively. For example, a top member in the fifth cyclic test performed using the 3D spacing between the bolts and 3/4 inch bolts has the designation of “F3C5T”. When reporting the results, the last digit is missing since the data is for the combination of the top and bottom members working together.



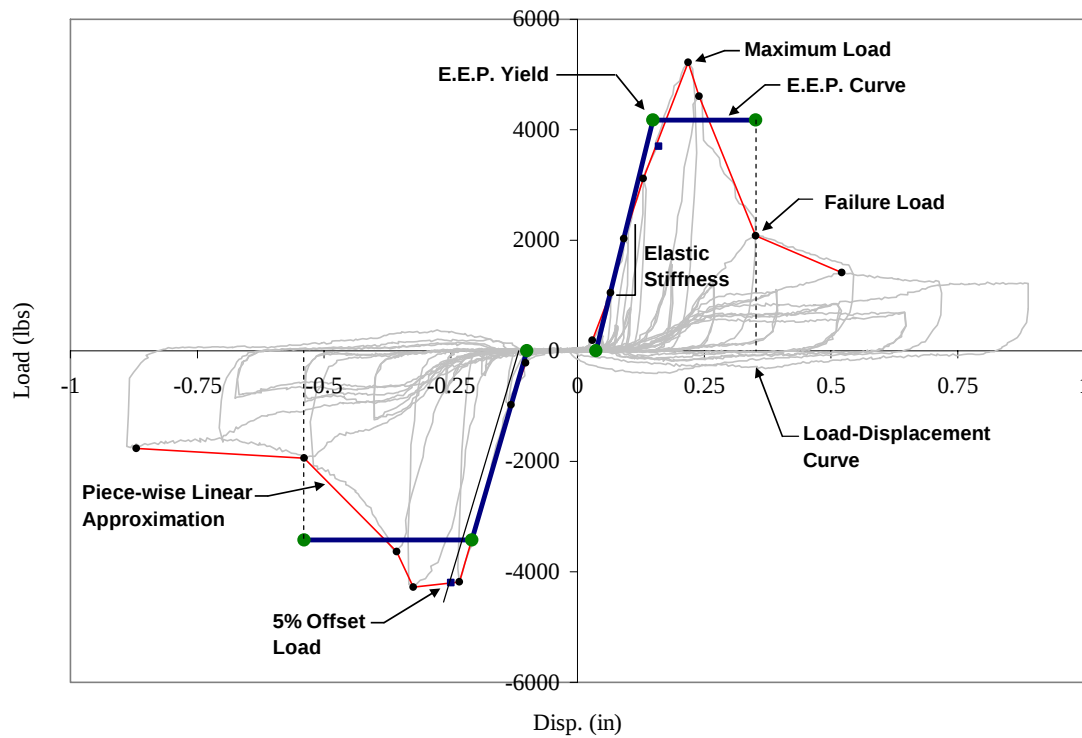


Figure B.1: Typical Test Identification and Definition of Cyclic Test Parameters.

B.1 Expected Yield Mode II

Table B.1: F8 Connection and Member Properties

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	Mean	St. Dev.	COV(%)
Max Load (lbs)	15750	14950	21300	20600	22500	15400	18950	19300	20400	16050	18520	2758	14.9
@ Displ. (in)	0.32	0.39	0.94	0.37	0.39	0.30	0.37	0.68	0.48	0.31	0.456	0.202	44.3
Failure Load (lbs)	12600	11950	17050	16450	18000	12350	15150	15400	16300	12800	14805	2204	14.9
@ Displ. (in)	0.34	0.42	0.94	0.42	0.43	0.31	0.40	0.68	0.53	0.37	0.485	0.191	39.3
40% Max (lbs)	5100	4200	7700	7750	5450	4200	5250	4650	5850	4800	5495	1284	23.4
@ Displ. (in)	0.12	0.11	0.17	0.14	0.11	0.10	0.12	0.11	0.14	0.12	0.125	0.021	16.7
E.E.P. Yield (lbs)	13150	13000	17450	17350	18300	14050	16200	16150	16750	13600	15600	1970	12.6
@ Displ. (in)	0.23	0.28	0.36	0.26	0.30	0.24	0.29	0.29	0.28	0.23	0.275	0.040	14.6
5% Offset (lbs)	14900	13250	16000	18250	20950	13450	18500	13000	16250	15000	15955	2606	16.3
@ Displ. (in)	0.29	0.33	0.39	0.32	0.38	0.27	0.36	0.28	0.29	0.29	0.318	0.044	13.8
Elastic Stiff. (lb/in)	73000	53850	51650	89750	72700	72600	65550	66400	80150	83550	70920	12118	17.1
Slack (in)	0.05	0.04	0.02	0.05	0.04	0.04	0.04	0.04	0.06	0.06	0.045	0.012	26.2
E.E.P. Energy (lb*in)	2950	3500	13700	4750	4900	2650	3800	8300	7650	3300	5550	3447	62.11
Ductility Ratio	1.52	1.54	2.87	1.84	1.47	1.32	1.39	2.38	1.84	1.63	1.78	0.49	27.5
Yield Mode	II	II	II	II	II	II	II	II	II	II			
Failure Mode	split	split	rupture	split	split	split	split	split	Split	split			
Governing Member	B	T	T	B	T	B	T	T	B	T			

F8 Series											Mean	St. Dev.	COV(%)
Member Top	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10			
M.C. (%)	14	15	15	14	12	15	11	14	11	7	12.7	2.7	21.6
S.G.	0.49	0.52	0.51	0.45	0.37	0.47	0.33	0.50	0.37	0.28	0.428	0.086	20.0
D.E. 5% Yield (psi)	4559	4523	3630	4500	4073	3643	5828	4041	1536	3160	3949	1115	28.2
D.E. Capacity (psi)	2132	4669	3448	4057	3728	3430	5803	3850	2029	3045	3619	1119	30.9
Member Bottom	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	Mean	St. Dev.	COV(%)
M.C. (%)	13	16	15	13	13	12	15	14	11	7	12.9	2.6	20.0
S.G.	0.67	0.53	0.52	0.42	0.40	0.37	0.48	0.51	0.36	0.24	0.448	0.119	26.5
D.E. 5% Yield (psi)	4429	3575	3323	4394	4582	1814	4113	3715	4161	3468	3757	810	21.6
D.E. Capacity (psi)	4315	3594	1444	3840	4213	1814	3824	3613	4161	2784	3360	1013	30.1

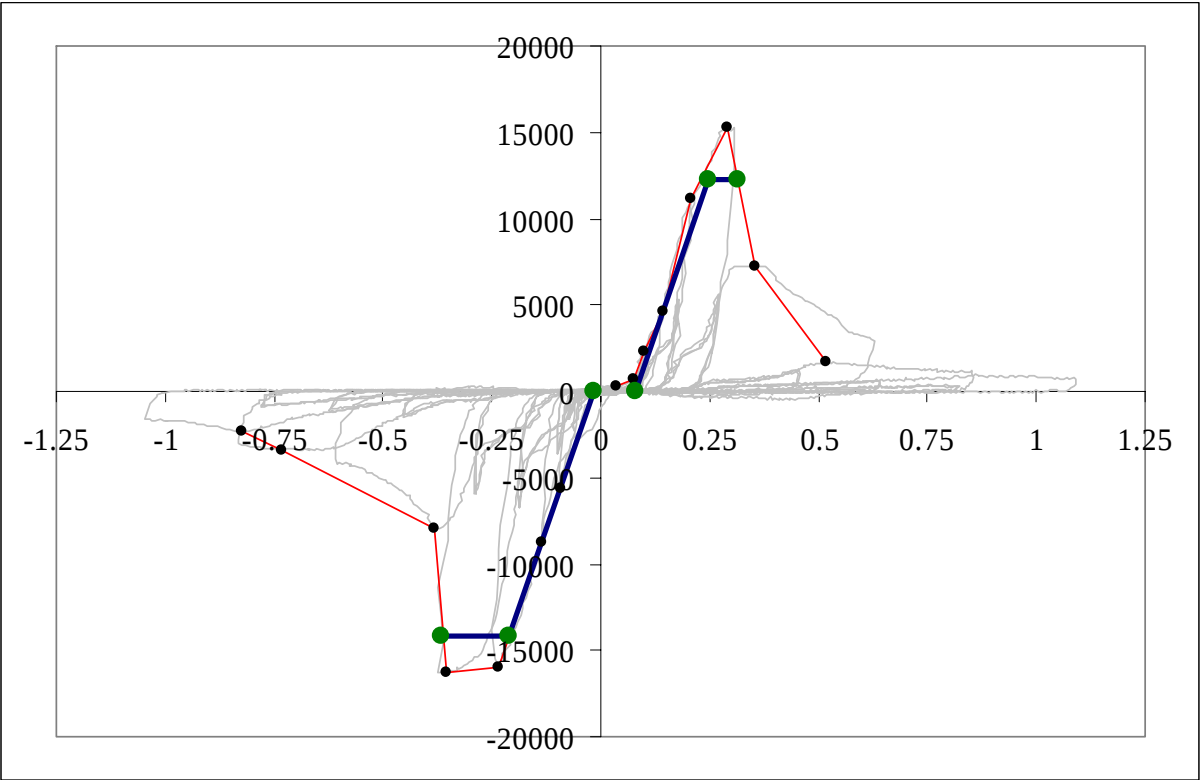


Figure B.2: F8C1 Load (lbs) – Deflection (in) Plot

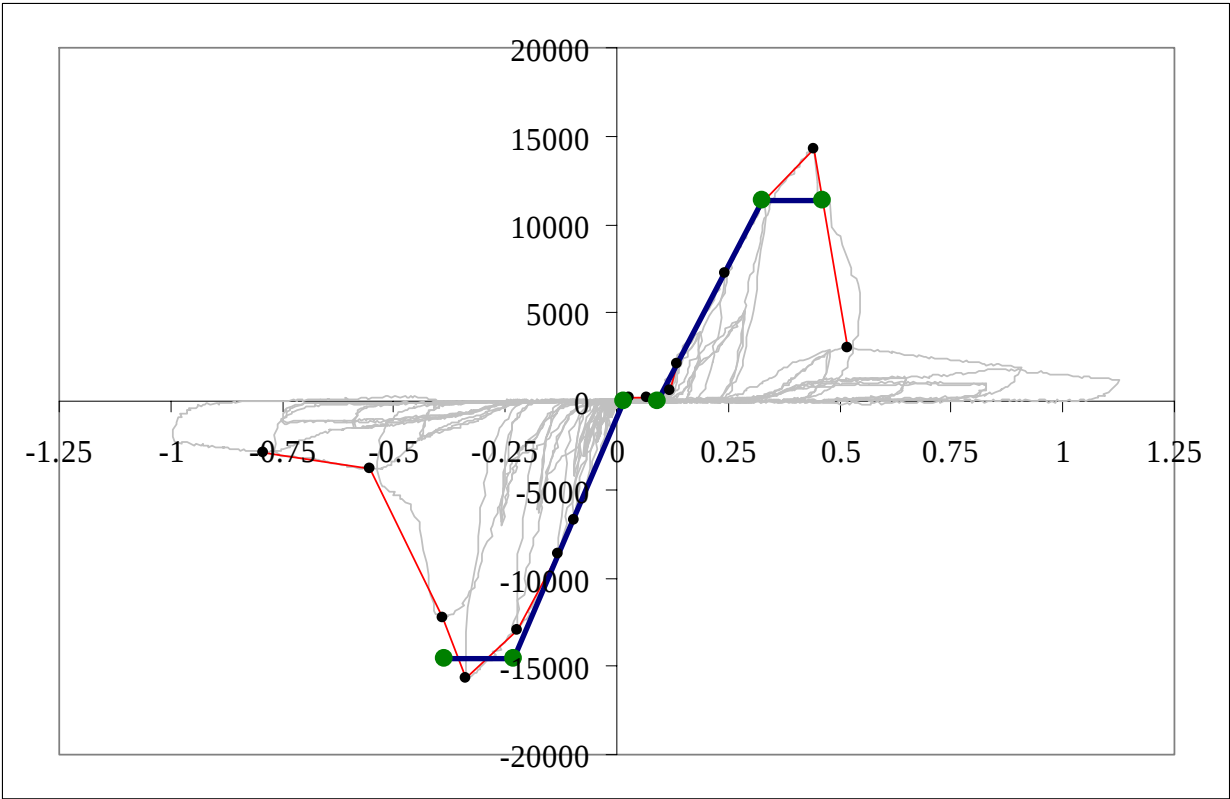


Figure B.3 F8C2 Load (lbs) – Deflection (in) Plot

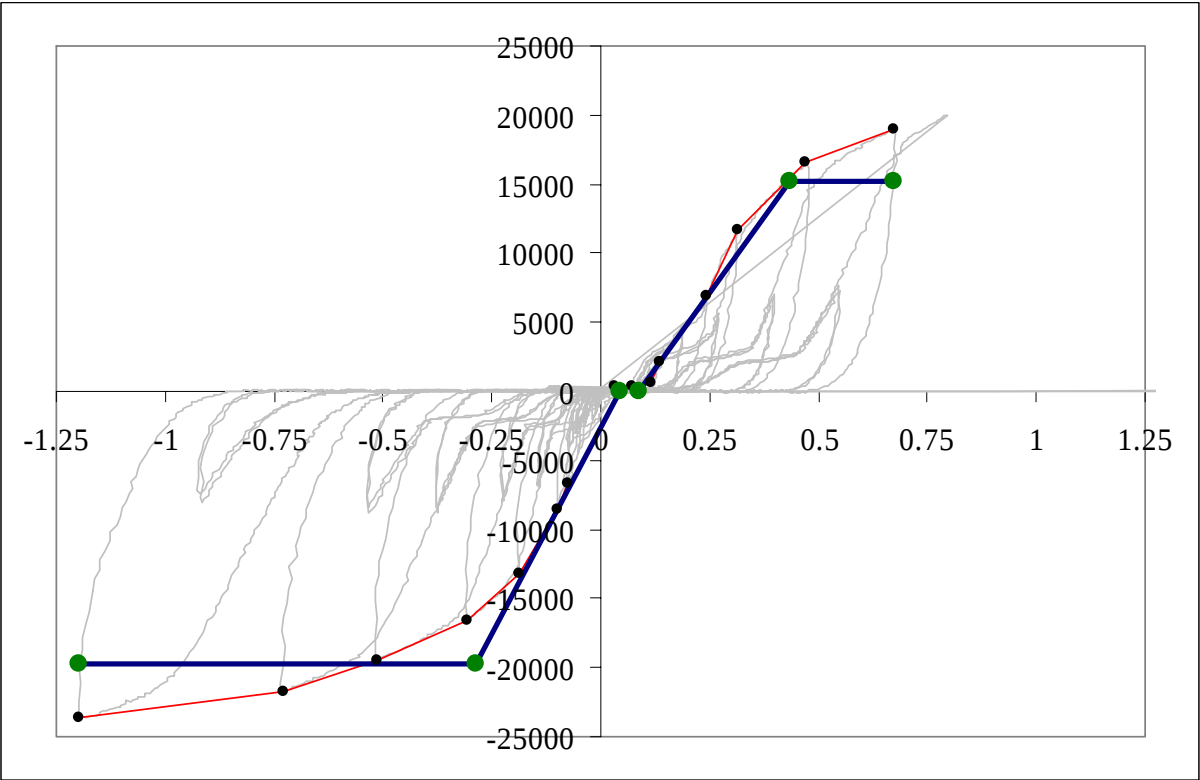


Figure B.4 F8C3 Load (lbs) – Deflection (in) Plot

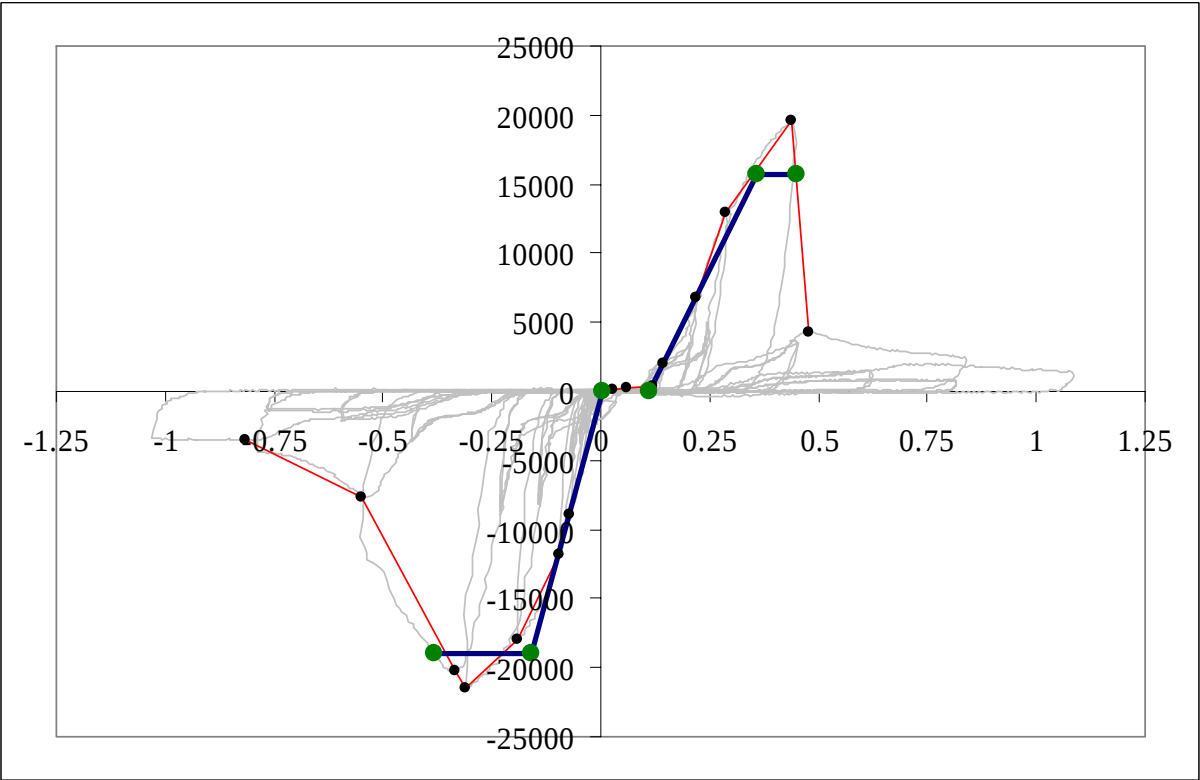


Figure B.5 F8C4 Load (lbs) – Deflection (in) Plot

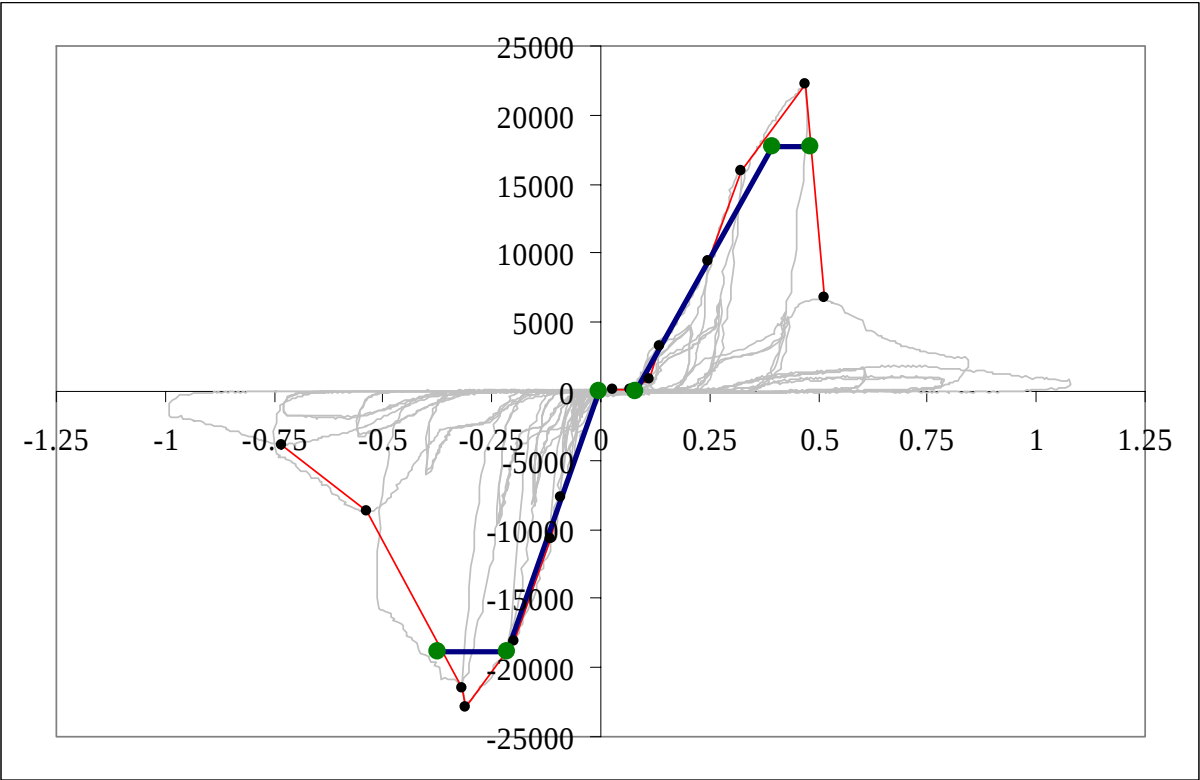


Figure B.6 F8C5 Load (lbs) – Deflection (in) Plot

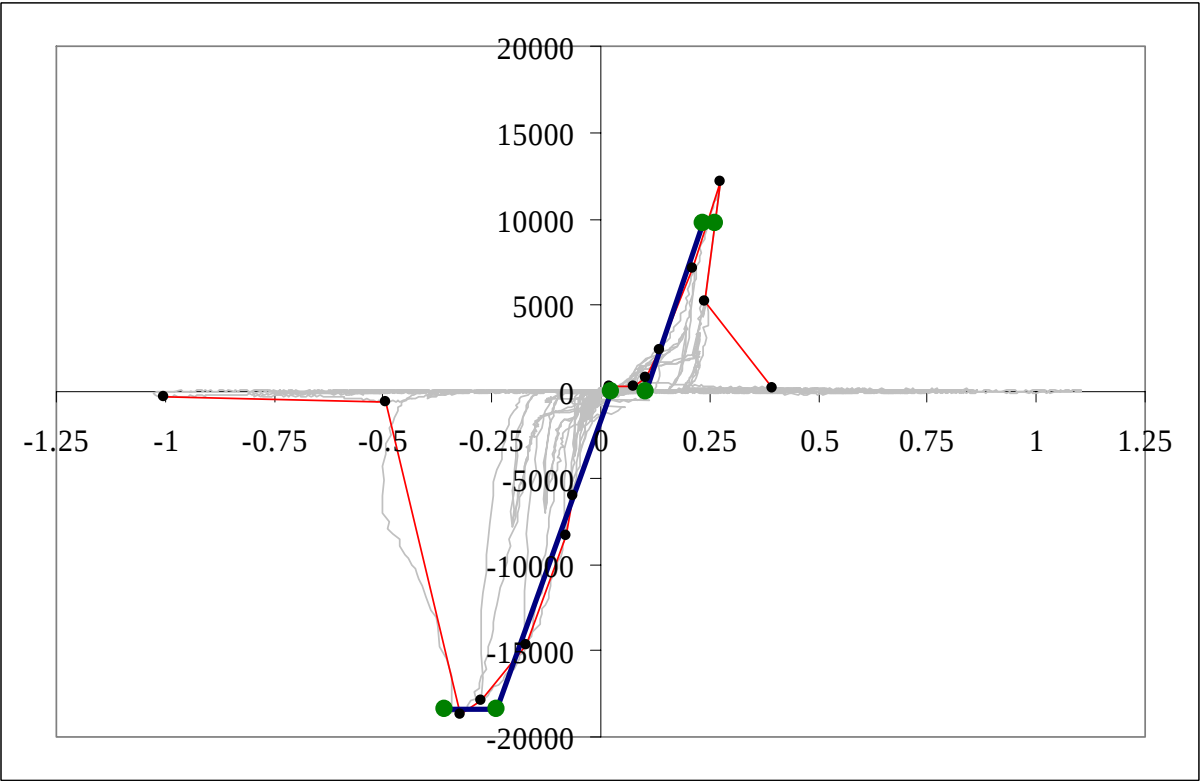
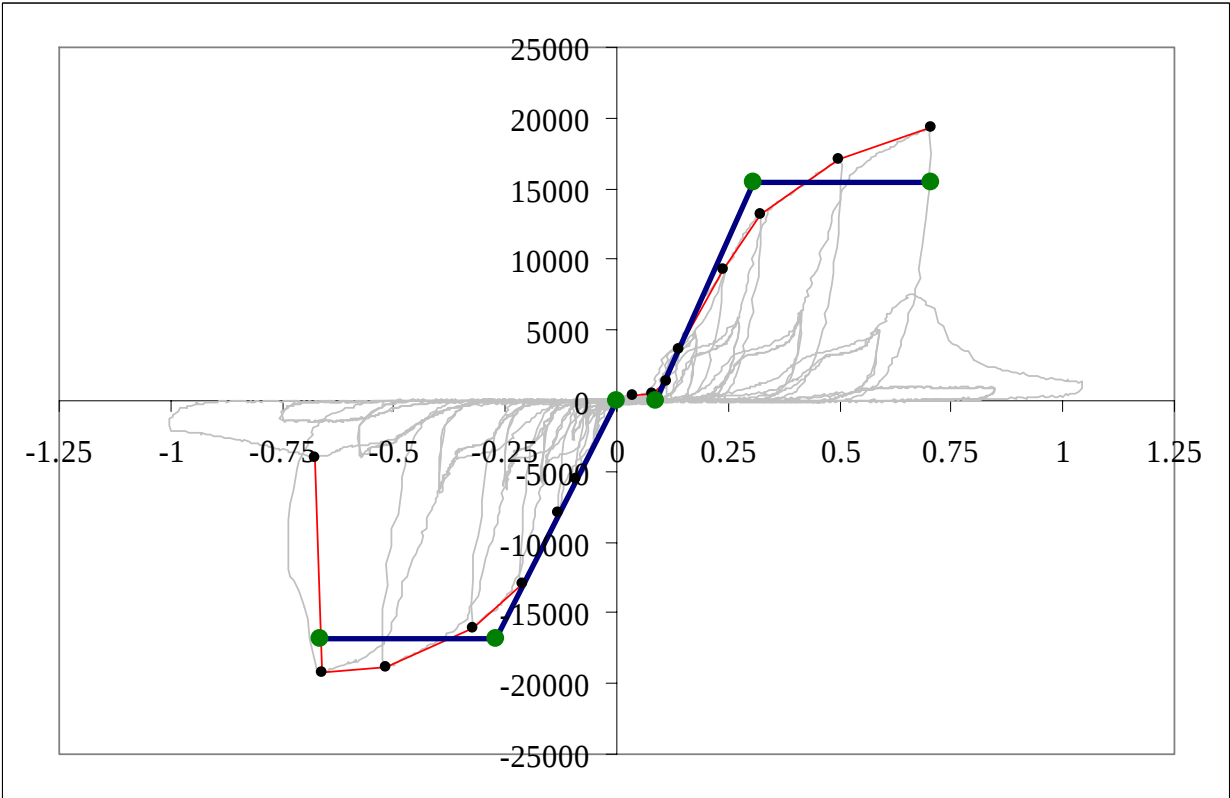
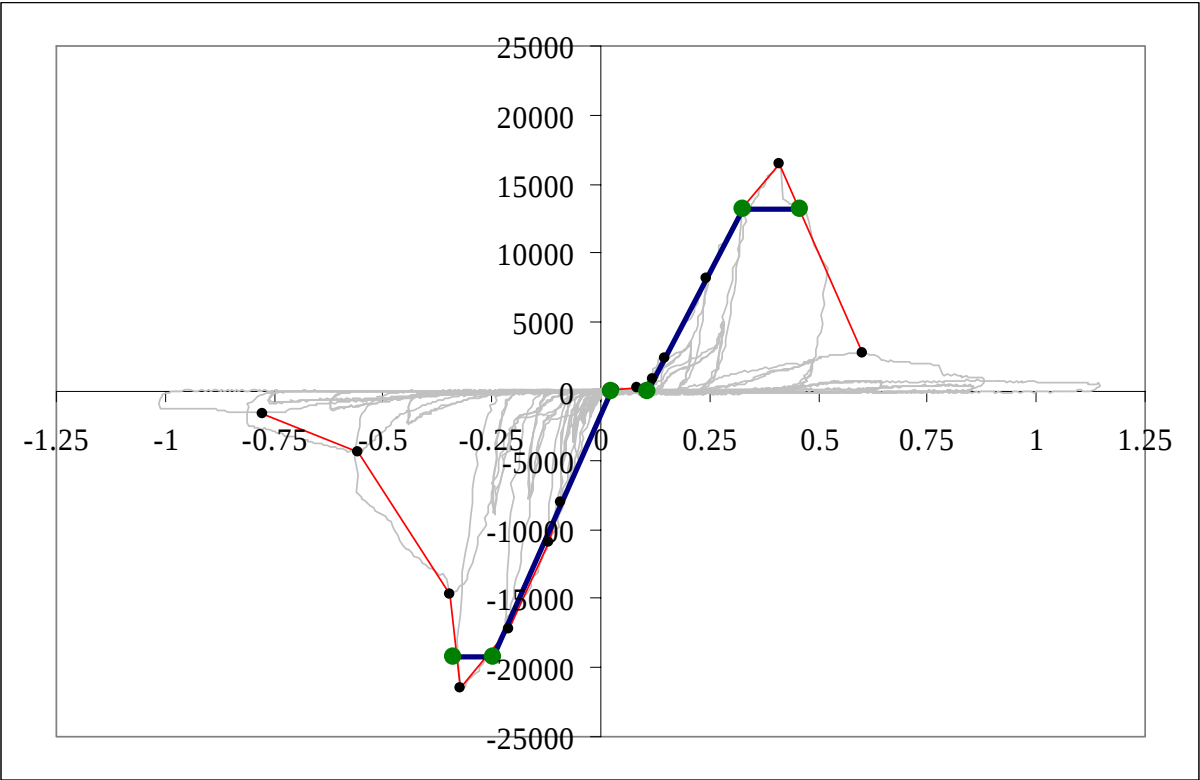


Figure B.7 F8C6 Load (lbs) – Deflection (in) Plot



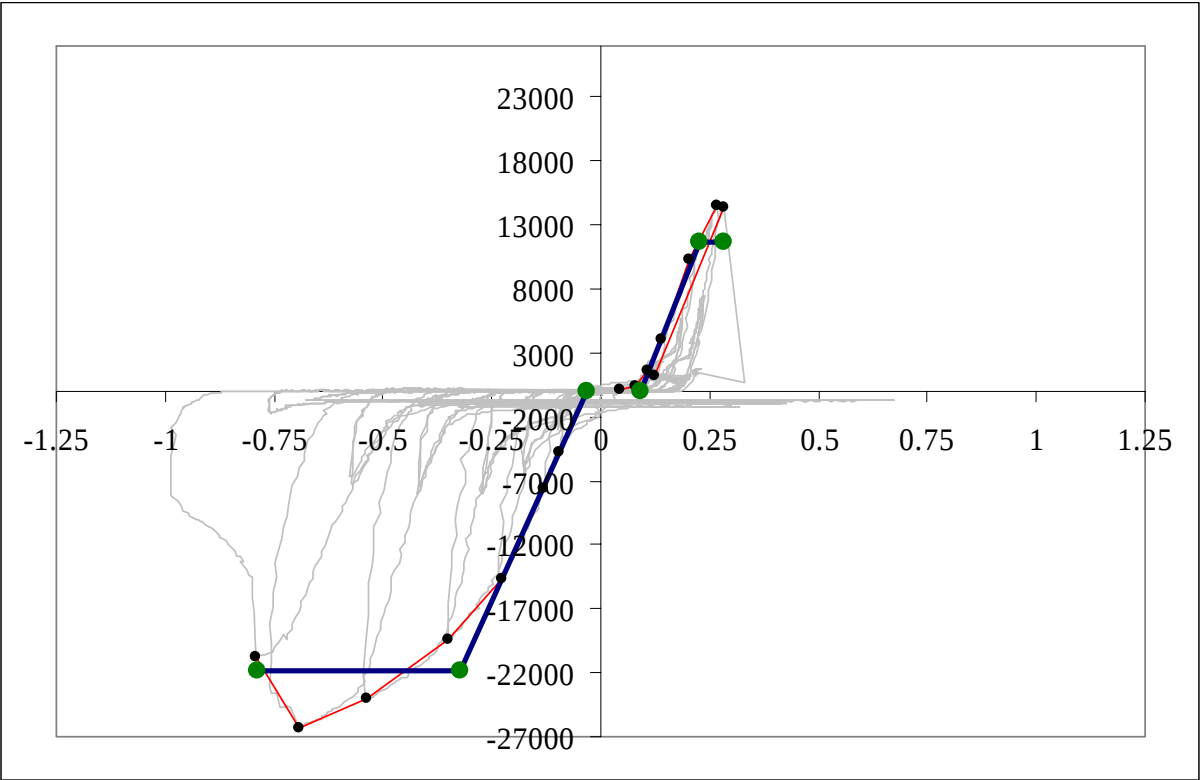


Figure B.10 F8C9 Load (lbs) – Deflection (in) Plot

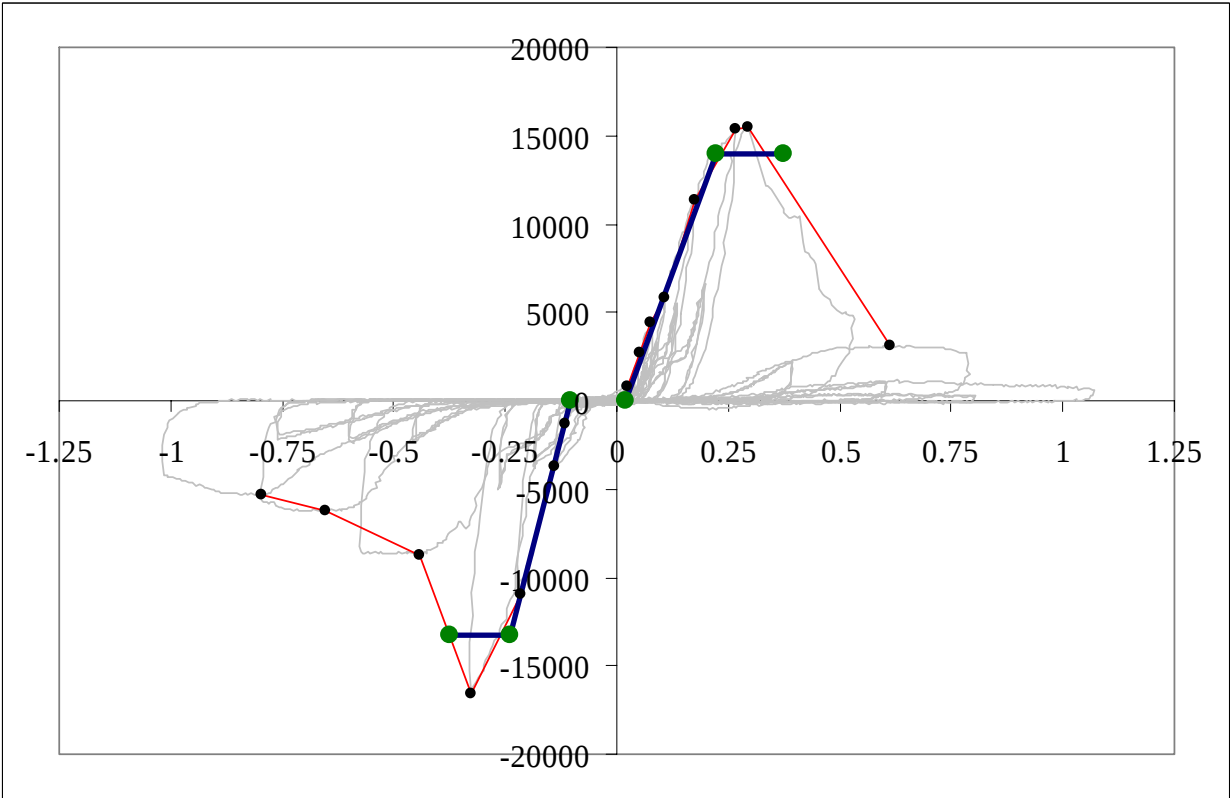


Figure B.11 F8C10 Load (lbs) – Deflection (in) Plot

Table B.2: F7 Connection and Member Properties

	F7 Series										Mean	St. Dev.	COV(%)
	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10			
Max Load (lbs)	23400	20500	22200	19950	22800	22100	20050	22900	17550	19750	21120	1851	8.76
@ Displ. (in)	0.58	0.46	0.59	0.55	0.56	0.51	0.37	0.45	0.52	0.43	0.501	0.072	14.3
Failure Load (lbs)	18750	16400	17750	15950	18250	17650	16050	18300	14050	15800	16895	1479	8.8
@ Displ. (in)	0.56	0.50	0.61	0.57	0.57	0.52	0.41	0.44	0.54	0.46	0.519	0.065	12.45
40% Max (lbs)	6950	5950	6500	6250	6550	5900	6850	7950	4300	5500	6270	970	15.5
@ Displ. (in)	0.12	0.13	0.12	0.12	0.11	0.13	0.12	0.13	0.12	0.12	0.122	0.006	4.57
E.E.P. Yield (lbs)	20100	17250	18950	17450	19700	18650	17300	19000	15800	16450	18065	1421	7.87
@ Displ. (in)	0.30	0.28	0.32	0.27	0.30	0.29	0.24	0.25	0.31	0.26	0.282	0.028	10.0
5% Offset (lbs)	17450	17500	17150	15000	17250	17150	17600	18750	14650	16400	16890	1236	7.32
@ Displ. (in)	0.31	0.32	0.34	0.28	0.32	0.31	0.29	0.29	0.34	0.30	0.309	0.020	6.59
Elastic Stiff. (lb/in)	73900	73100	62950	76650	71800	82550	83550	96550	61100	78600	76075	10285	13.5
Slack (in)	0.02	0.04	0.02	0.04	0.03	0.06	0.04	0.05	0.05	0.05	0.040	0.013	33.1
E.E.P. Energy (lb*in)	7650	5750	8350	7100	8000	6800	4950	5850	5500	5200	6515	1226	18.8
Ductility Ratio	1.88	1.78	1.92	2.18	1.96	1.91	1.73	1.79	1.79	1.81	1.88	0.13	6.87
Yield Mode	II	II	II	II	II	II	II	II	II	II			
Failure Mode	split	split	split	split	split	split	split	split	split	split			
Governing Member	B	T	T	T	T	B	T	T	T	T			

	F7 Series										Mean	St. Dev.	COV(%)
	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10			
Member Top													
M.C. (%)	13	15	14	15	14	15	15	15	15	15	14.5	0.6	4.4
S.G.	0.68	0.53	0.46	0.52	0.44	0.50	0.53	0.60	0.48	0.54	0.526	0.070	13.3
D.E. 5% Yield (psi)	5181	4011	3921	4115	4118	4198	3111	5106	3820	4895	4248	641	15.1
D.E. Capacity (psi)	5000	3903	3822	4115	3938	4021	1624	5115	3429	4640	3961	981	24.8
Member Bottom													
M.C. (%)	15	14	15	16	16	15	15	15	15	16	15.3	0.5	3.3
S.G.	0.73	0.49	0.54	0.55	0.55	0.54	0.63	0.66	0.53	0.64	0.587	0.077	13.1
D.E. 5% Yield (psi)	4914	5377	4024	4249	5478	5188	4158	5059	3507	4852	4681	656	14.0
D.E. Capacity (psi)	3866	5390	4603	4228	894	5150	4666	5110	3704	4943	4255	1305	30.7

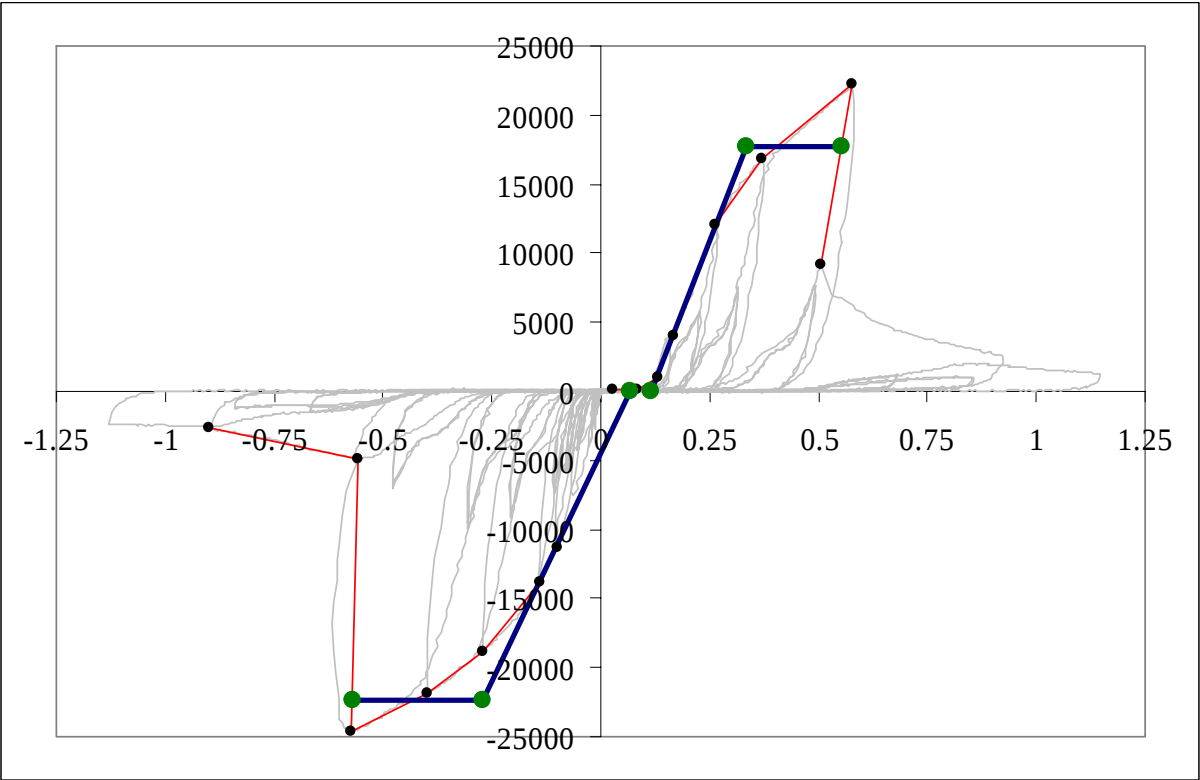


Figure B.12: F7C1 Load (lbs) – Deflection (in) Plot

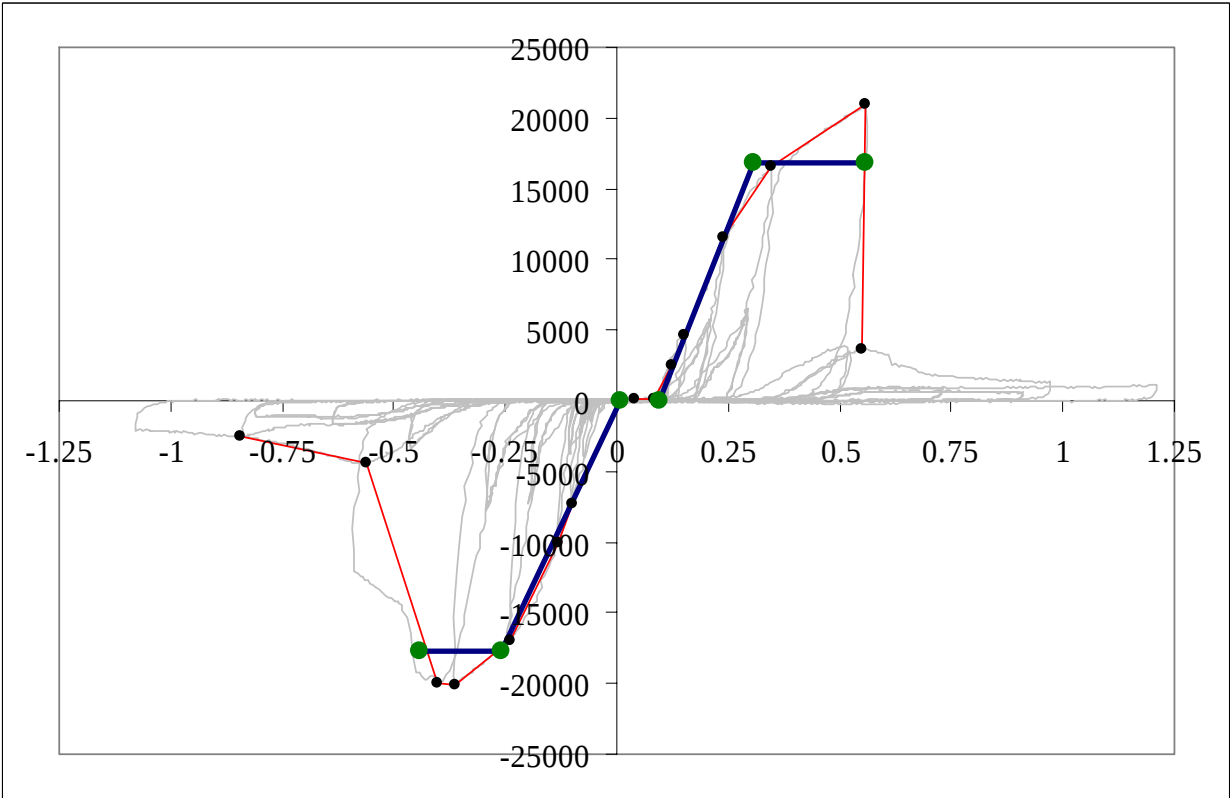


Figure B.13: F7C2 Load (lbs) – Deflection (in) Plot

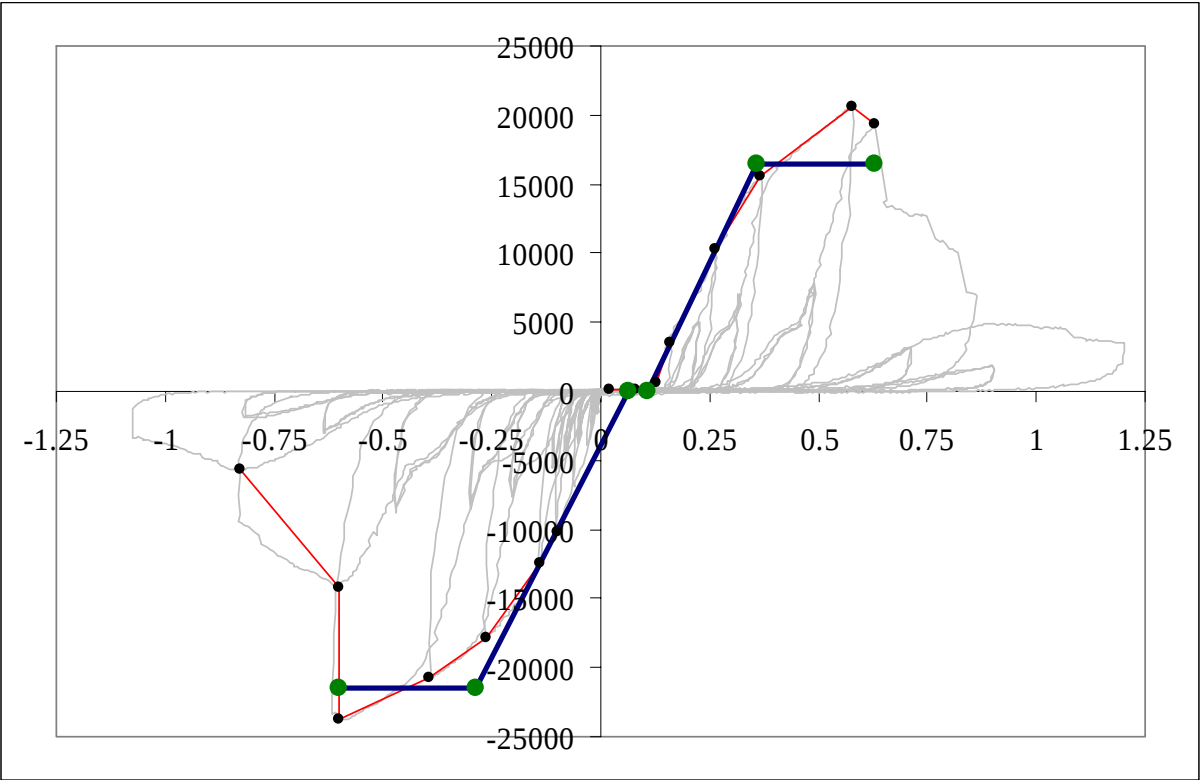


Figure B.14: F7C3 Load (lbs) – Deflection (in) Plot

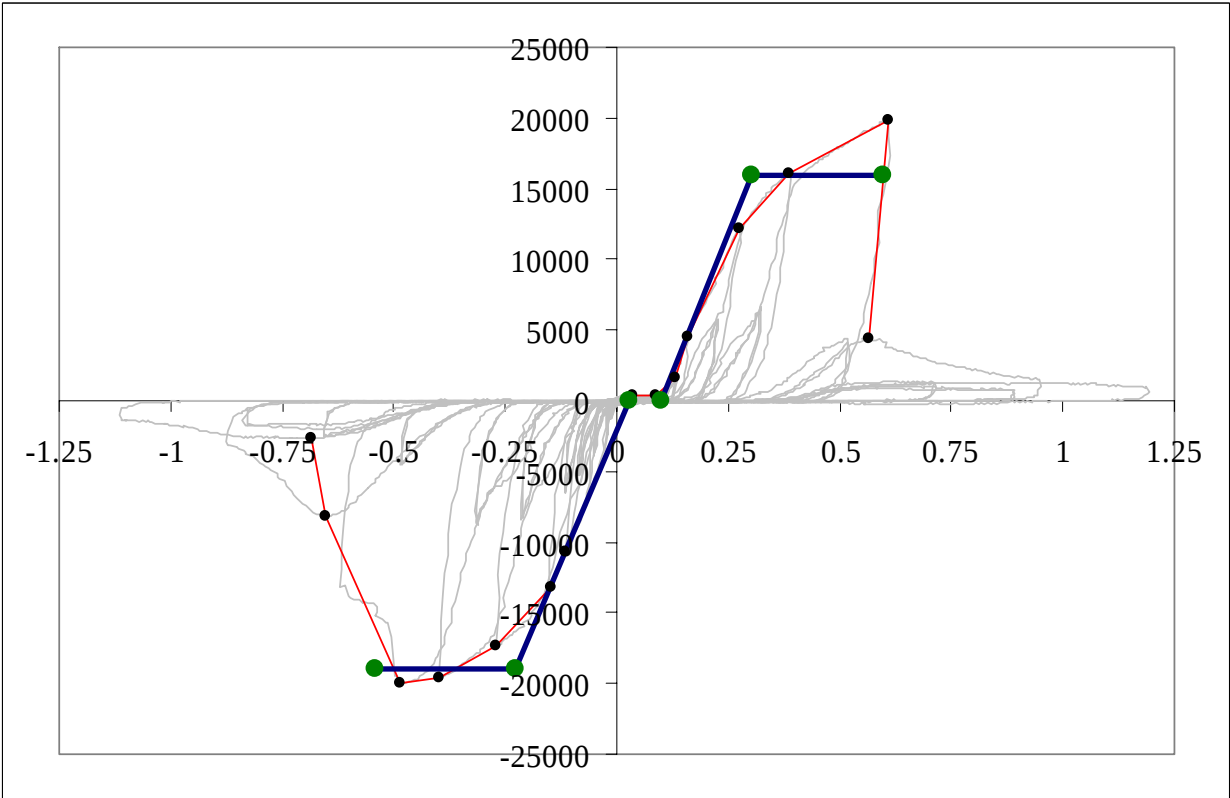


Figure B.15: F7C4 Load (lbs) – Deflection (in) Plot

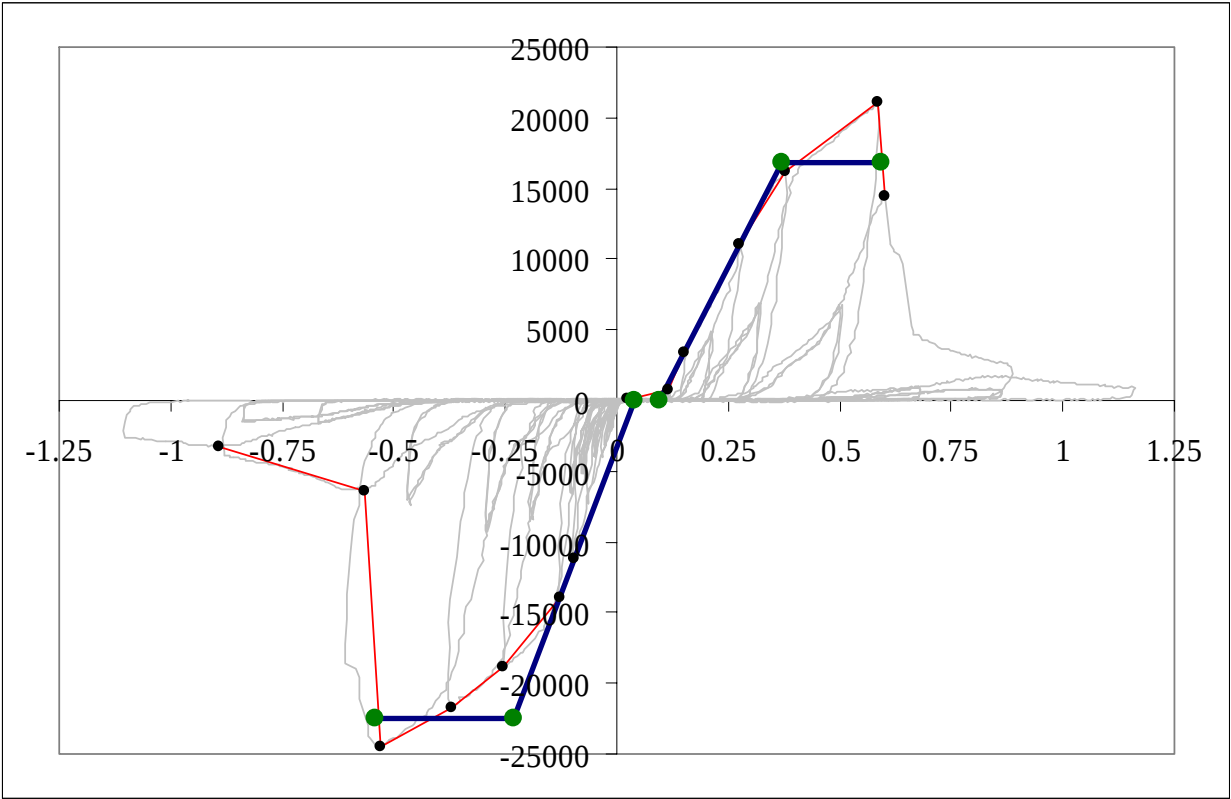


Figure B.16: F7C5 Load (lbs) – Deflection (in) Plot

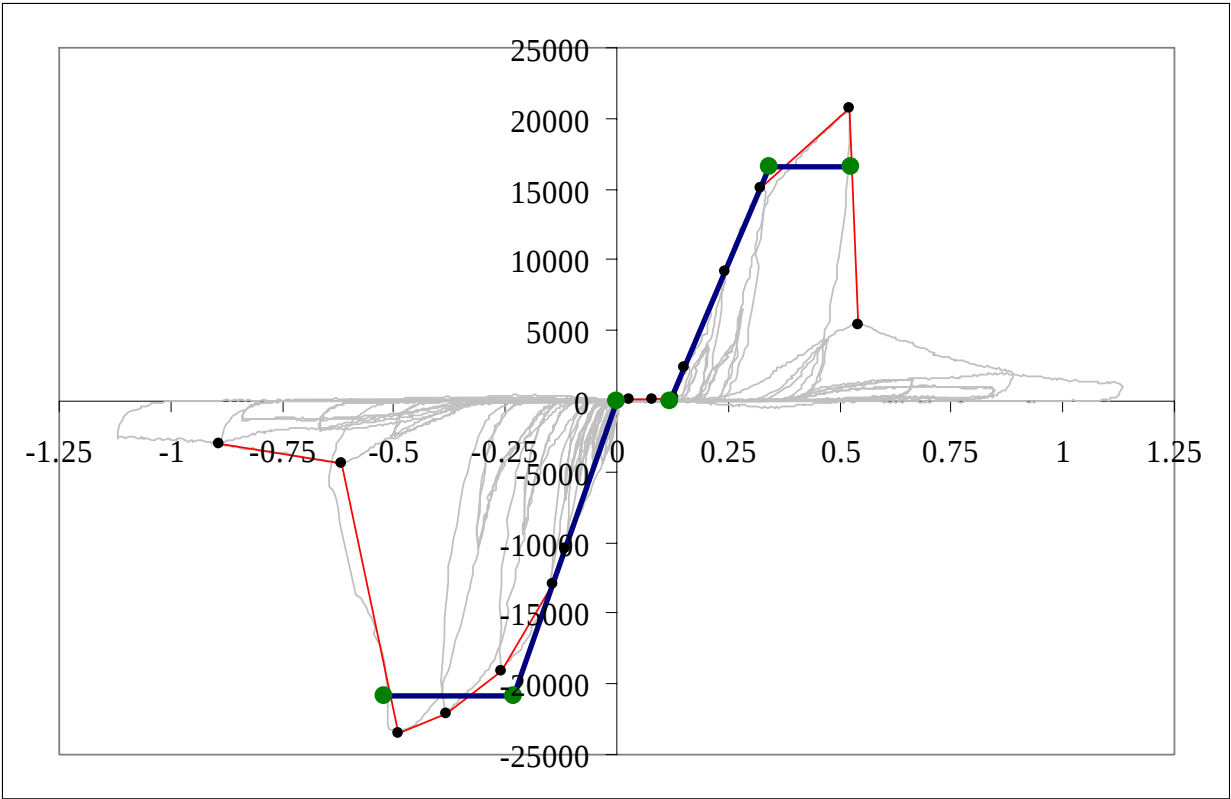


Figure B.17: F7C6 Load (lbs) – Deflection (in) Plot

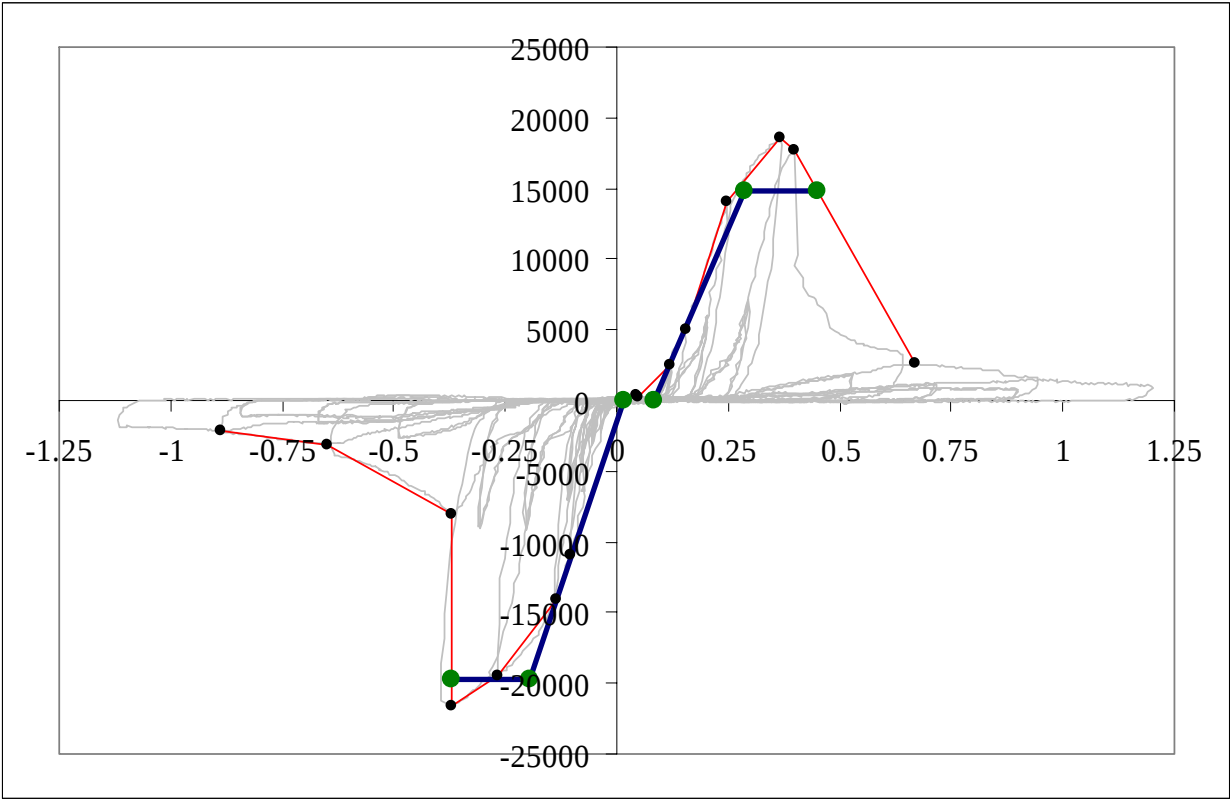


Figure B.18: F7C7 Load (lbs) – Deflection (in) Plot

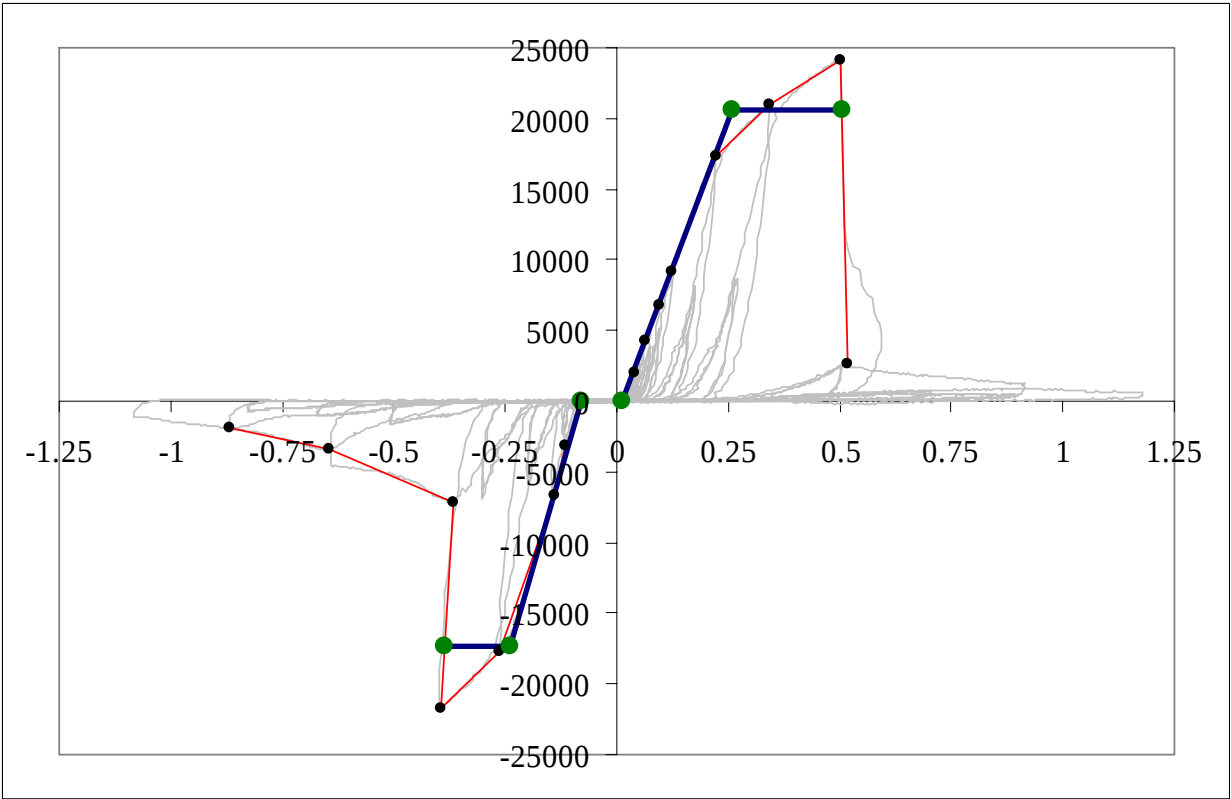


Figure B.19: F7C8 Load (lbs) – Deflection (in) Plot

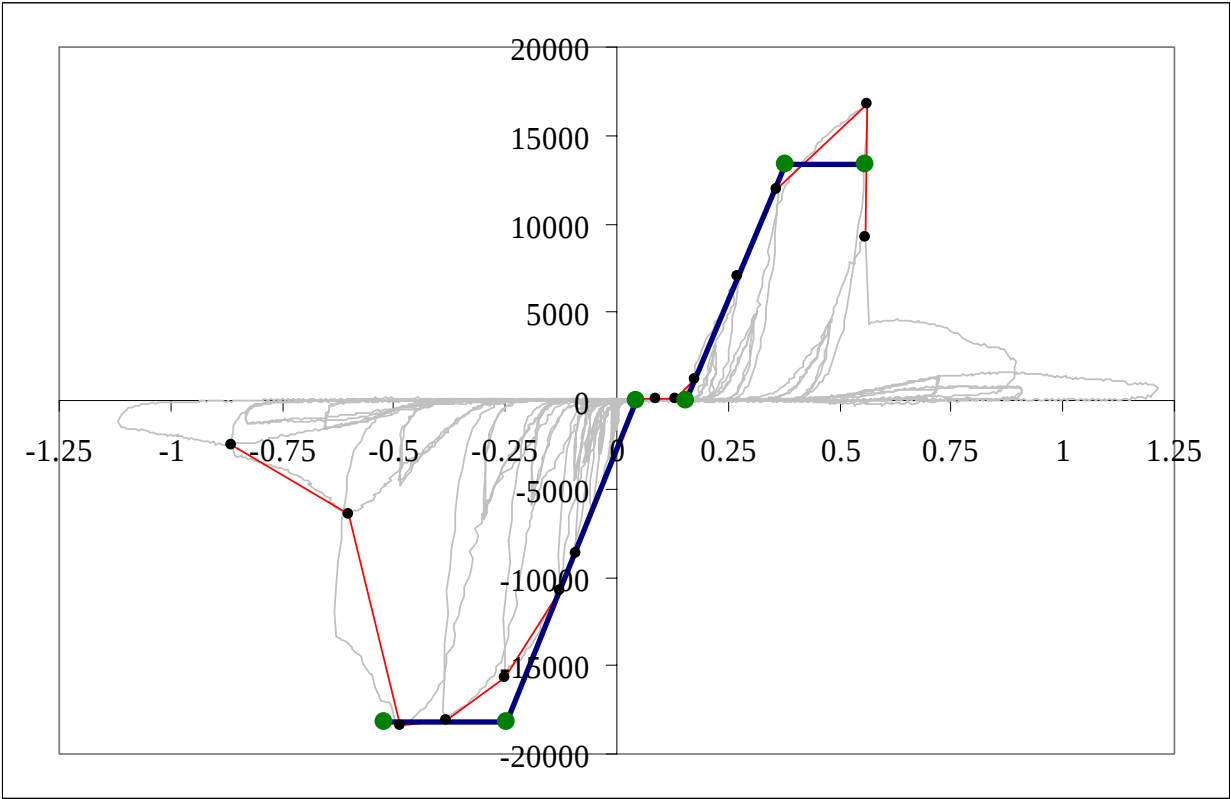


Figure B.20: F7C9 Load (lbs) – Deflection (in) Plot

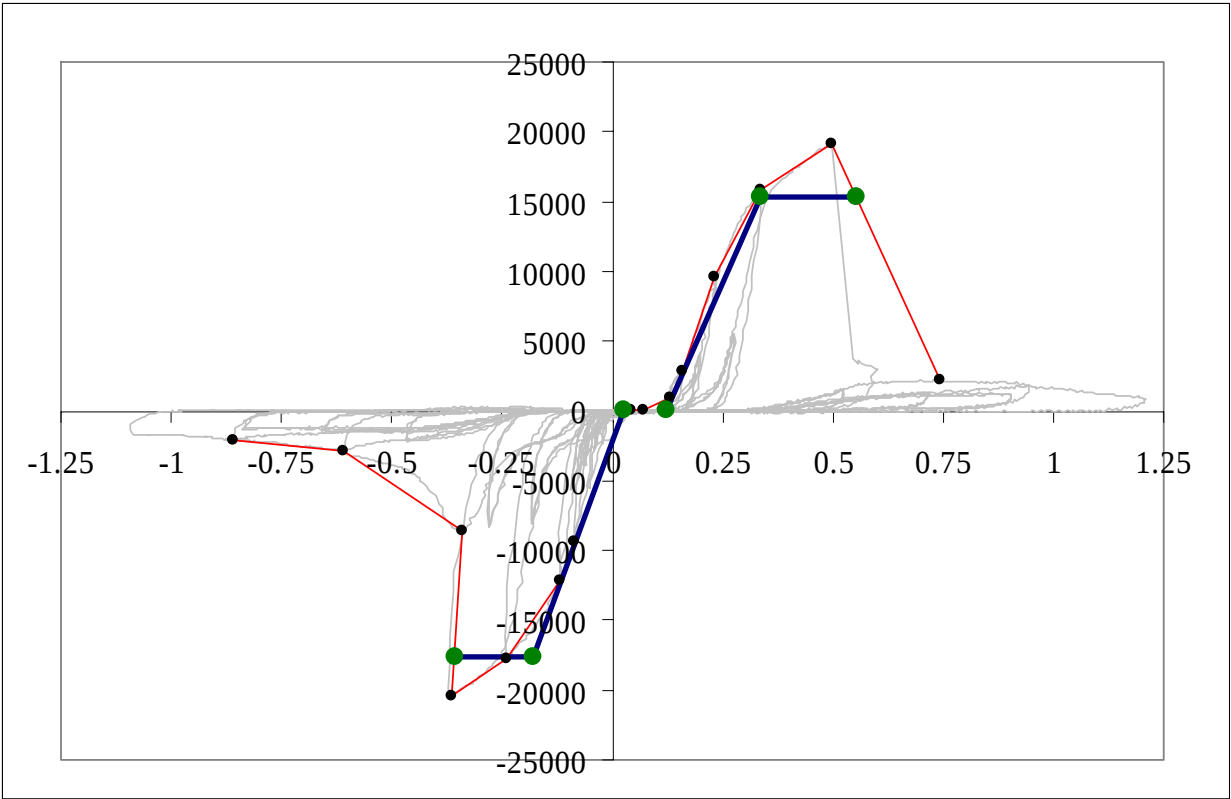


Figure B.21: F7C10 Load (lbs) – Deflection (in) Plot

Table B.3: F6 Connection and Member Properties

	F6 Series										Mean	St. Dev.	COV(%)
	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10			
Max Load (lbs)	17350	16600	21200	15450	14500	17650	18000	16300	17950	16100	17110	1828	10.7
@ Displ. (in)	0.50	0.34	0.43	0.38	0.25	0.37	0.34	0.31	0.38	0.45	0.375	0.072	19.2
Failure Load (lbs)	13900	13250	16950	12350	11600	14100	14400	13050	14350	12900	13685	1459	10.7
@ Displ. (in)	0.51	0.38	0.44	0.43	0.31	0.43	0.41	0.38	0.39	0.47	0.414	0.055	13.3
40% Max (lbs)	4250	5150	5400	3950	3900	4800	5350	6150	4800	4950	4870	700	14.4
@ Displ. (in)	0.13	0.13	0.13	0.11	0.10	0.12	0.11	0.13	0.11	0.11	0.118	0.011	9.62
E.E.P. Yield (lbs)	14850	13250	16950	13600	11600	14350	15100	13050	14600	13850	14120	1429	10.1
@ Displ. (in)	0.31	0.25	0.27	0.28	0.19	0.27	0.25	0.22	0.27	0.25	0.255	0.035	13.7
5% Offset (lbs)	14650	15850	17500	14150	13600	16650	17450	14750	16750	14400	15575	1441	9.25
@ Displ. (in)	0.35	0.33	0.32	0.34	0.25	0.35	0.32	0.29	0.35	0.30	0.317	0.032	10.2
Elastic Stiff. (lb/in)	59600	67300	88200	57450	87500	63600	74350	74400	60650	64800	69785	11074	15.9
Slack (in)	0.05	0.05	0.07	0.04	0.05	0.04	0.04	0.04	0.03	0.04	0.047	0.011	22.6
E.E.P. Energy (lb*in)	4900	3300	4750	3700	2400	4050	4150	3450	3550	5050	3930	823	20.9
Ductility Ratio	1.63	1.54	1.65	1.55	1.65	1.65	1.68	1.73	1.44	1.86	1.64	0.11	6.94
Yield Mode	II	II	II	II	II	II	II	II	II	II			
Failure Mode	split	split	split	split	split	split	split	split	split	split			
Governing Member	B	B	T	B	B	T	B	B	B	T			

	F6 Series										Mean	St. Dev.	COV(%)
Member Top	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10			
M.C. (%)	15	15	15	15	14	14	15	16	15	15	14.9	0.7	4.4
S.G.	0.63	0.47	0.45	0.46	0.52	0.54	0.55	0.61	0.53	0.64	0.539	0.068	12.7
D.E. 5% Yield (psi)	4663	4764	4171	4713	6375	4937	4889	3885	3489	3314	4520	876	19.4
D.E. Capacity (psi)	3122	4619	2426	3705	7925	4259	4814	3954	3543	2985	4135	1524	36.9
Member Bottom	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	Mean	St. Dev.	COV(%)
M.C. (%)	15	15	16	15	15	16	13	13	15	13	14.5	1.2	7.9
S.G.	0.68	0.42	0.49	0.45	0.58	0.58	0.54	0.49	0.65	0.55	0.544	0.084	15.4
D.E. 5% Yield (psi)	3283	4820	5381	3728	4122	4258	3893	4328	5510	4005	4333	710	16.4
D.E. Capacity (psi)	3284	4820	5239	3880	3818	4059	3946	3368	5417	3466	4130	767	18.6

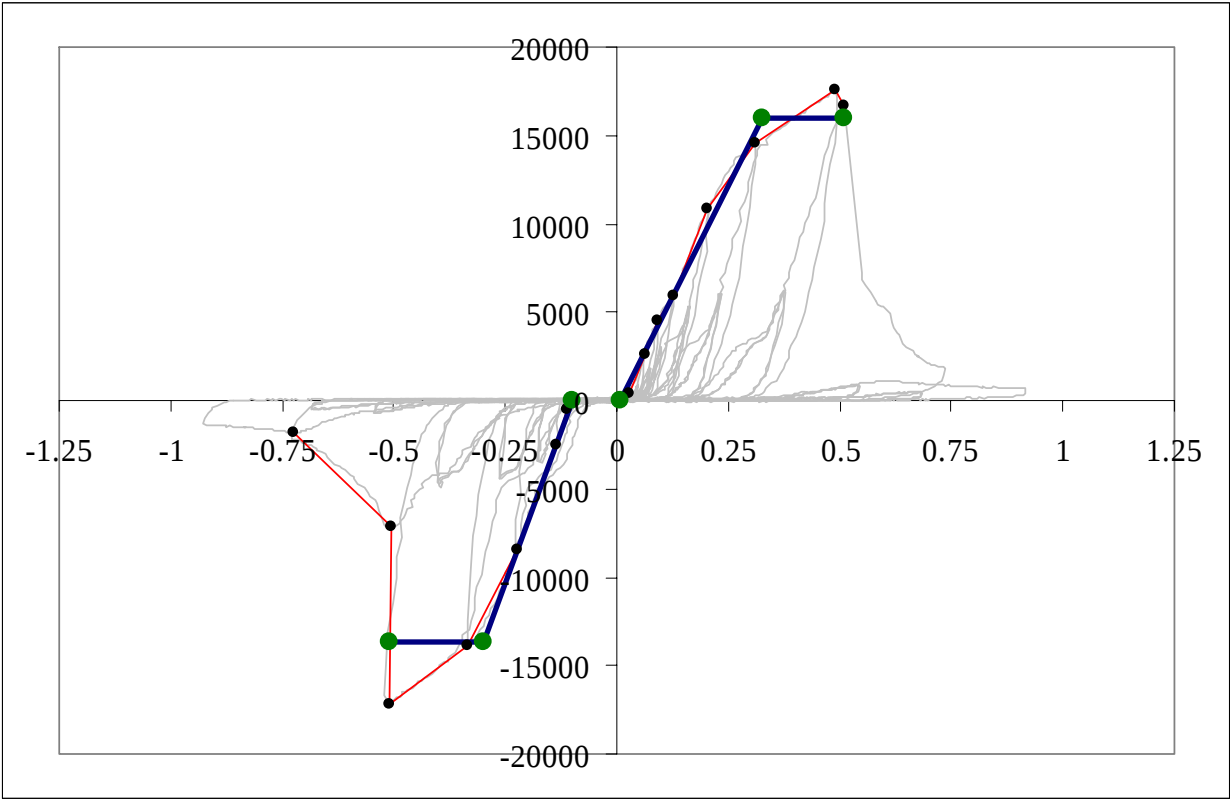


Figure B.22: F6C1 Load (lbs) – Deflection (in) Plot

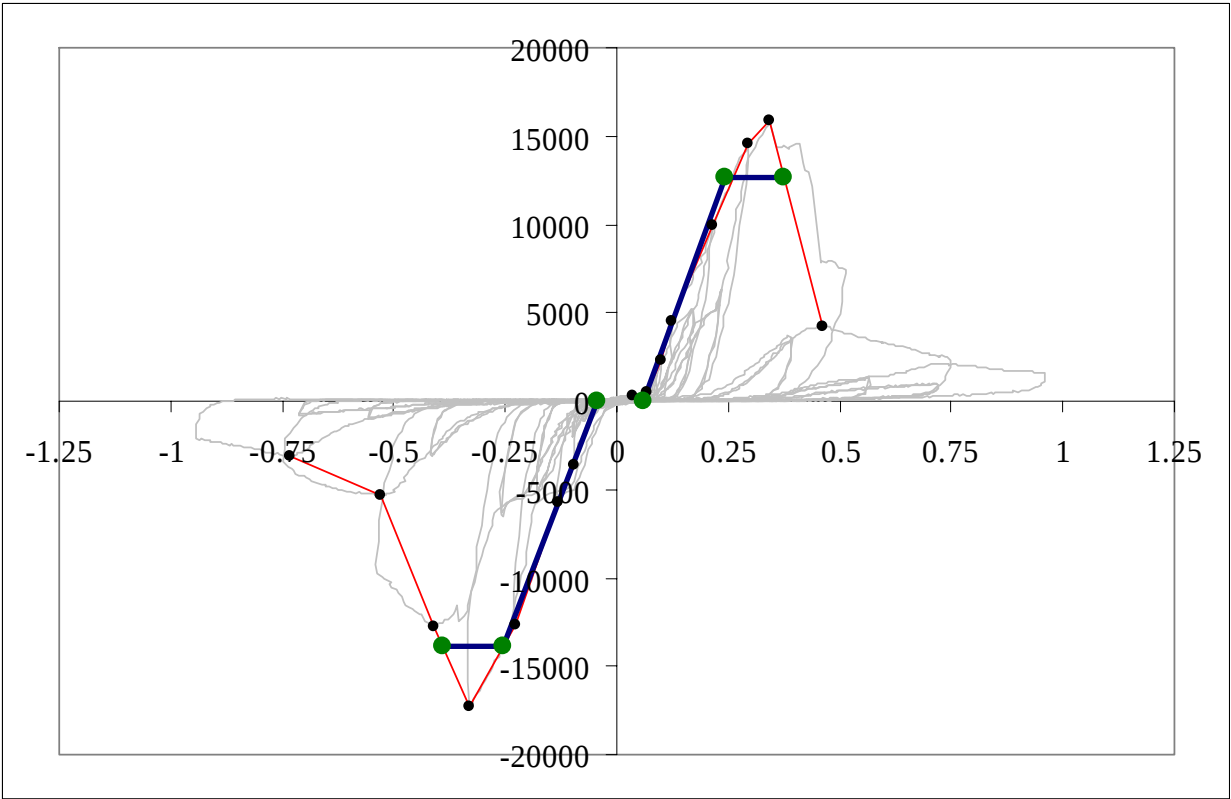


Figure B.23: F6C2 Load (lbs) – Deflection (in) Plot

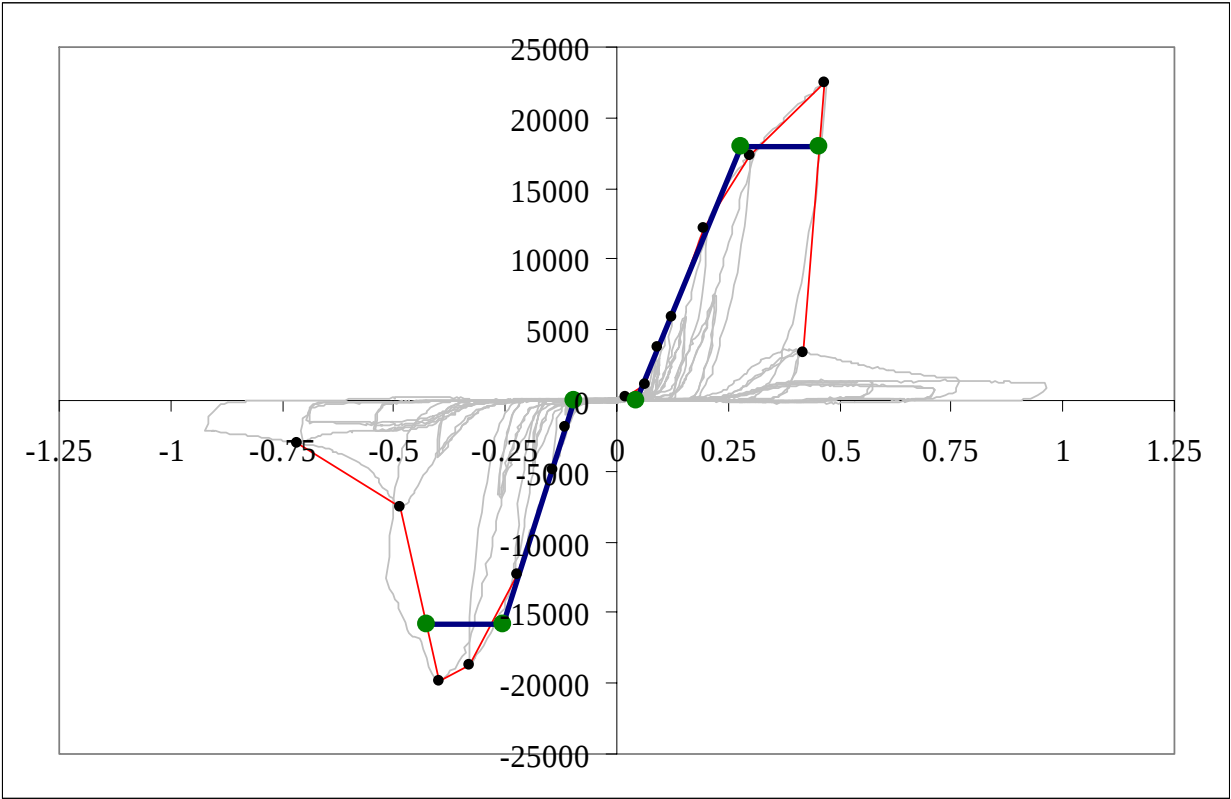


Figure B.24: F6C3 Load (lbs) – Deflection (in) Plot

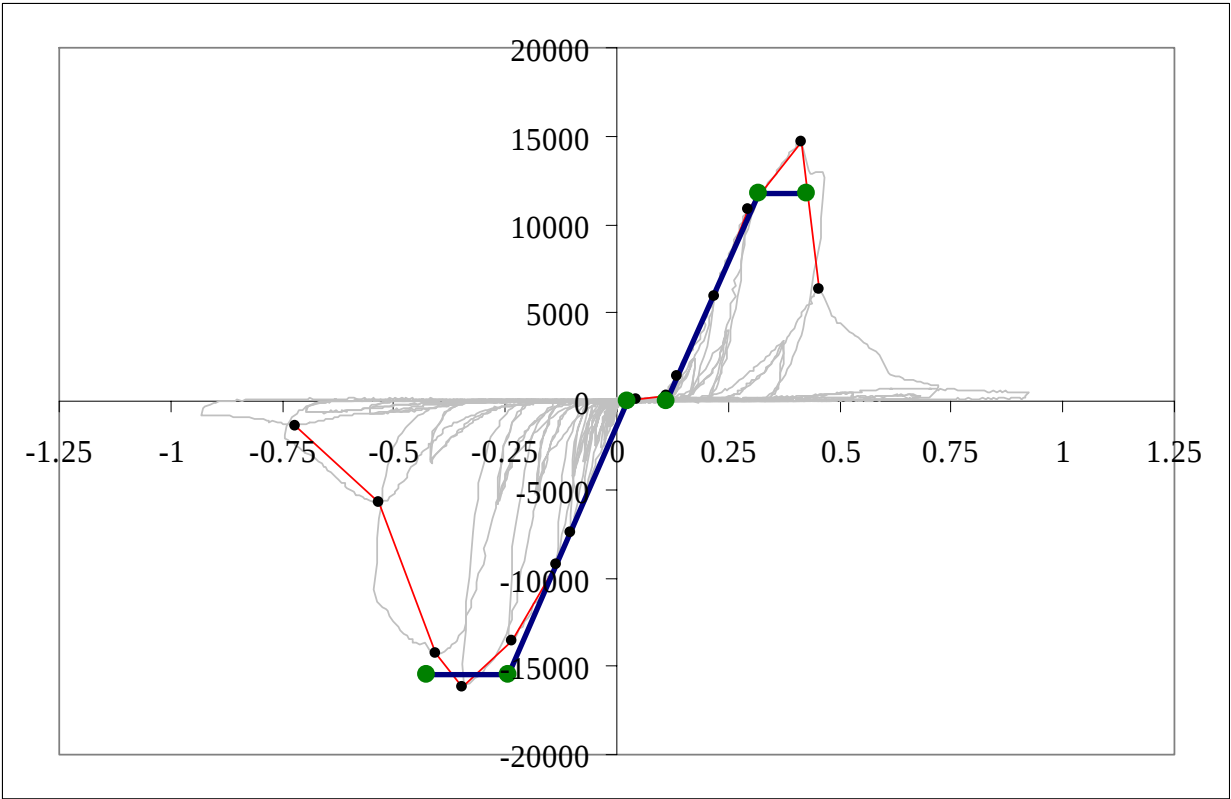


Figure B.25: F6C4 Load (lbs) – Deflection (in) Plot

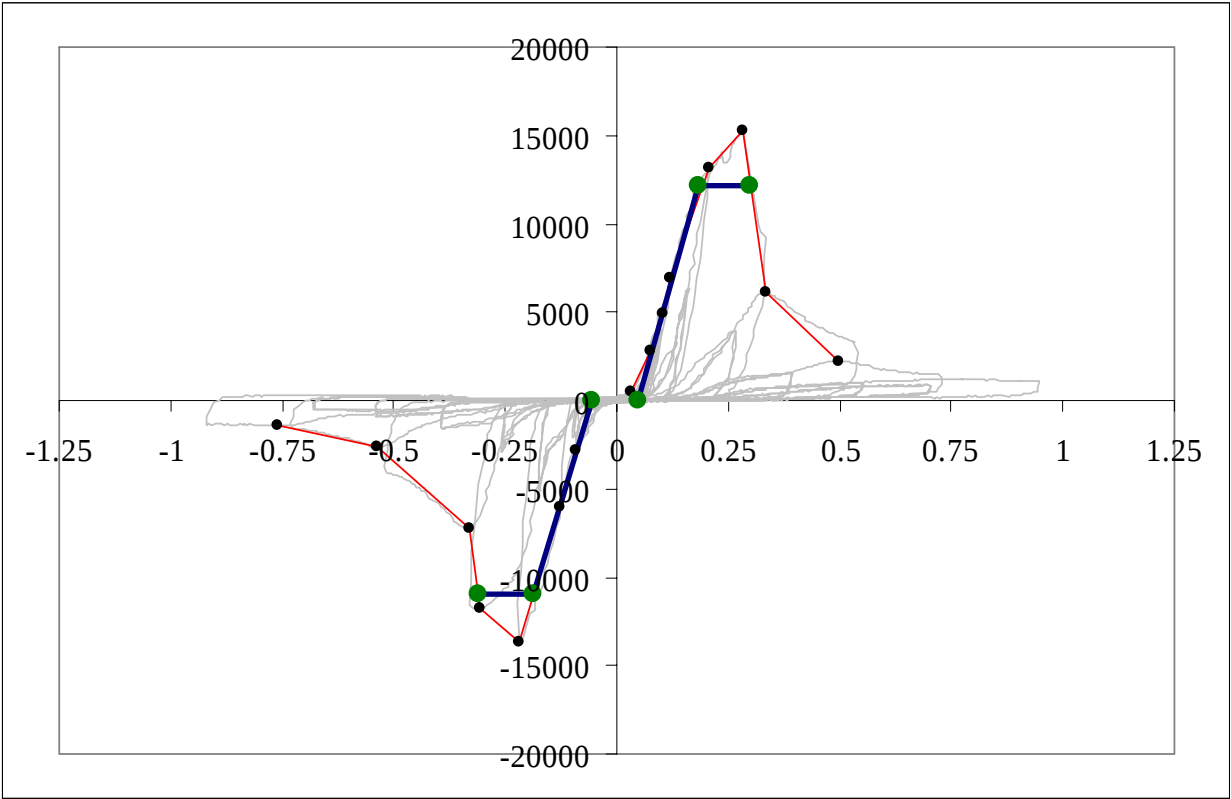


Figure B.26: F6C5 Load (lbs) – Deflection (in) Plot

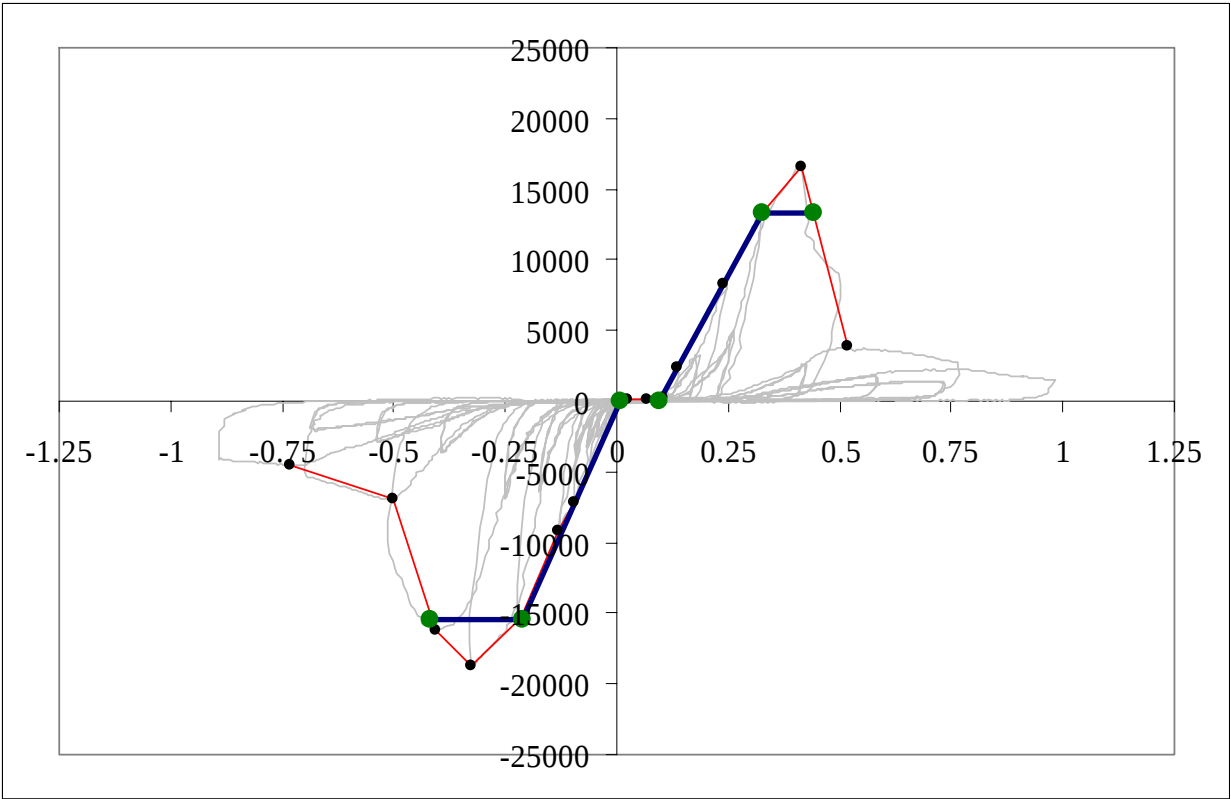


Figure B.27: F6C6 Load (lbs) – Deflection (in) Plot

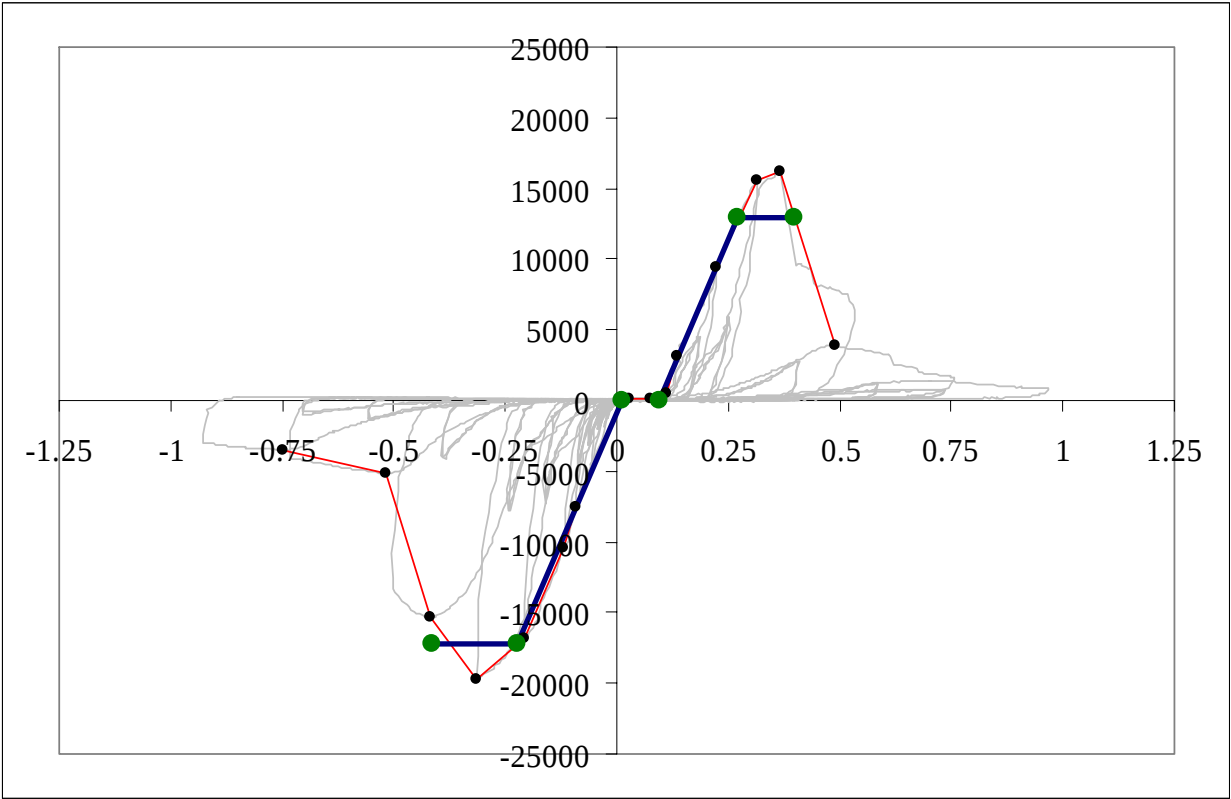


Figure B.28: F6C7 Load (lbs) – Deflection (in) Plot

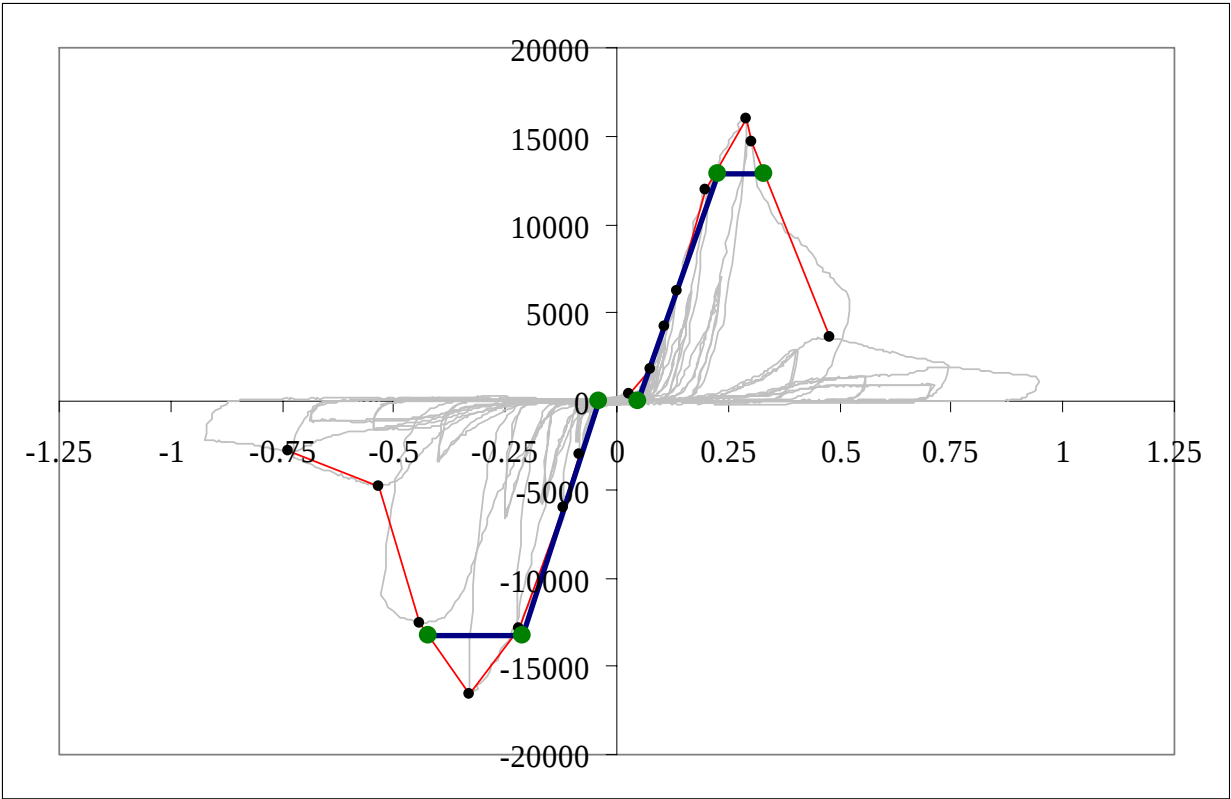


Figure B.29: F6C8 Load (lbs) – Deflection (in) Plot

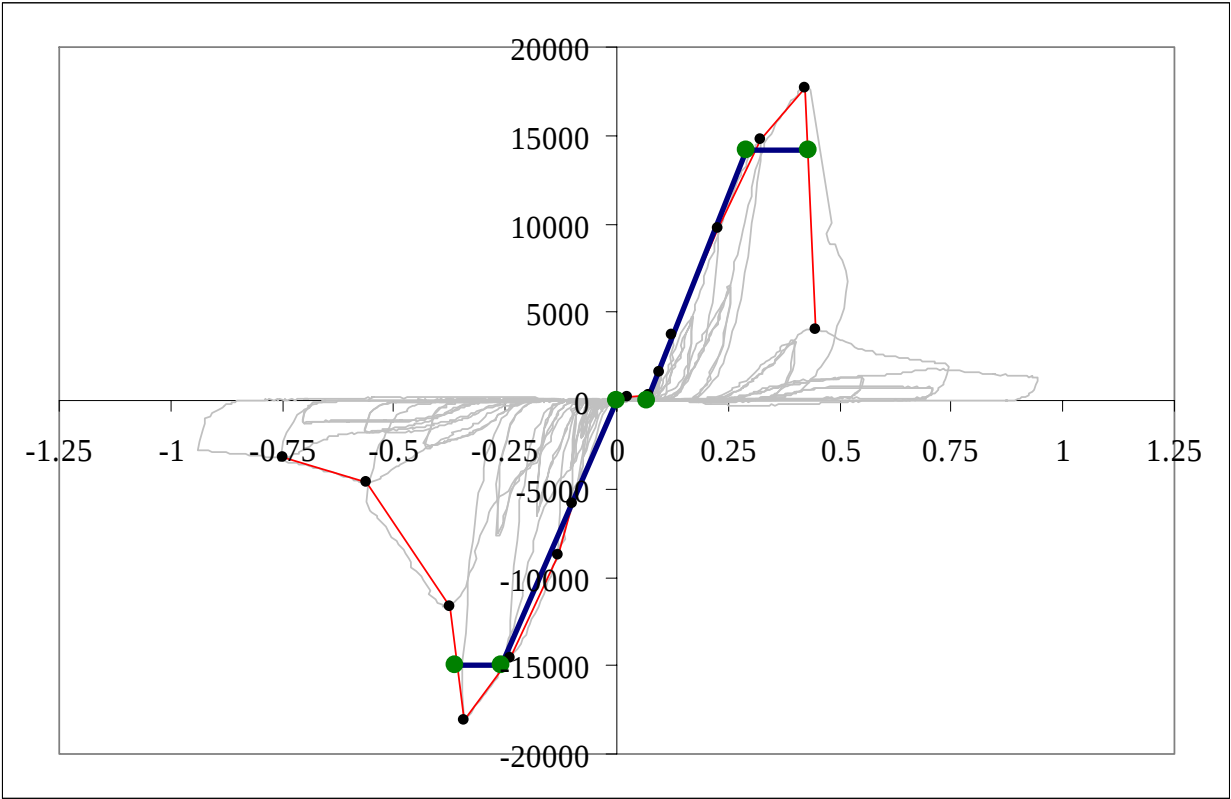


Figure B.30: F6C9 Load (lbs) – Deflection (in) Plot

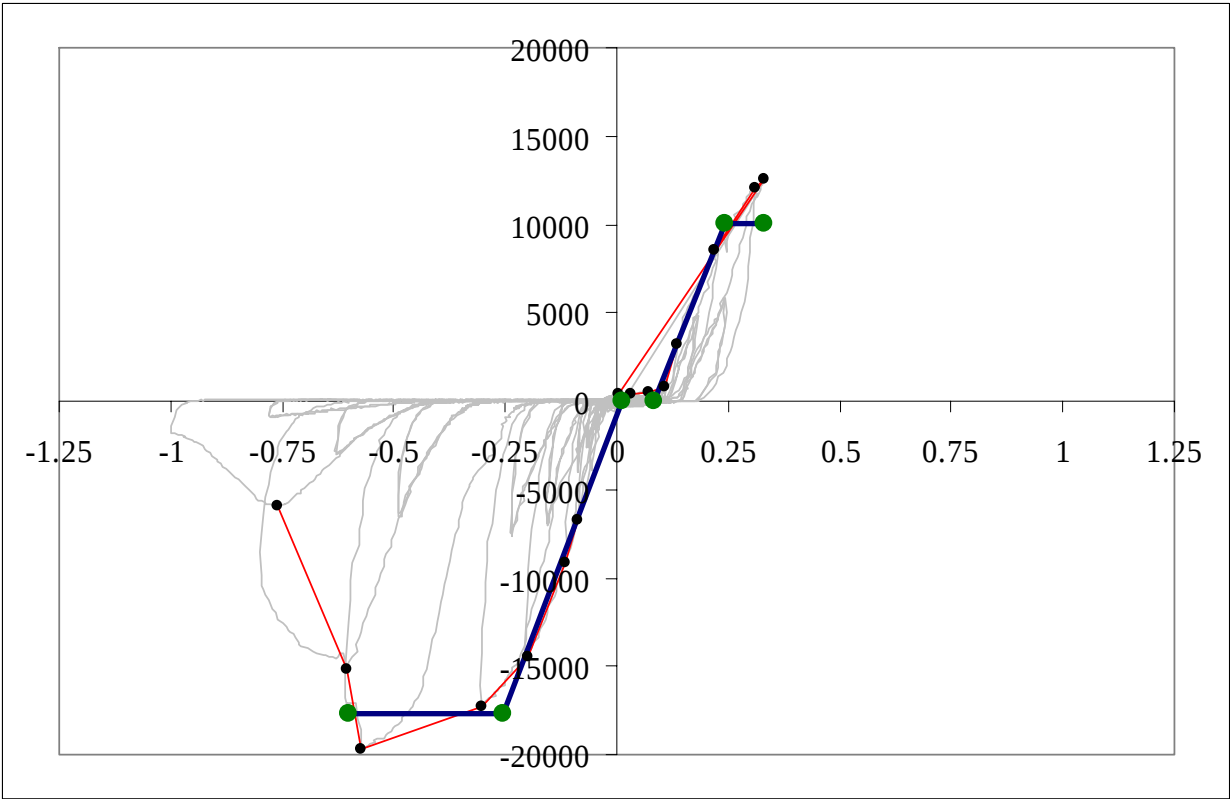


Figure B.31: F6C10 Load (lbs) – Deflection (in) Plot

Table B.4: F5 Connection and Member Properties

	F5 Series										Mean	St. Dev.	COV(%)
	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10			
Max Load (lbs)	17750	14400	12650	14050	11200	14900	12550	11750	13150	12300	13470	1905	14.1
@ Displ. (in)	0.30	0.29	0.27	0.37	0.21	0.33	0.35	0.30	0.24	0.28	0.293	0.050	17.0
Failure Load (lbs)	14200	11500	10100	11200	8950	11900	10050	9400	10500	9850	10765	1522	14.1
@ Displ. (in)	0.30	0.31	0.32	0.42	0.23	0.35	0.36	0.34	0.26	0.34	0.323	0.054	16.8
40% Max (lbs)	5350	4000	4550	3850	3600	4900	2950	3000	4900	4450	4155	816	19.6
@ Displ. (in)	0.12	0.11	0.10	0.12	0.10	0.12	0.09	0.11	0.11	0.12	0.109	0.010	9.02
E.E.P. Yield (lbs)	14200	12000	11550	12050	9650	12150	11000	10900	10750	10050	11430	1287	11.3
@ Displ. (in)	0.22	0.21	0.23	0.28	0.18	0.24	0.22	0.27	0.18	0.22	0.225	0.034	15.1
5% Offset (lbs)	16300	13750	11750	13500	8900	14450	11400	10650	12650	11950	12530	2089	16.7
@ Displ. (in)	0.29	0.28	0.29	0.35	0.21	0.32	0.27	0.31	0.23	0.29	0.282	0.041	14.5
Elastic Stiff. (lb/in)	83150	78400	52000	52100	78450	58900	65050	48100	89950	58900	66500	14852	22.3
Slack (in)	0.05	0.06	0.01	0.04	0.06	0.03	0.05	0.05	0.06	0.04	0.046	0.015	33.4
E.E.P. Energy (lb*in)	2250	2150	2400	3250	1200	2650	2600	2000	1650	2300	2245	562	25.0
Ductility Ratio	1.36	1.52	1.42	1.53	1.34	1.45	1.71	1.25	1.52	1.60	1.47	0.14	9.2
Yield Mode	II	II	II	II	II	II	II	II	II	II			
Failure Mode	split	split	split	split	split	split	split	split	split	split			
Governing Member	T	B	B	T/B	B	B	T	T/B	T	B			

	F5 Series										Mean	St. Dev.	COV(%)
Member Top	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10			
M.C. (%)	13	14	12	15	15	15	15	11	12	15	13.8	1.7	12.1
S.G.	0.27	0.56	0.44	0.62	0.59	0.56	0.62	0.48	0.41	0.57	0.513	0.110	21.4
D.E. 5% Yield (psi)	4825	4284	4444	4462	4070	4578	5017	4178	5144	2949	4395	617	14.0
D.E. Capacity (psi)	4748	4037	2734	4460	4055	4536	5017	3618	5094	2967	4127	813	19.7

Member Bottom	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	Mean	St. Dev.	COV(%)
M.C. (%)	14	15	14	13	15	14	15	14	14	15	14.3	0.8	5.8
S.G.	0.47	0.58	0.49	0.48	0.58	0.50	0.59	0.48	0.51	0.40	0.509	0.061	12.0
D.E. 5% Yield (psi)	5333	4820	4982	4032	4326	3589	3556	3363	6269	3584	4385	951	21.7
D.E. Capacity (psi)	3211	4674	4690	3998	4315	3572	2786	3712	6088	3351	4040	952	23.6

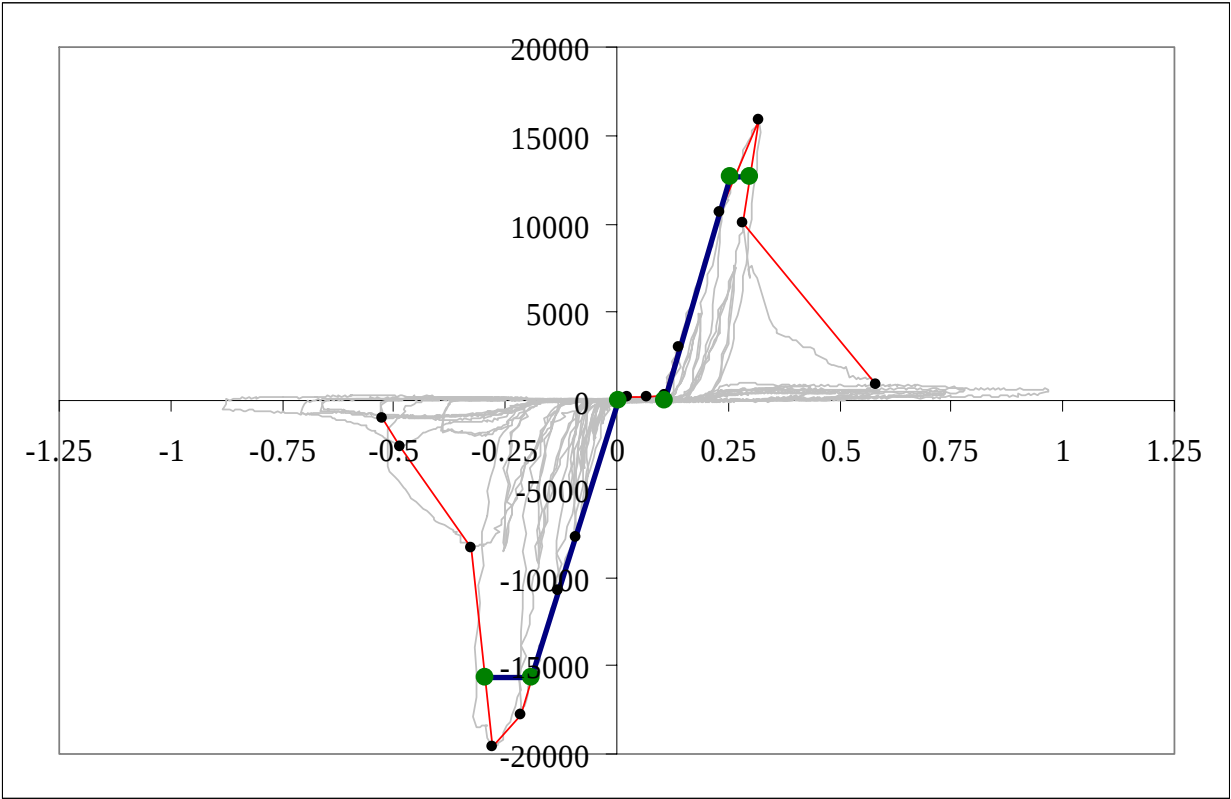


Figure B.32: F5C1 Load (lbs) – Deflection (in) Plot

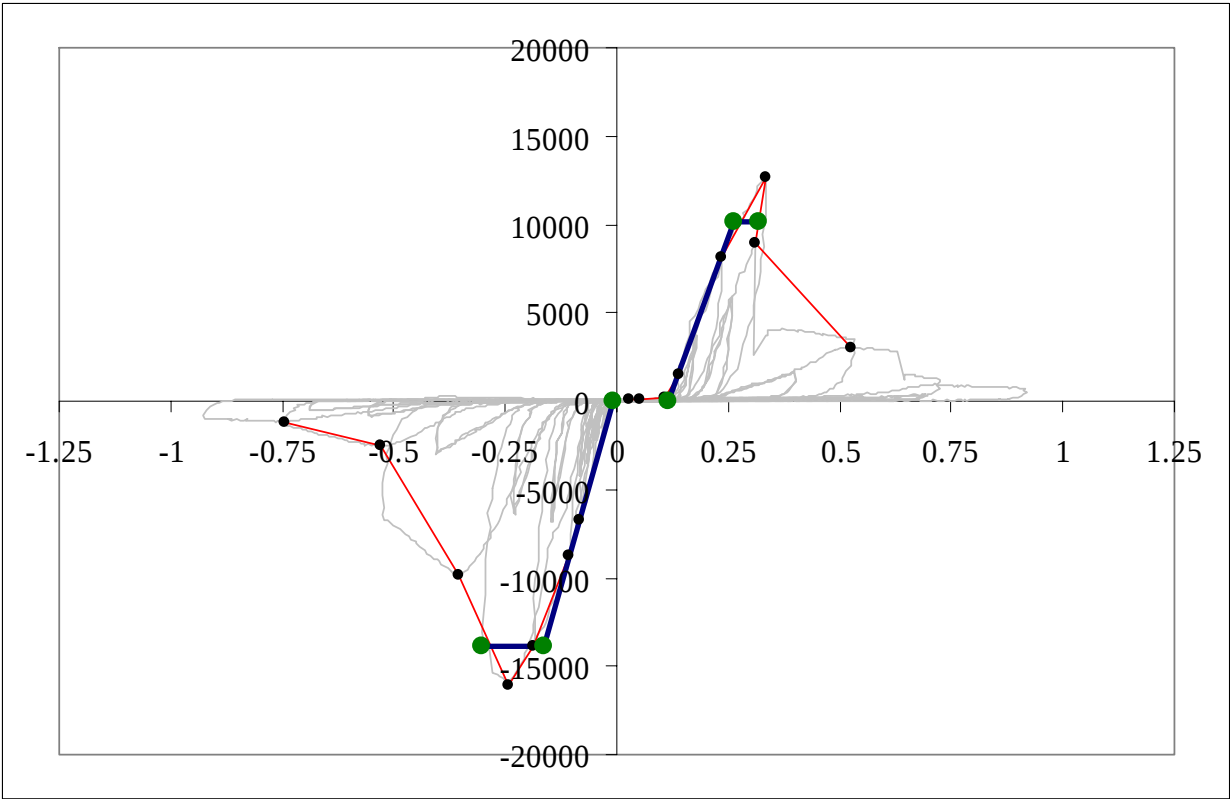


Figure B.33: F5C2 Load (lbs) – Deflection (in) Plot

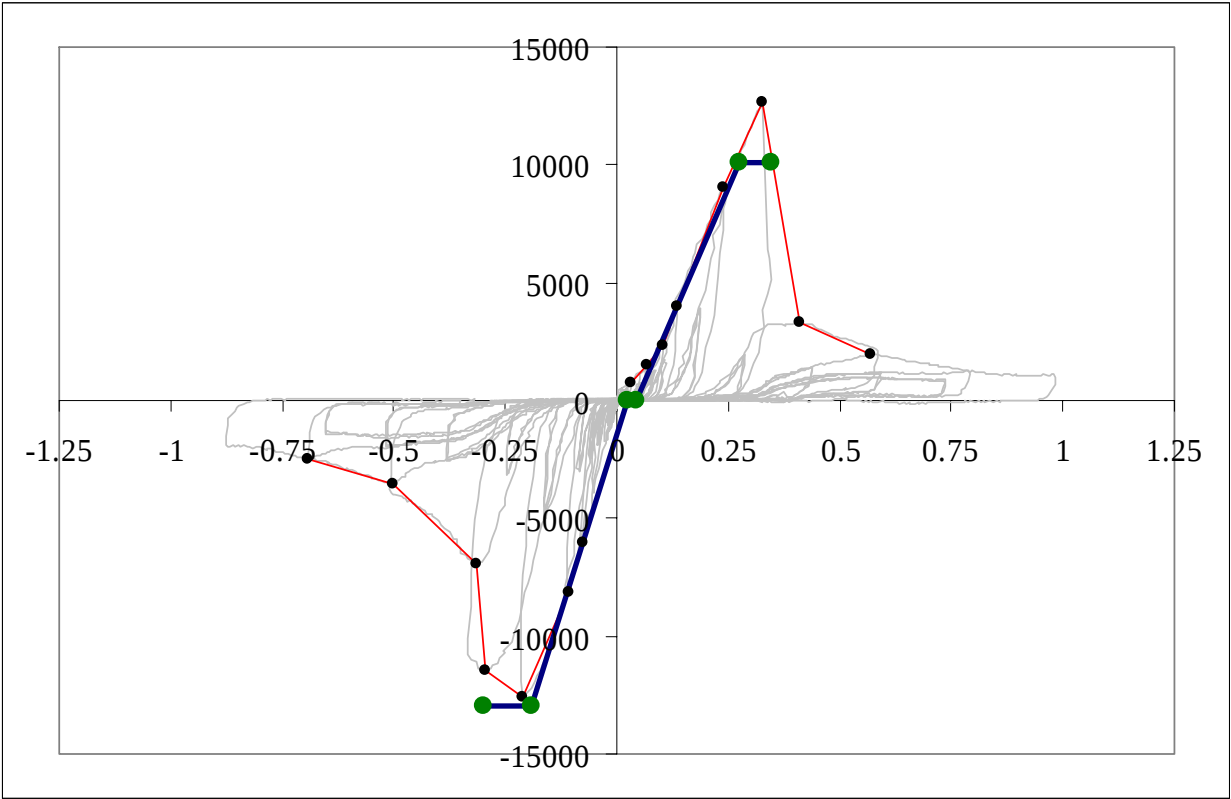


Figure B.34: F5C3 Load (lbs) – Deflection (in) Plot

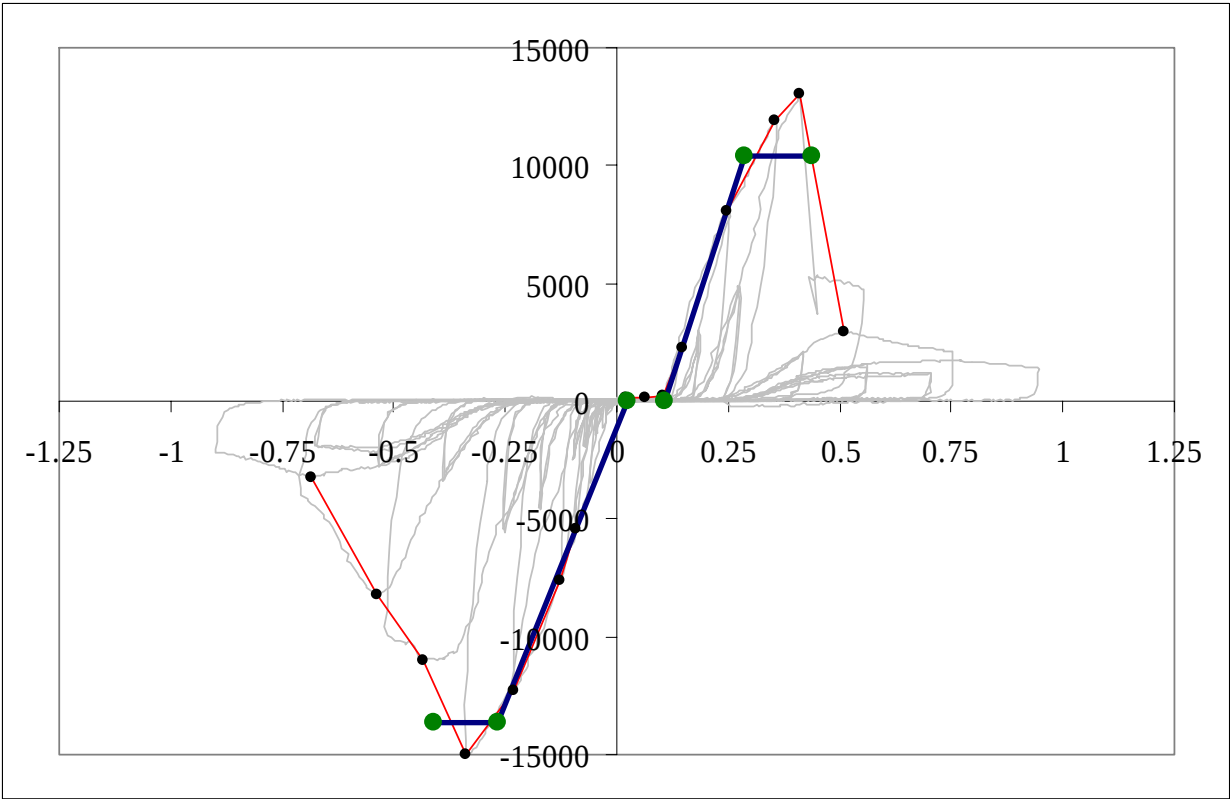


Figure B.35: F5C4 Load (lbs) – Deflection (in) Plot

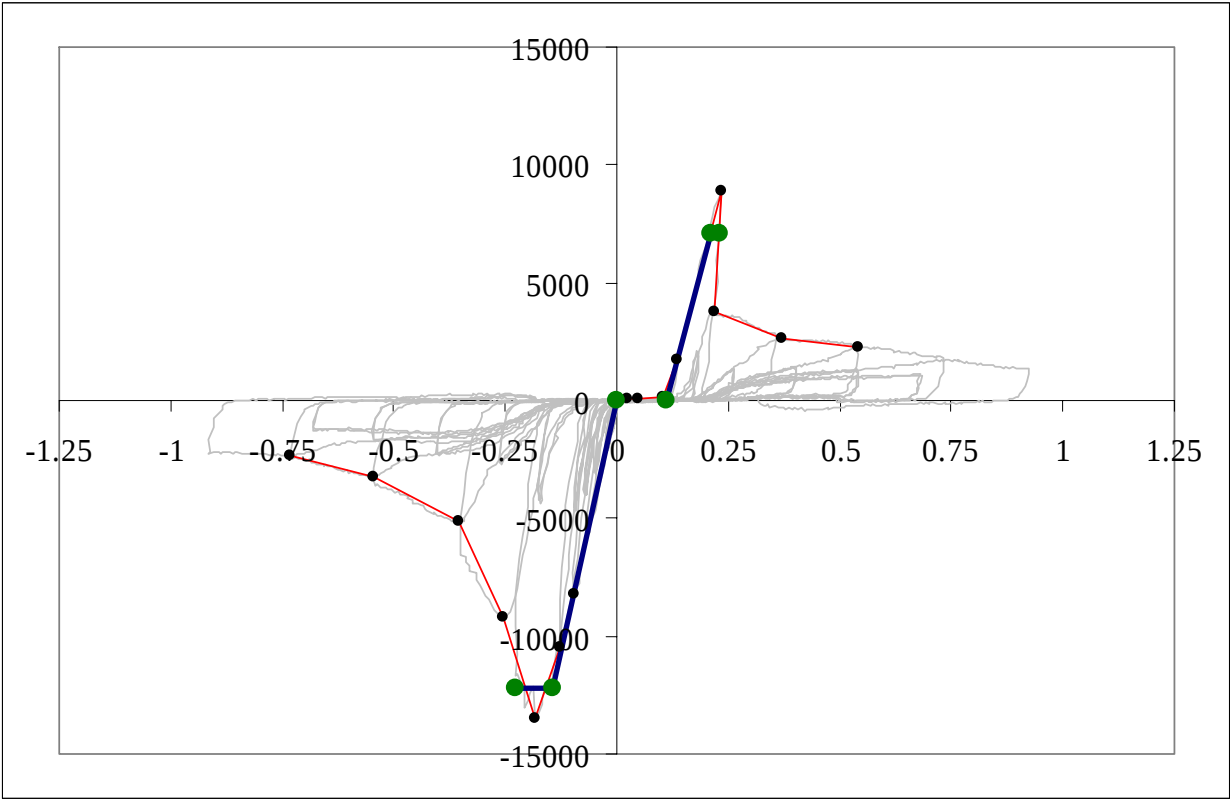


Figure B.36: F5C5 Load (lbs) – Deflection (in) Plot

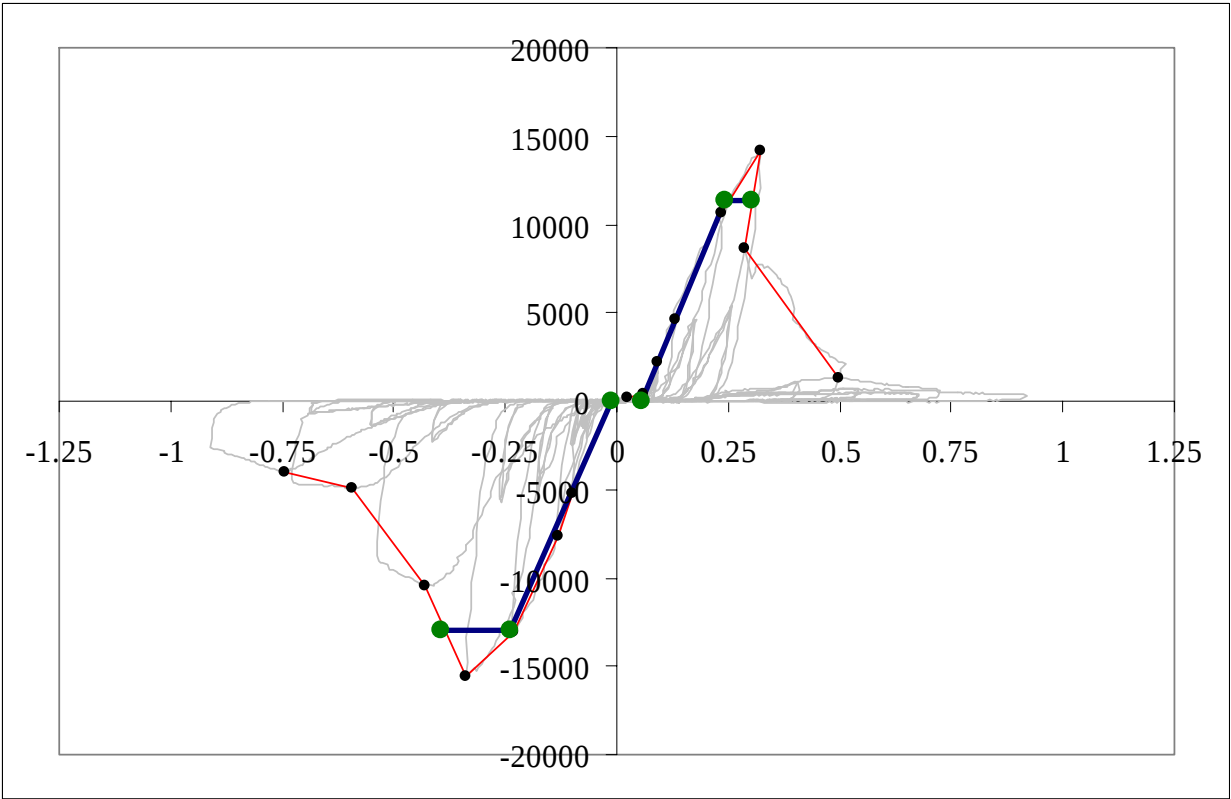


Figure B.37: F5C6 Load (lbs) – Deflection (in) Plot

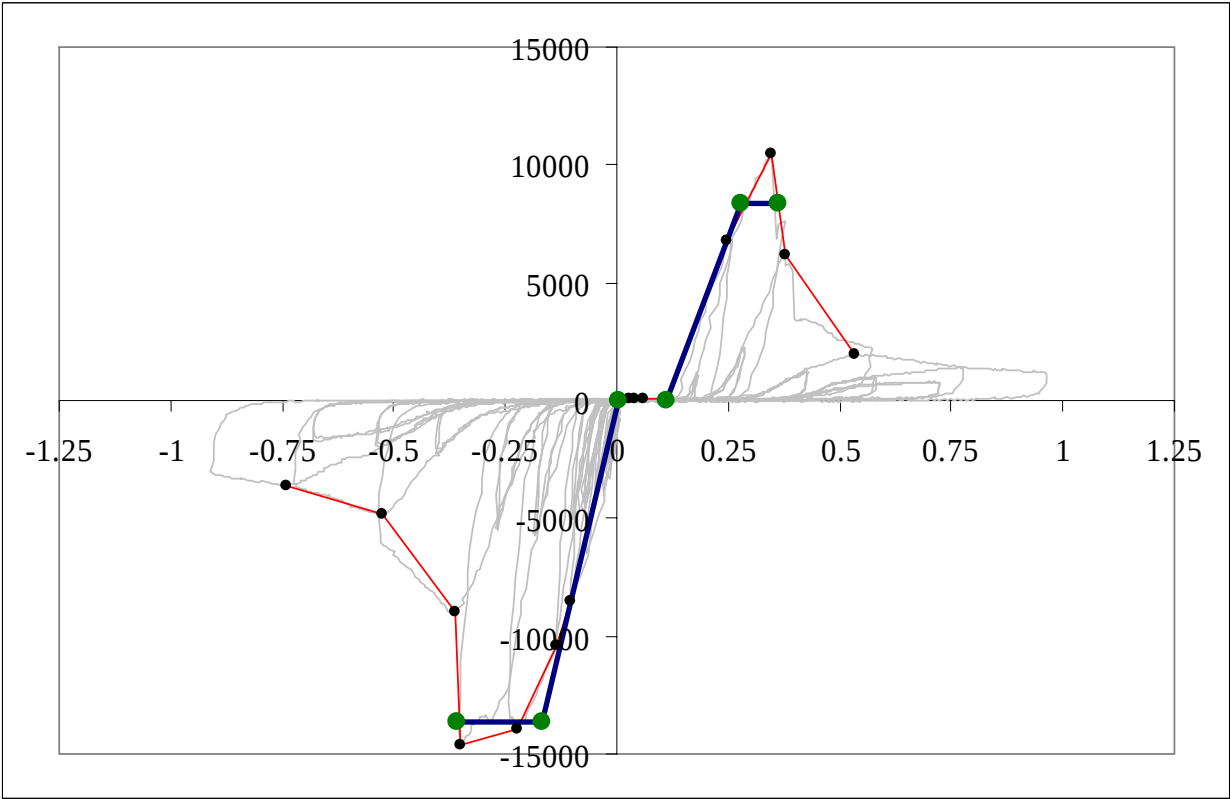


Figure B.38: F5C7 Load (lbs) – Deflection (in) Plot

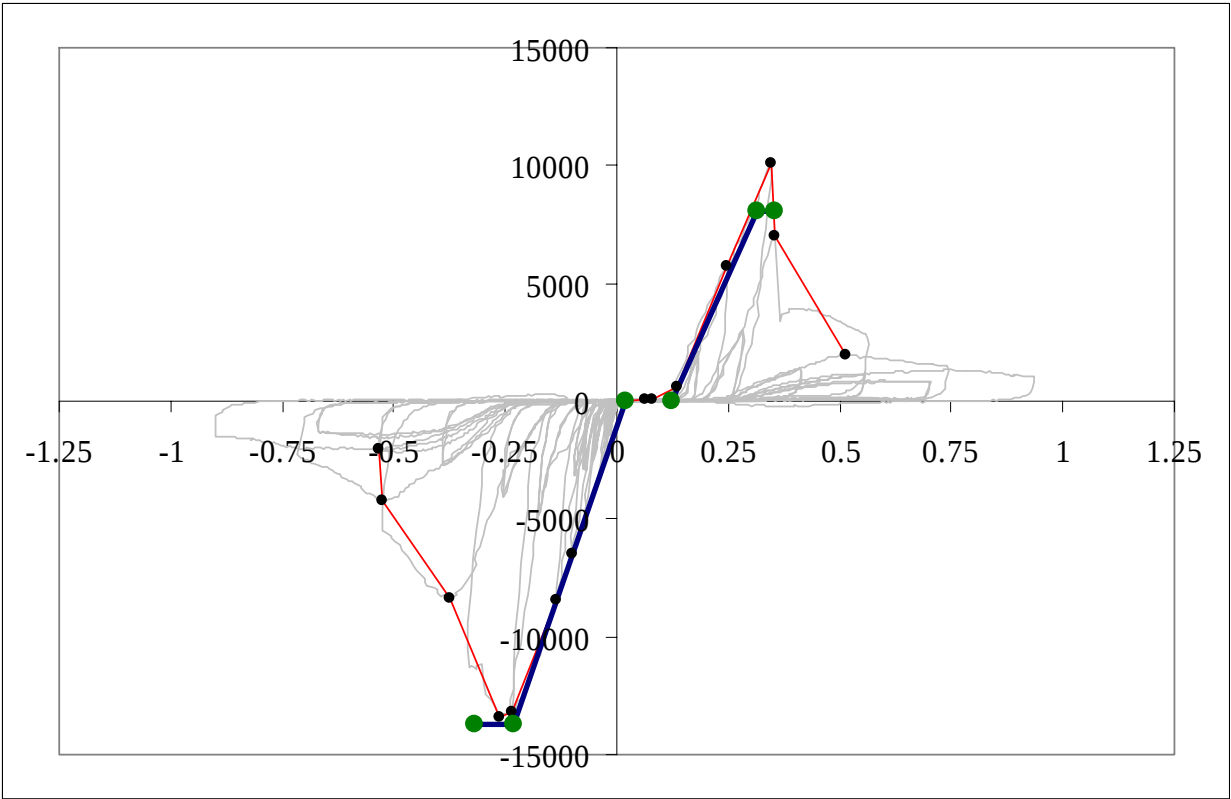


Figure B.39: F5C8 Load (lbs) – Deflection (in) Plot

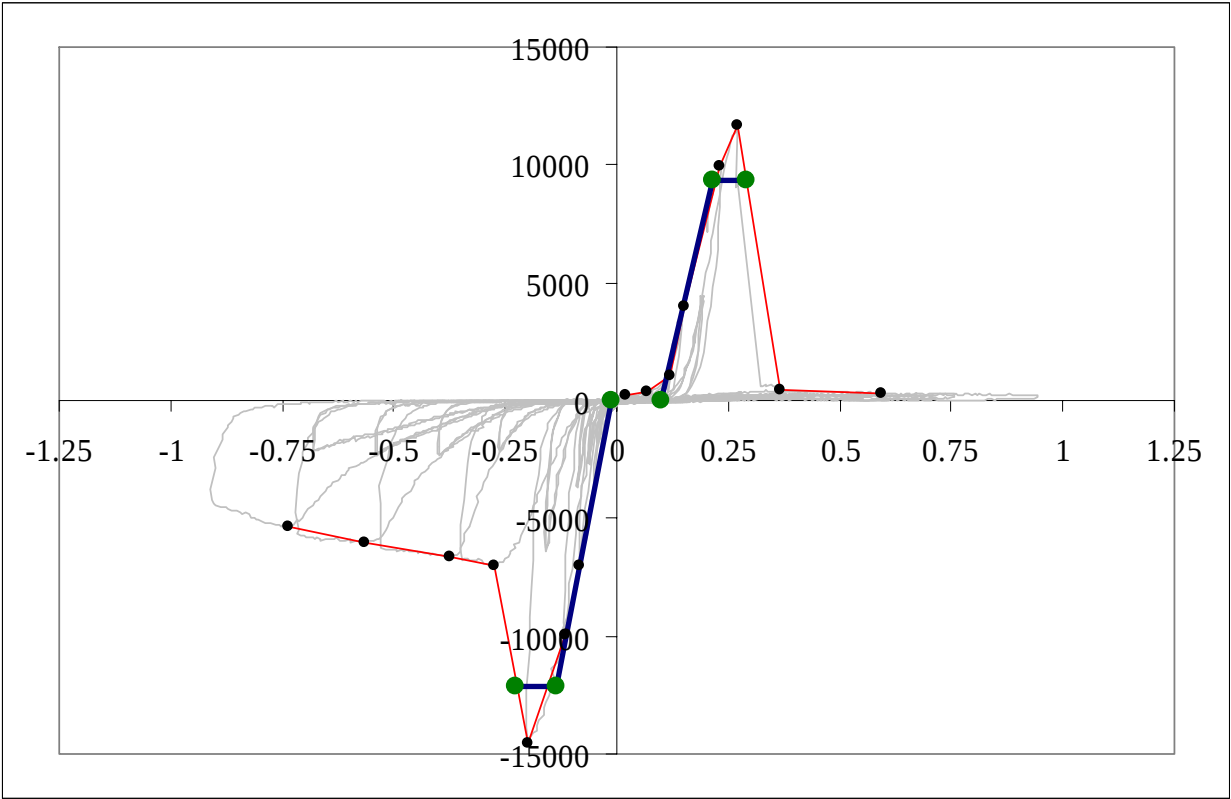


Figure B.40: F5C9 Load (lbs) – Deflection (in) Plot

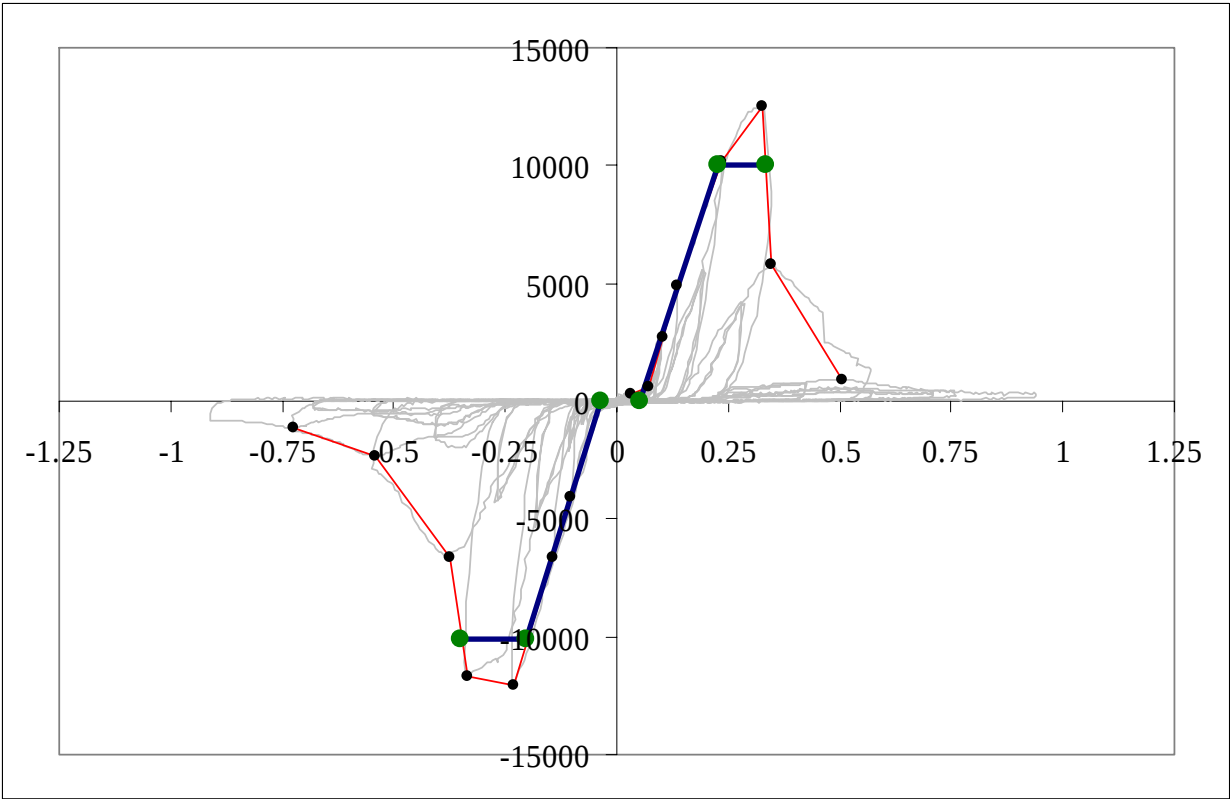


Figure B.41: F5C10 Load (lbs) – Deflection (in) Plot

Table B.5: F3 Connection and Member Properties

	F3 Series										Mean	St. Dev.	COV(%)
	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10			
Max Load (lbs)	11250	10900	10750	11400	12550	10100	12250	7850	11650	12600	11130	1407	12.6
@ Displ. (in)	0.25	0.24	0.23	0.24	0.23	0.29	0.24	0.23	0.31	0.34	0.260	0.041	15.6
Failure Load (lbs)	9000	8700	8600	9100	10050	8100	9800	6300	9350	10100	8910	1123	12.6
@ Displ. (in)	0.37	0.26	0.30	0.28	0.26	0.28	0.27	0.27	0.34	0.45	0.308	0.063	20.3
40% Max (lbs)	3850	2750	4200	2850	4250	3050	4400	2050	3500	3500	3440	763	22.2
@ Displ. (in)	0.10	0.09	0.10	0.09	0.10	0.10	0.11	0.08	0.11	0.09	0.097	0.009	9.20
E.E.P. Yield (lbs)	9600	8700	8600	9100	10050	8100	10550	6350	9600	10750	9140	1299	14.2
@ Displ. (in)	0.22	0.17	0.15	0.14	0.17	0.21	0.19	0.17	0.21	0.21	0.185	0.027	14.9
5% Offset (lbs)	11050	8800	9850	9400	10500	9150	11200	7400	11550	11550	10045	1370	13.6
@ Displ. (in)	0.29	0.22	0.21	0.19	0.21	0.27	0.24	0.24	0.28	0.26	0.239	0.035	14.7
Elastic Stiff. (lb/in)	47500	74800	91750	119200	84850	46100	72650	46900	61400	63700	70885	23241	32.8
Slack (in)	0.02	0.05	0.05	0.06	0.05	0.03	0.05	0.04	0.05	0.04	0.044	0.012	27.2
E.E.P. Energy (lb*in)	2500	1350	1850	1650	1600	1400	1700	1150	2200	3750	1915	759	39.6
Ductility Ratio	1.63	1.53	1.98	1.92	1.58	1.36	1.43	1.88	1.64	2.11	1.71	0.25	14.7
Yield Mode	II	II	II	II	II	II	II	II	II	II			
Failure Mode	split	split	split	split	split	split	split	split	split	split			
Governing Member	B	T	T	B	B	T	B	B	T	B			

	F3 Series										Mean	St. Dev.	COV(%)
Member Top	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10			
M.C. (%)	16	13	20	16	15	14	12	13	14	15	14.9	2.3	15.7
S.G.	0.60	0.37	0.85	0.62	0.62	0.55	0.48	0.49	0.45	0.65	0.568	0.132	23.3
D.E. 5% Yield (psi)	4454	3897	4646	4782	5064	3862	4540	4205	4538	4246	4423	378	8.5
D.E. Capacity (psi)	4530	3928	4574	5016	5076	3951	3279	3107	4639	3887	4199	679	16.2

Member Bottom	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	Mean	St. Dev.	COV(%)
M.C. (%)	15	13	13	14	13	15	13	14	15	14	13.9	0.8	5.8
S.G.	0.47	0.51	0.39	0.51	0.50	0.57	0.48	0.47	0.60	0.52	0.501	0.058	11.6
D.E. 5% Yield (psi)	4504	5671	5348	5443	*	4554	*	5056	4305	4598	4935	511	10.4
D.E. Capacity (psi)	3845	5047	4754	4474	*	3115	*	1385	3759	3959	3792	1150	30.3

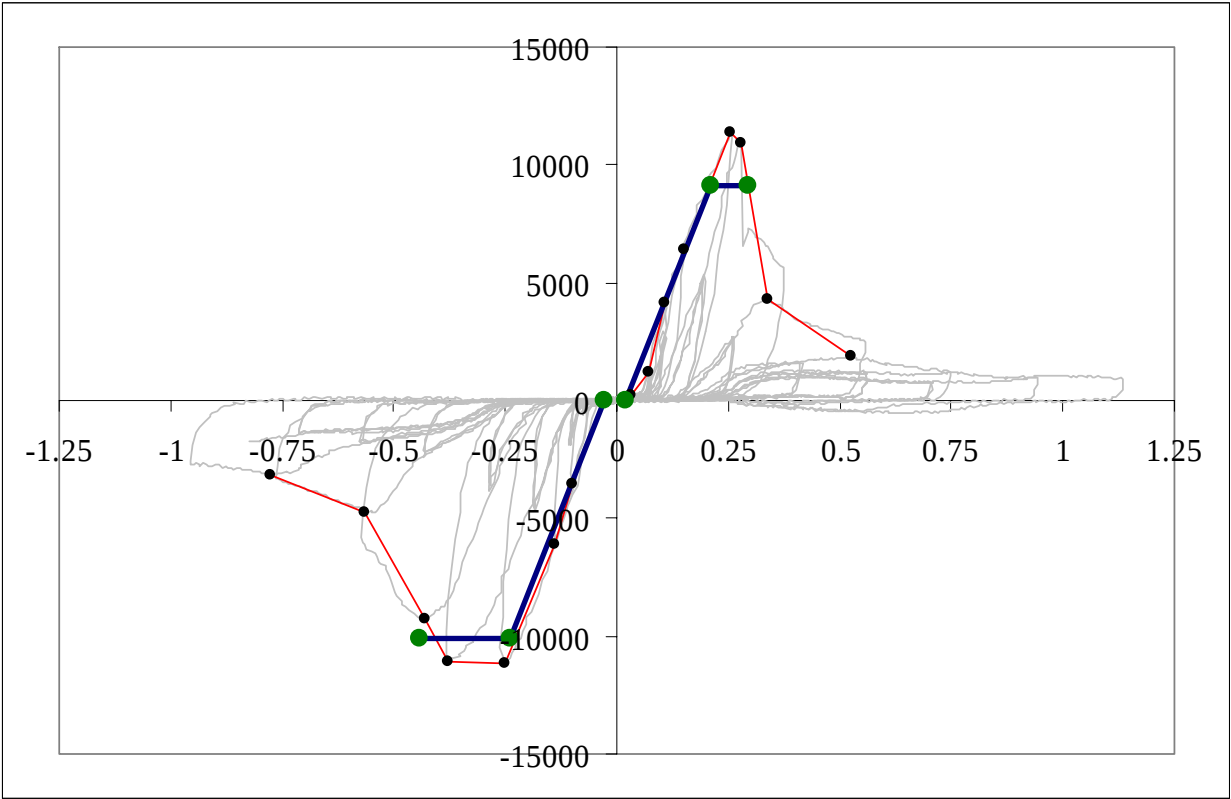


Figure B.42: F3C1 Load (lbs) – Deflection (in) Plot

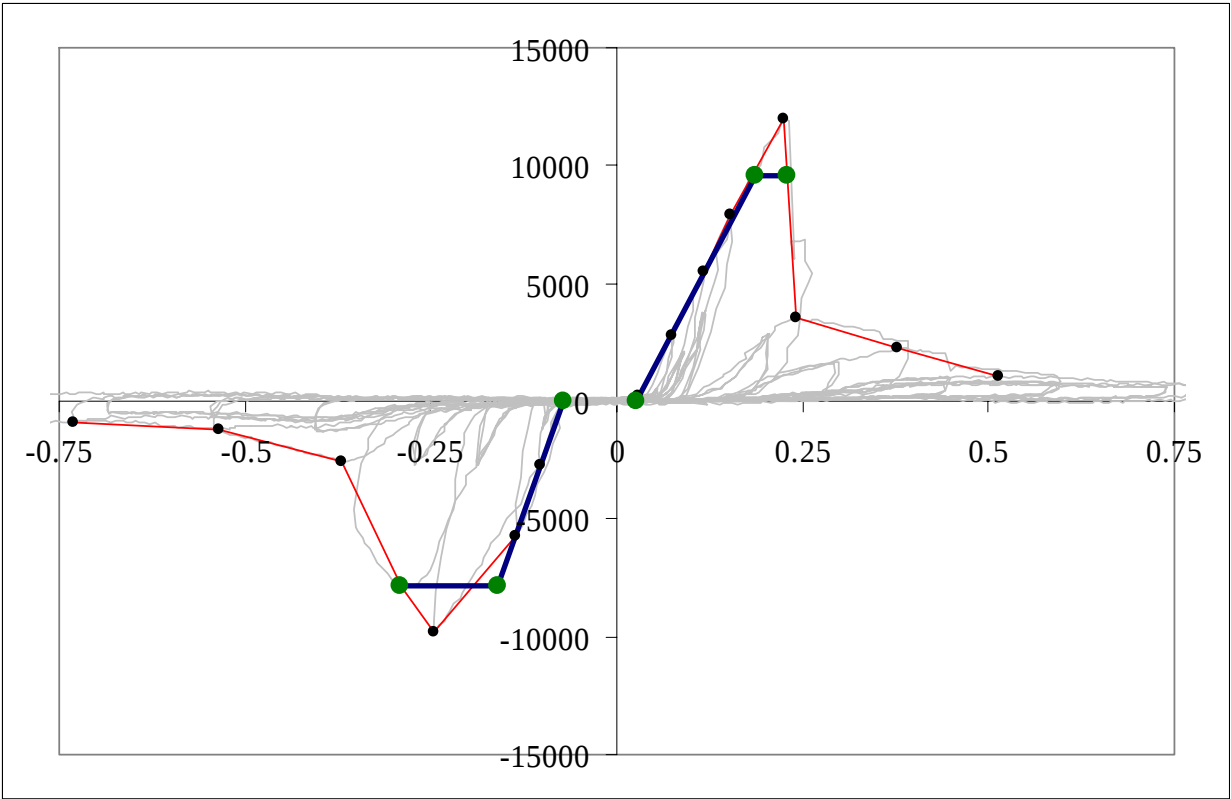


Figure B.43: F3C2 Load (lbs) – Deflection (in) Plot

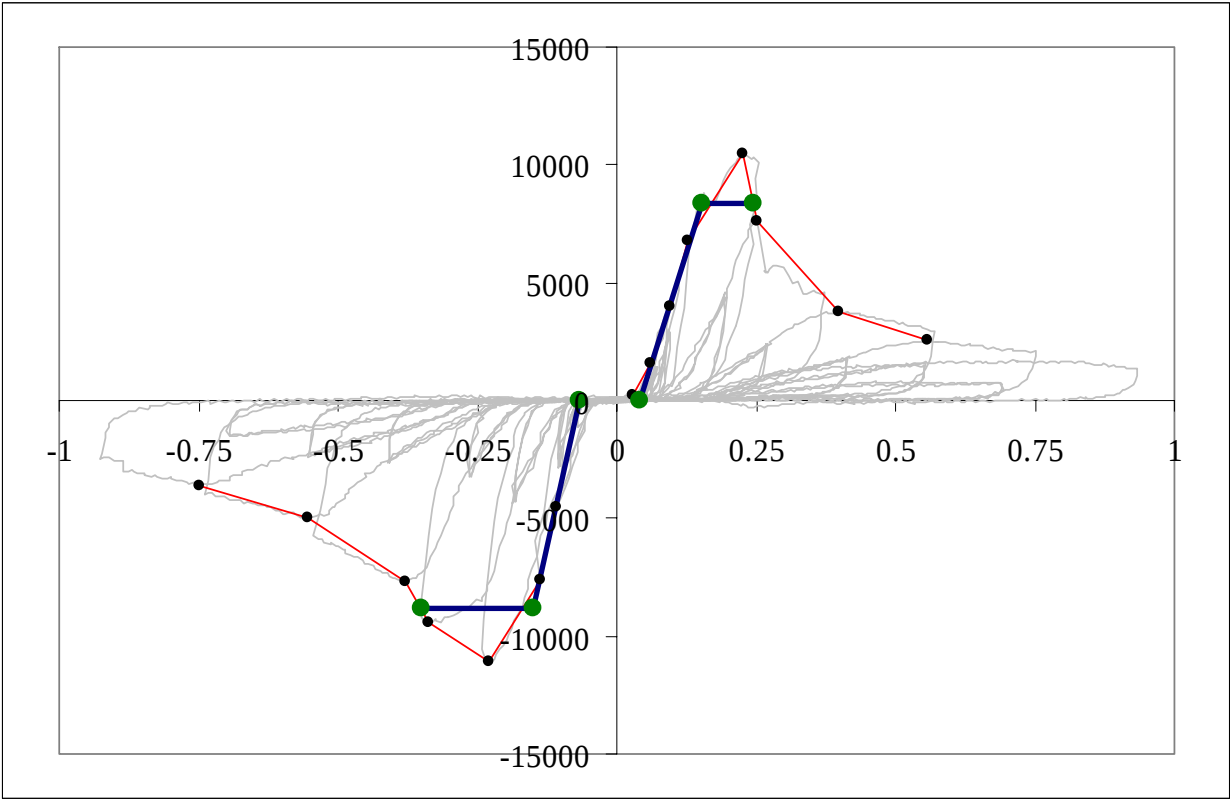


Figure B.44: F3C3 Load (lbs) – Deflection (in) Plot

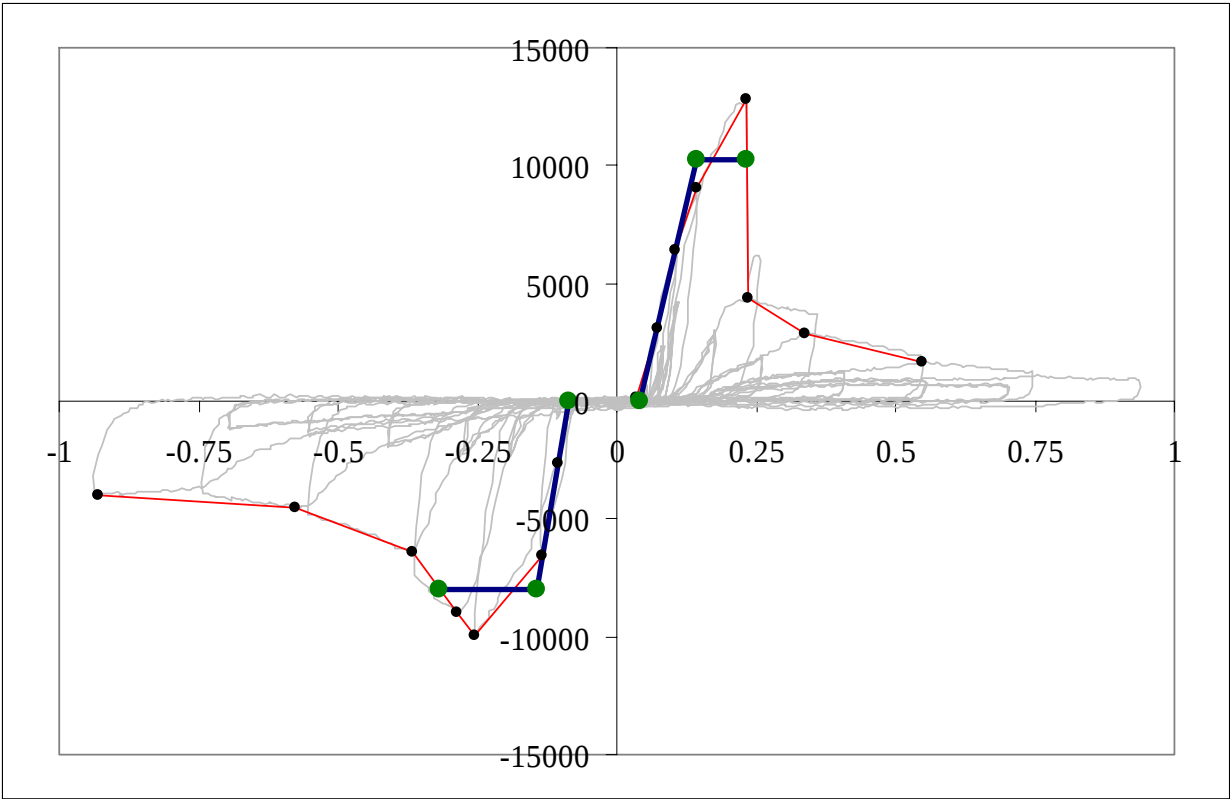


Figure B.45: F3C4 Load (lbs) – Deflection (in) Plot

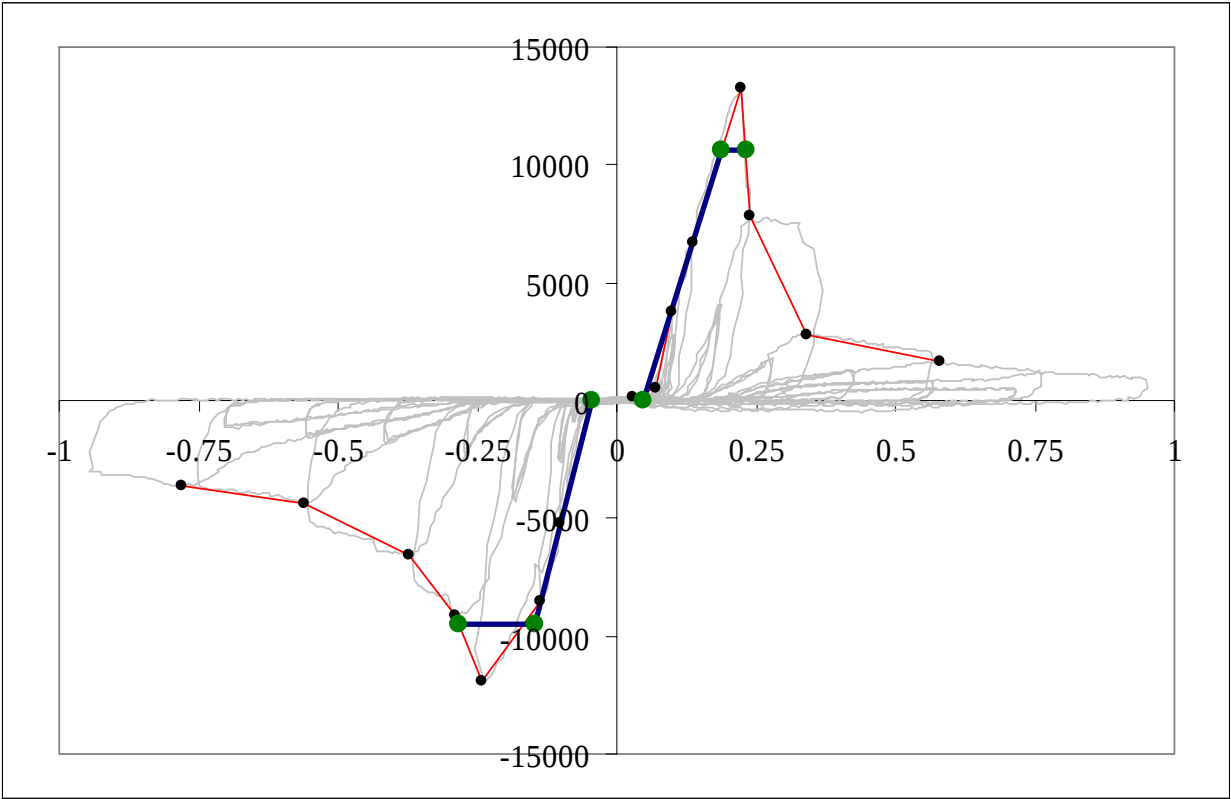


Figure B.46: F3C5 Load (lbs) – Deflection (in) Plot

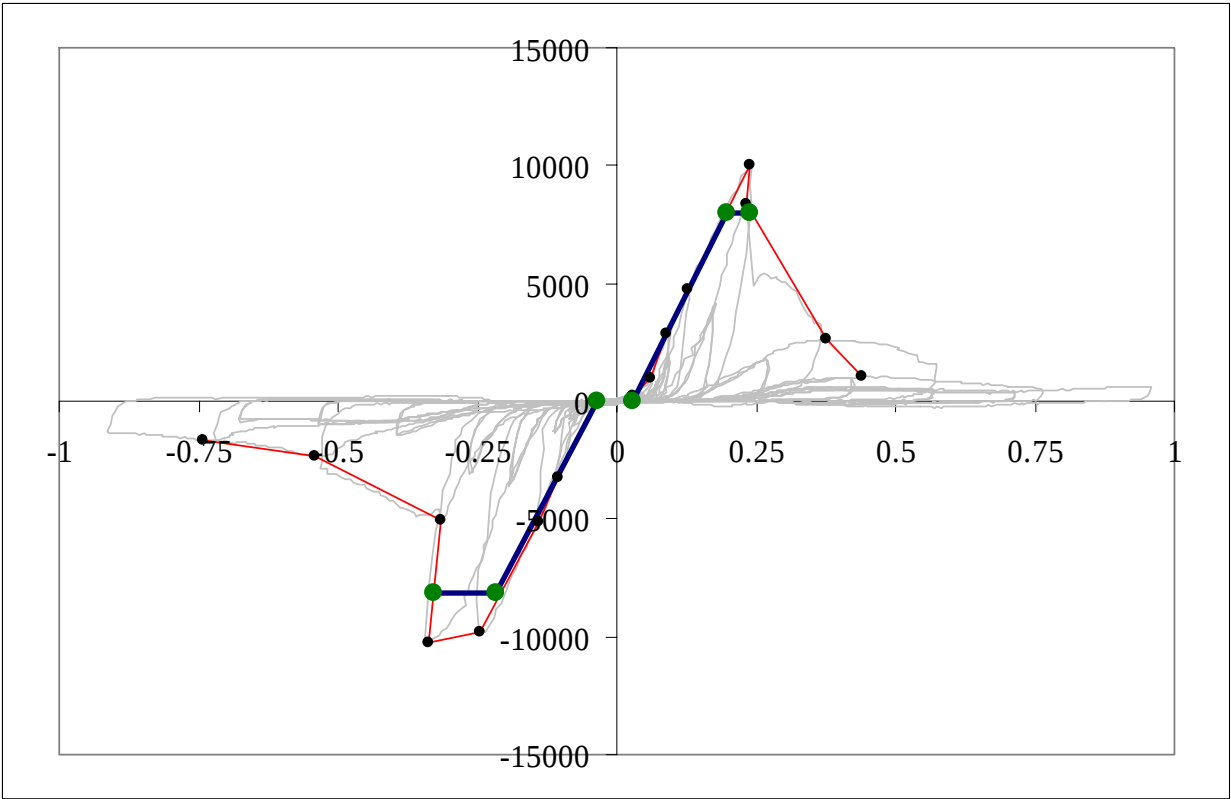


Figure B.47: F3C6 Load (lbs) – Deflection (in) Plot

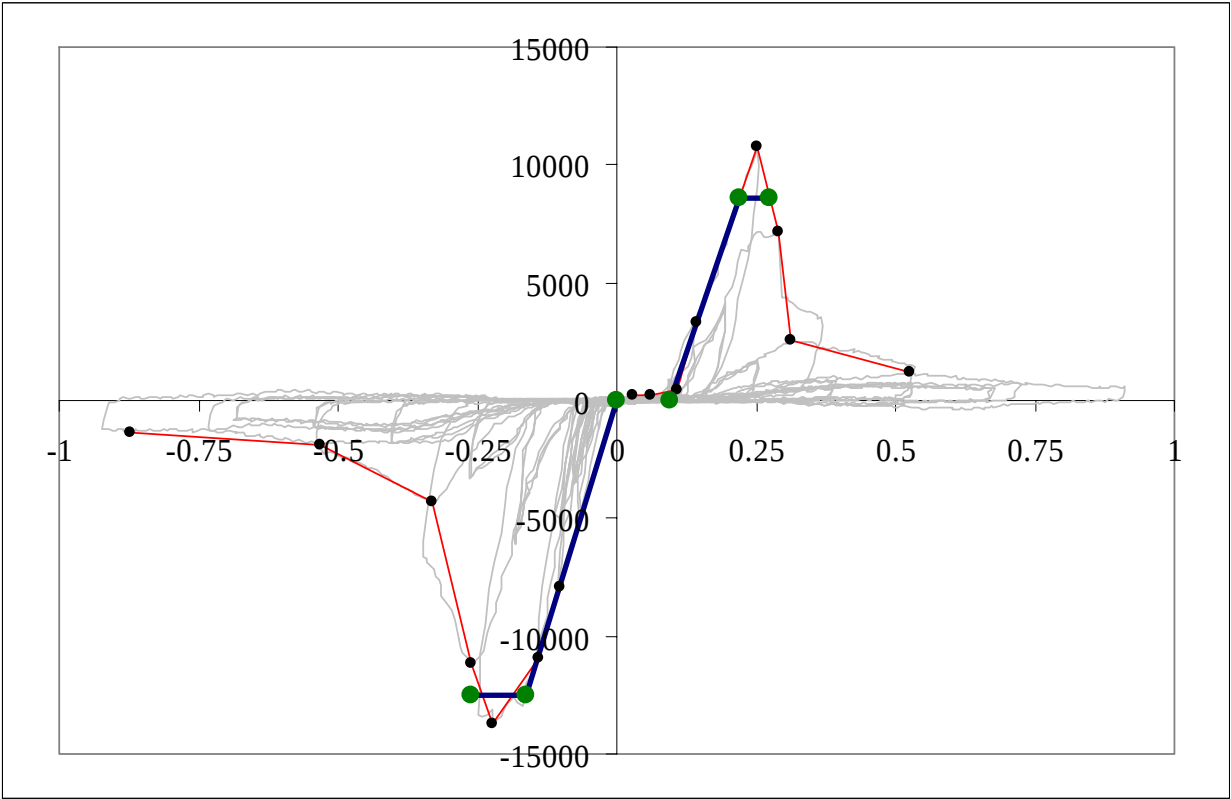


Figure B.48: F3C7 Load (lbs) – Deflection (in) Plot

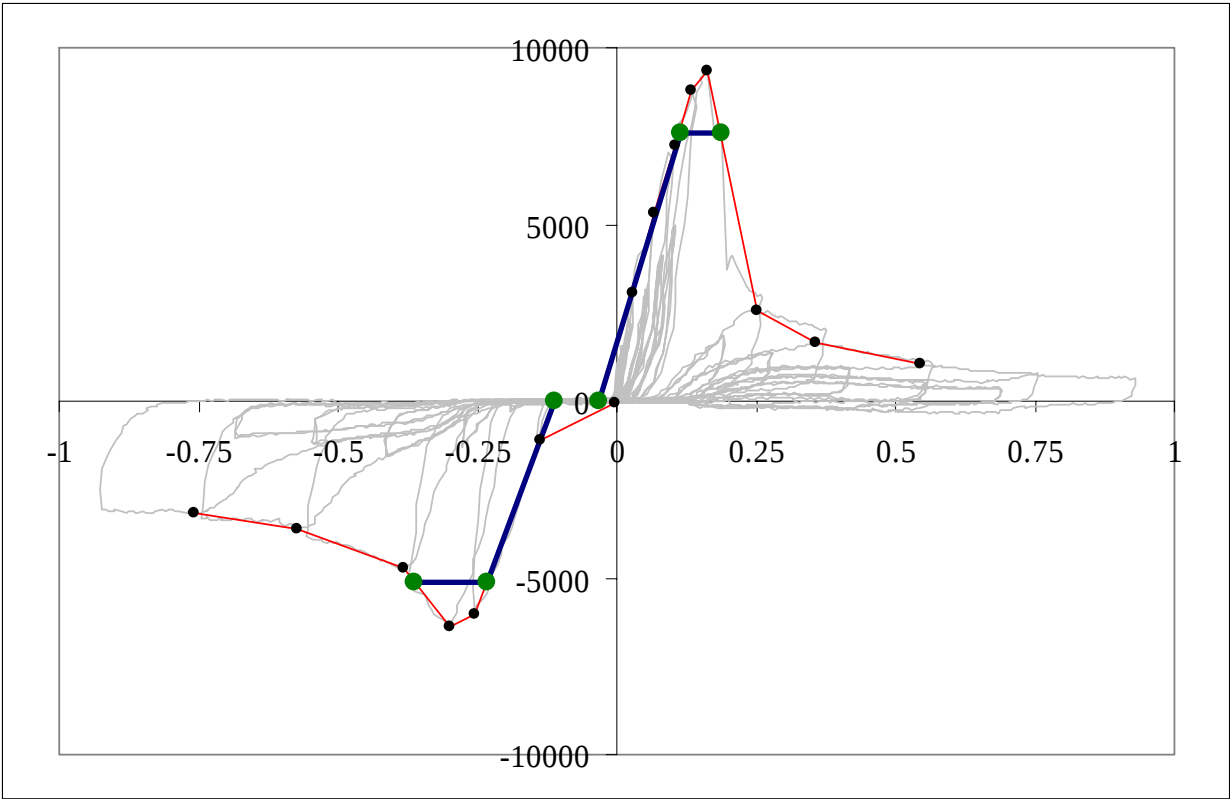


Figure B.49: F3C8 Load (lbs) – Deflection (in) Plot

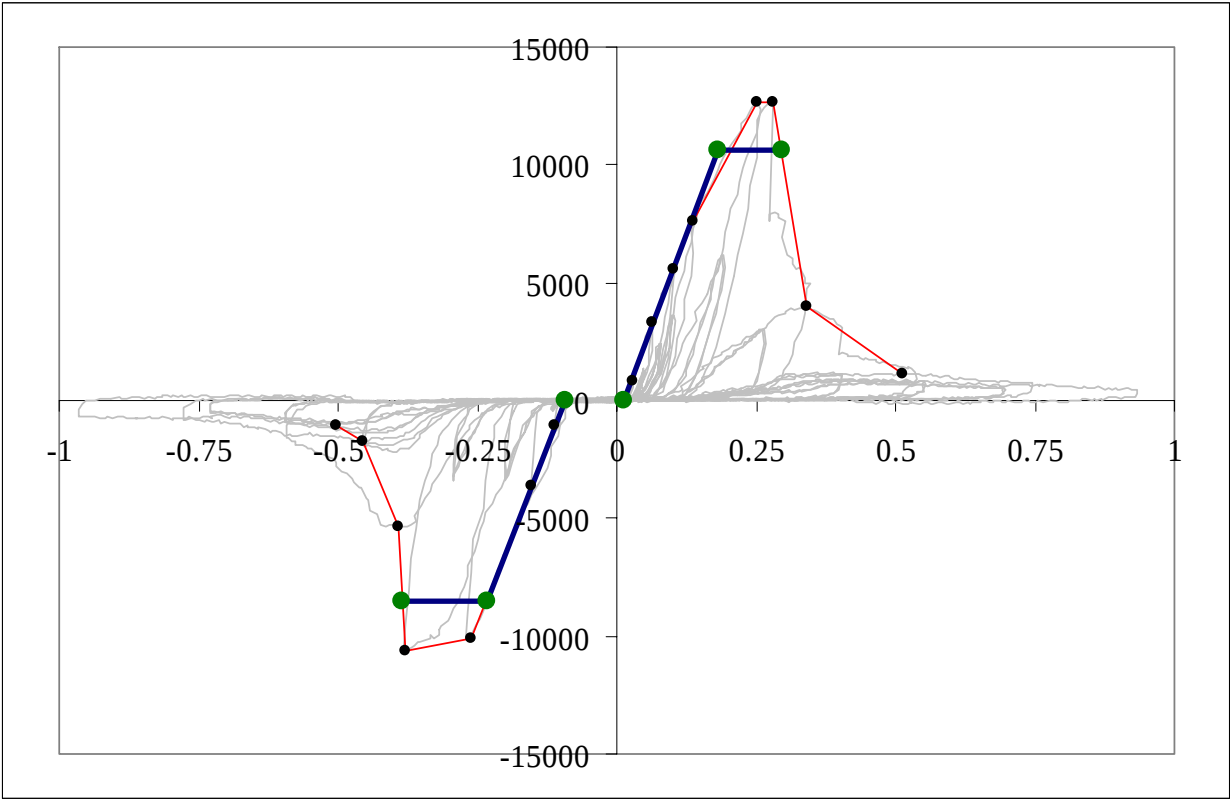


Figure B.50: F3C9 Load (lbs) – Deflection (in) Plot

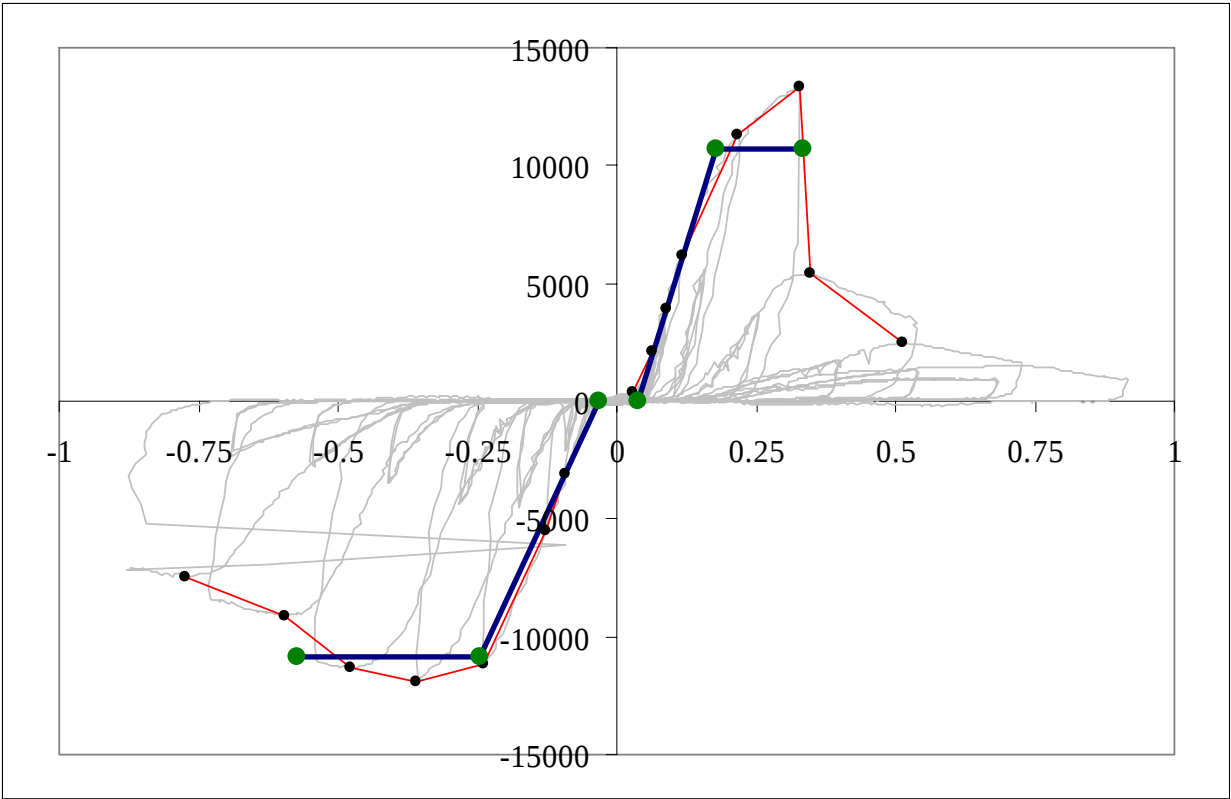


Figure B.51: F3C10 Load (lbs) – Deflection (in) Plot

B.2 Expected Yield Mode III

Table B.6: H8 Connection and Member Properties

	H8 Series										Mean	St. Dev.	COV(%)
	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10			
Max Load (lbs)	17700	18250	17550	18200	22550	20400	17500	18250	24950	24350	19970	2925	14.6
@ Displ. (in)	0.30	0.33	0.42	0.68	0.64	0.52	0.34	0.34	0.66	0.46	0.469	0.149	31.8
Failure Load (lbs)	14150	14600	14050	14550	18050	16350	14000	14600	19950	19500	15980	2343	14.7
@ Displ. (in)	0.34	0.46	0.63	0.71	0.69	0.57	0.41	0.41	0.71	0.54	0.546	0.138	25.2
40% Max (lbs)	6500	6850	5700	5500	6750	8150	6400	6550	8150	7800	6835	934	13.7
@ Displ. (in)	0.10	0.12	0.14	0.17	0.14	0.15	0.14	0.14	0.12	0.14	0.135	0.017	12.7
E.E.P. Yield (lbs)	16150	15100	15050	15100	20100	18100	14550	14600	21550	20100	17040	2680	15.7
@ Displ. (in)	0.22	0.22	0.28	0.37	0.36	0.31	0.29	0.24	0.26	0.28	0.283	0.053	18.8
5% Offset (lbs)	14150	14150	14500	13800	19000	16400	16650	14650	15650	18250	15720	1818	11.6
@ Displ. (in)	0.22	0.24	0.30	0.37	0.37	0.31	0.35	0.26	0.23	0.29	0.294	0.057	19.5
Elastic Stiff. (lb/in)	84200	82450	65300	47300	58650	61650	55200	79650	100500	90150	72505	17251	23.8
Slack (in)	0.03	0.04	0.05	0.05	0.02	0.02	0.02	0.05	0.03	0.05	0.036	0.015	42.2
E.E.P. Energy (lb*in)	3350	5350	7300	7900	10200	7500	3900	4050	12150	7800	6950	2846	40.9
Ductility Ratio	1.52	2.11	2.23	1.92	1.89	1.86	1.43	1.71	2.75	2.02	1.94	0.38	19.3
Yield Mode	II	II	II	II	II	II	II	II	II,IV	II			
Failure Mode	split	split	split	split	split	split	split	split	split	split			
Governing Member	B	B	B	B	B	B	B	B	B	B			

	H8 Series										Mean	St. Dev.	COV(%)
	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10			
M.C. (%)	14	14	15	15	15	15	15	13	14	12	14.3	1.1	7.9
S.G.	0.20	0.21	0.19	0.22	0.21	0.21	0.22	0.13	0.21	0.16	0.197	0.029	14.7
D.E. 5% Yield (psi)	3247	2820	2327	2416	3741	2696	2764	4259	9522	5238	3903	2175	55.7
D.E. Capacity (psi)	3228	3305	2951	2990	6705	3477	3567	5690	12183	5602	4970	2867	57.7

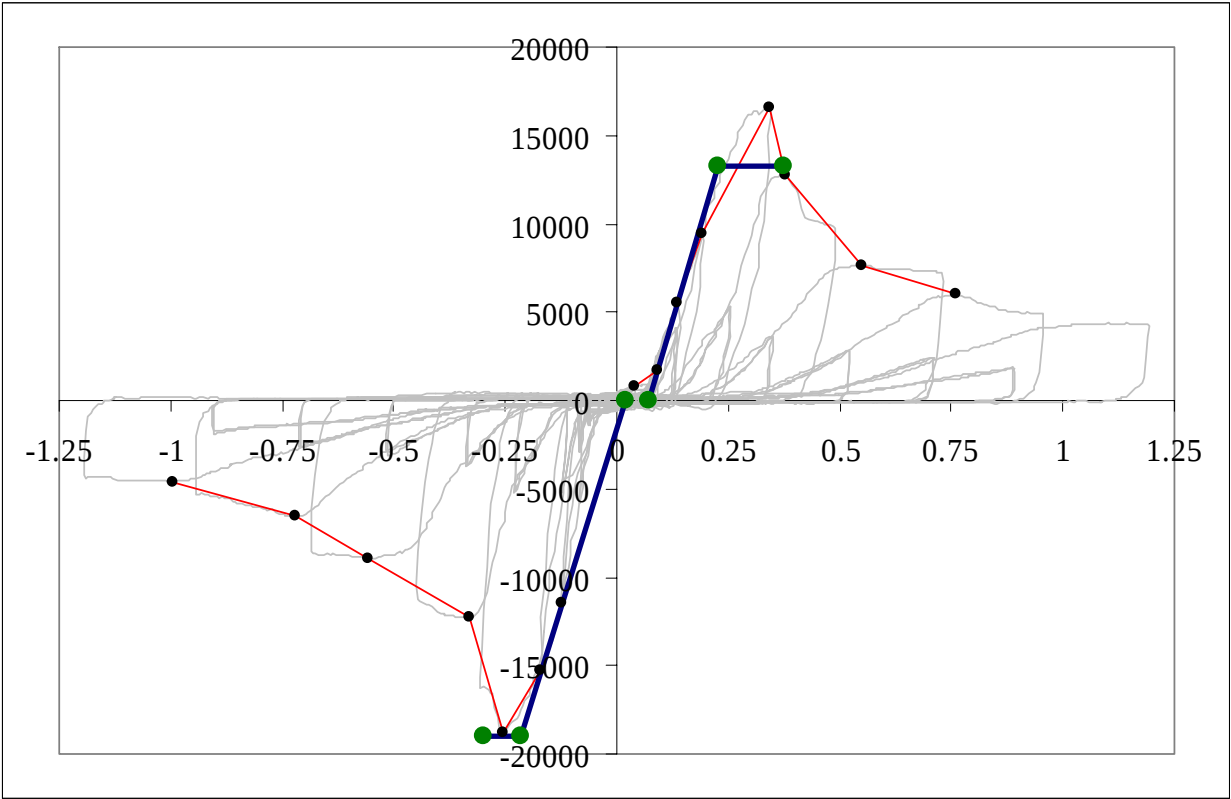


Figure B.52: H8C1 Load (lbs) – Deflection (in) Plot

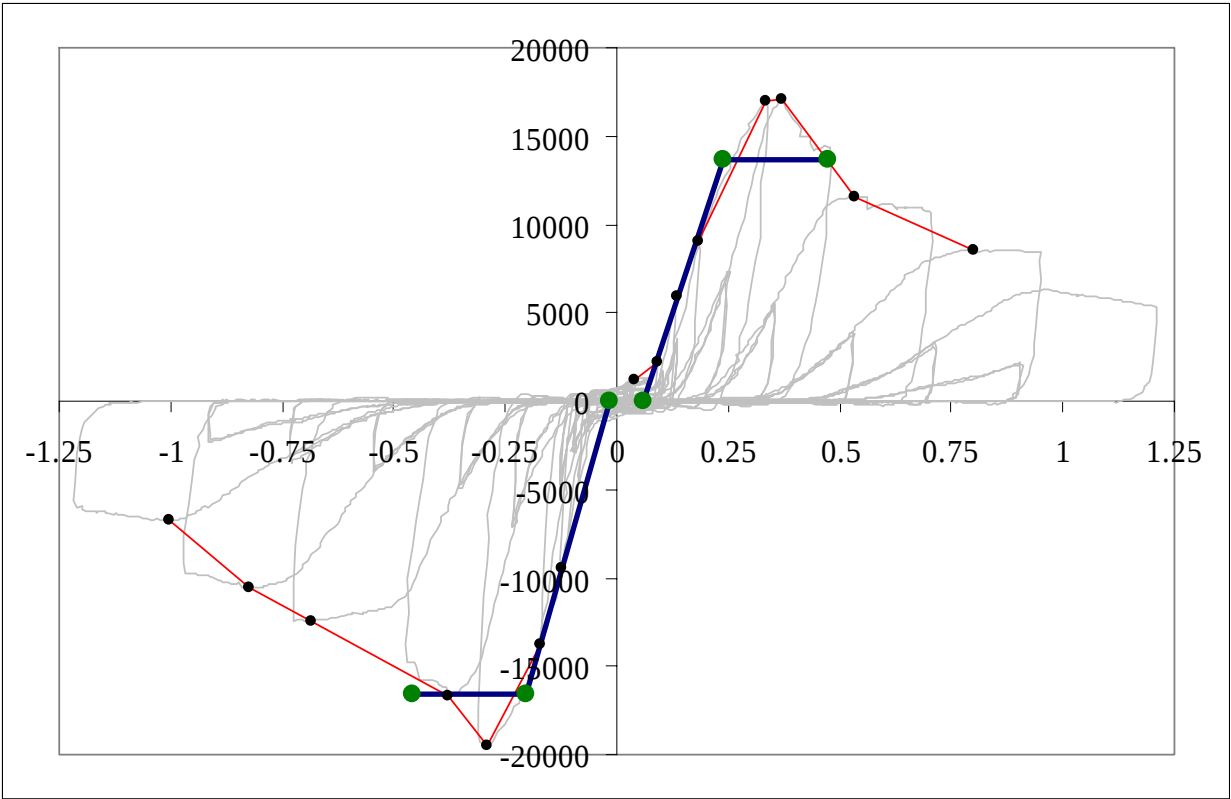


Figure B.53 H8C2 Load (lbs) – Deflection (in) Plot

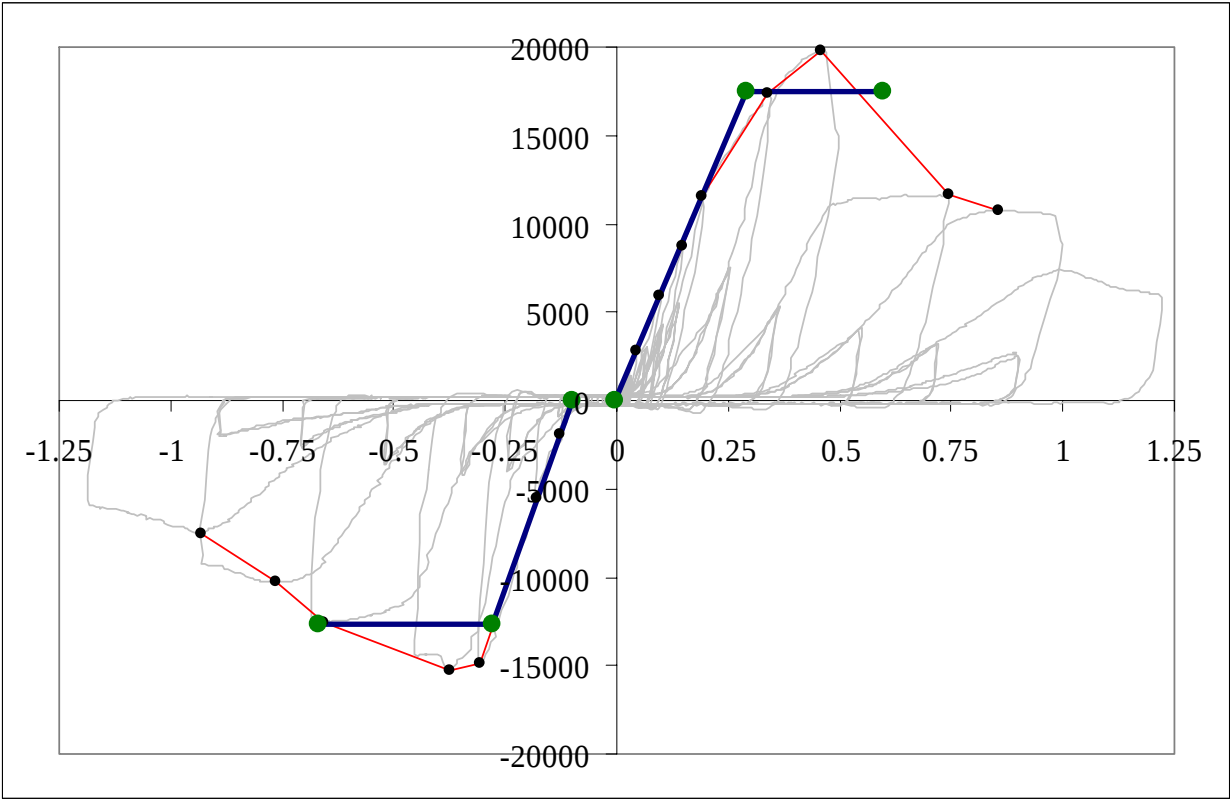


Figure B.54 H8C3 Load (lbs) – Deflection (in) Plot

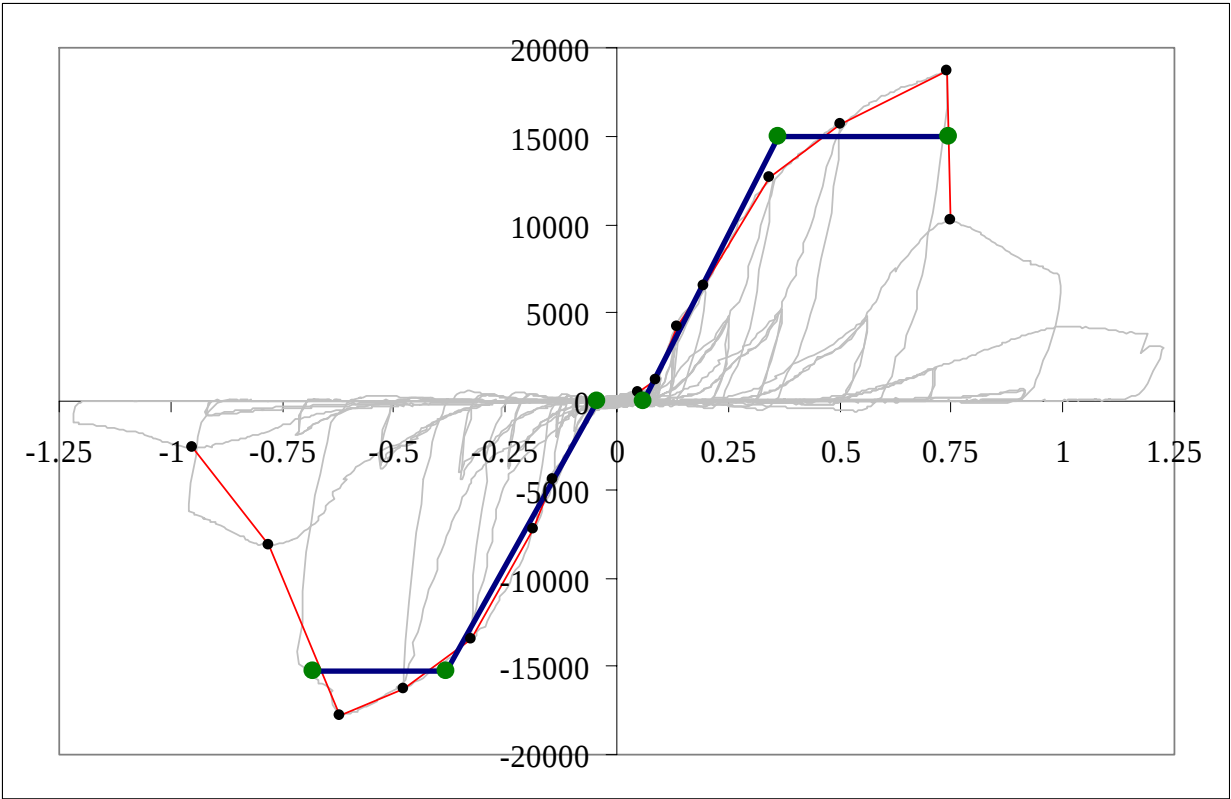


Figure B.55 H8C4 Load (lbs) – Deflection (in) Plot

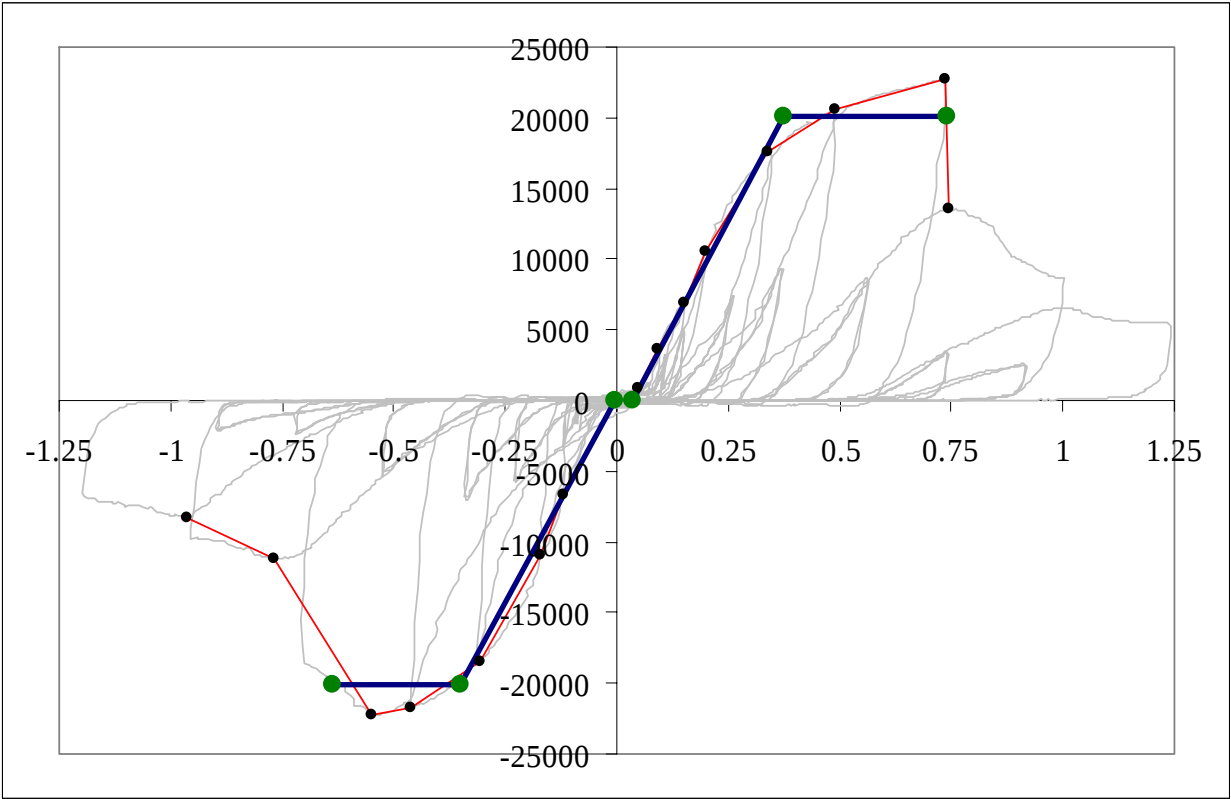


Figure B.56 H8C5 Load (lbs) – Deflection (in) Plot

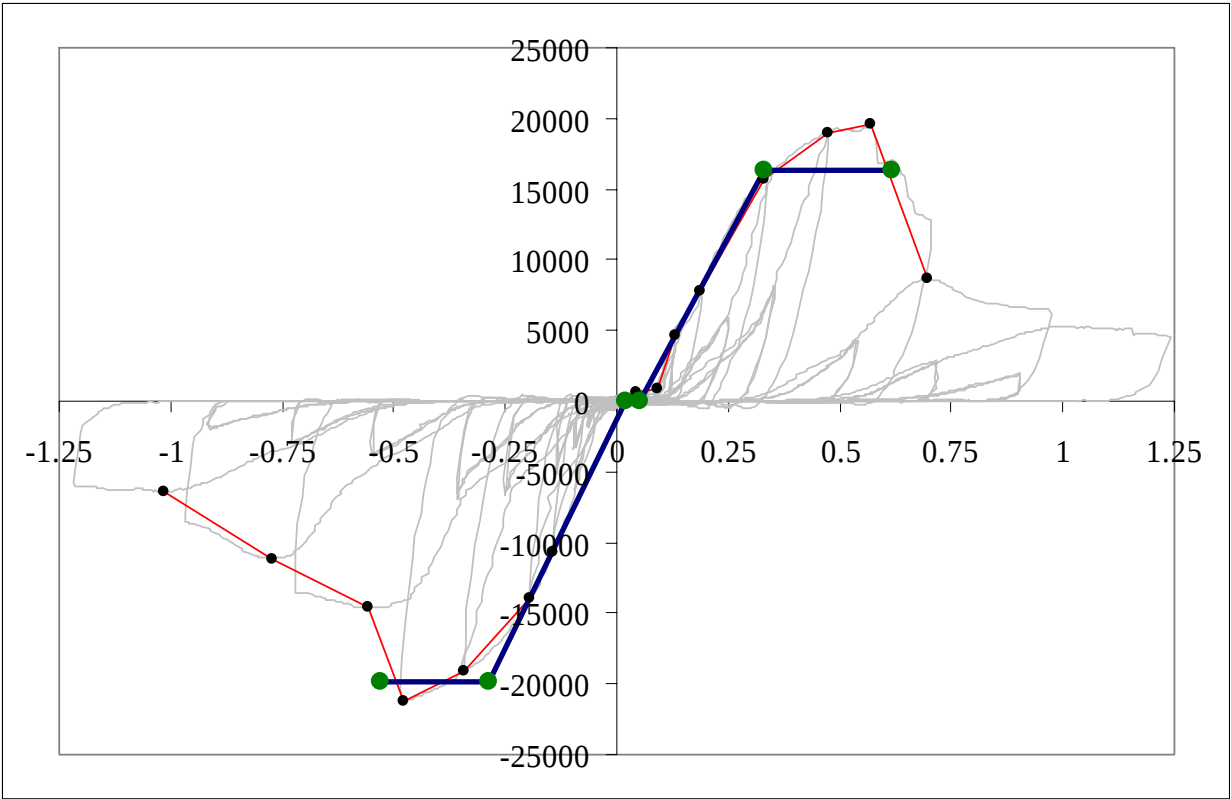


Figure B.57 H8C6 Load (lbs) – Deflection (in) Plot

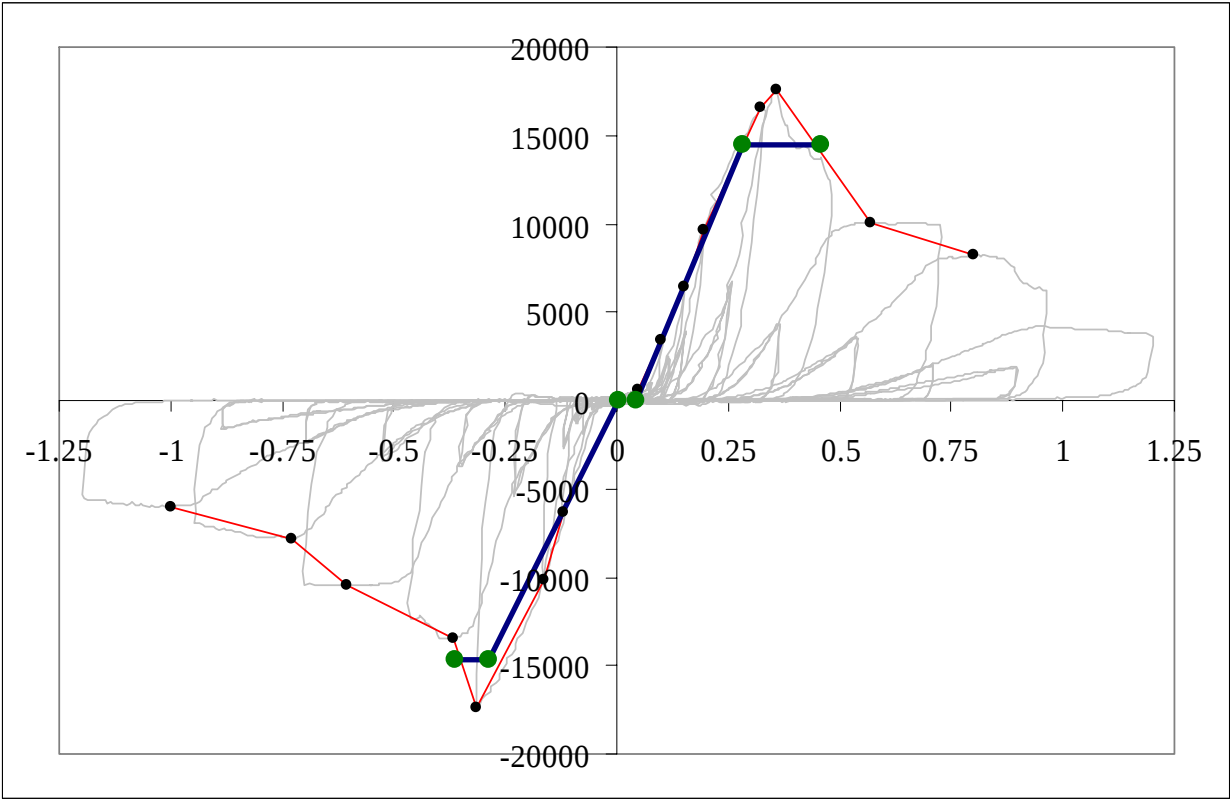


Figure B.58 H8C7 Load (lbs) – Deflection (in) Plot

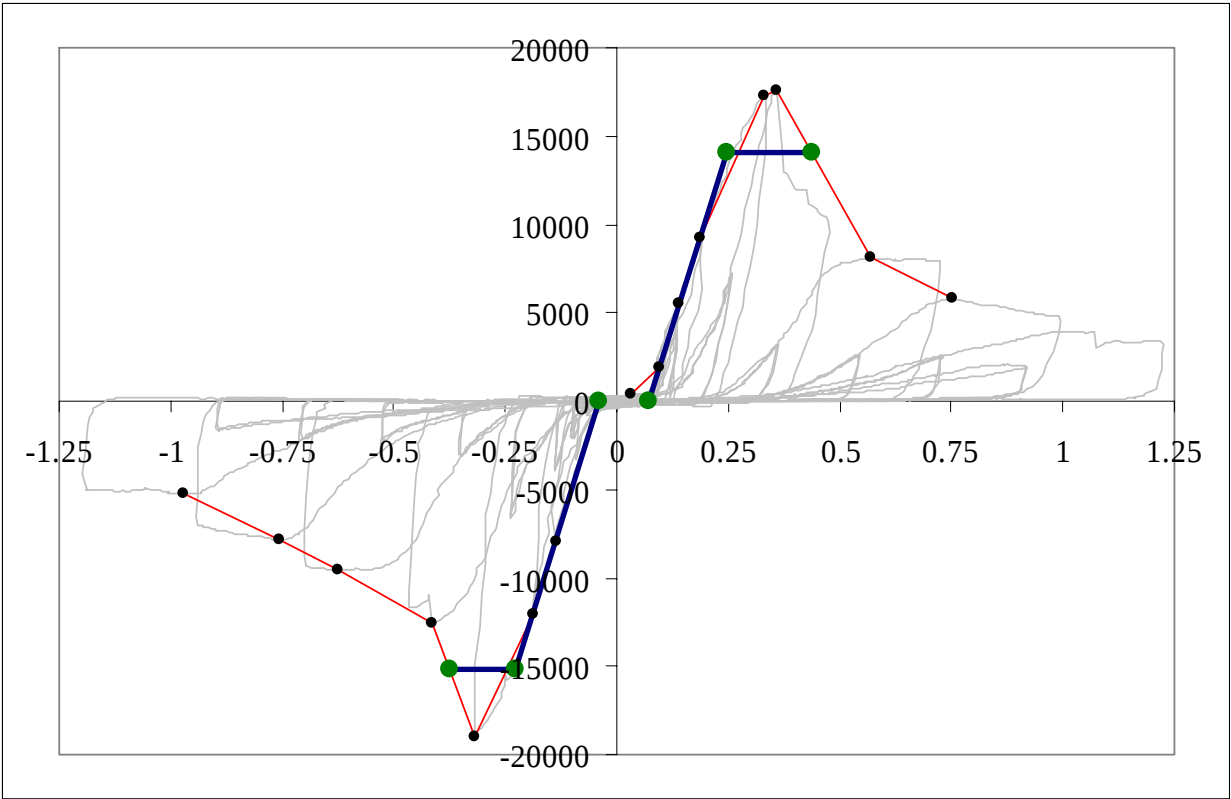


Figure B.59 H8C8 Load (lbs) – Deflection (in) Plot

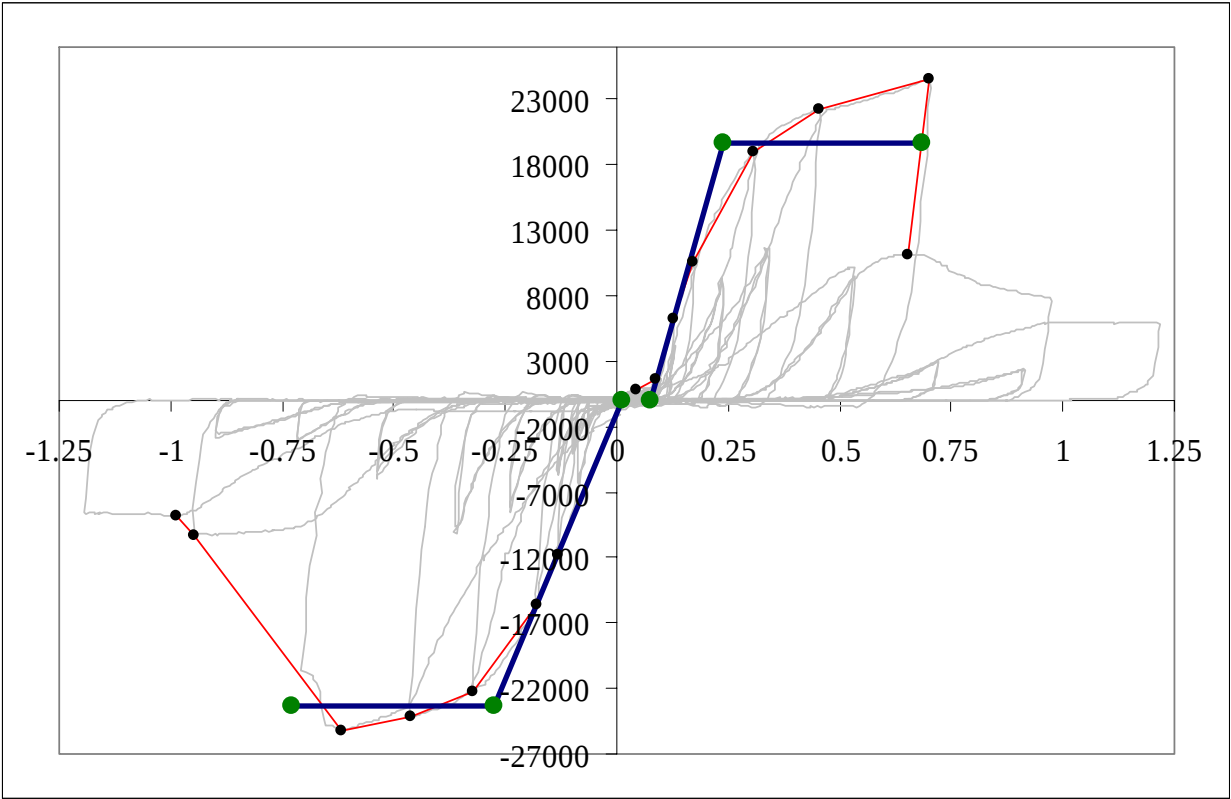


Figure B.60 H8C9 Load (lbs) – Deflection (in) Plot

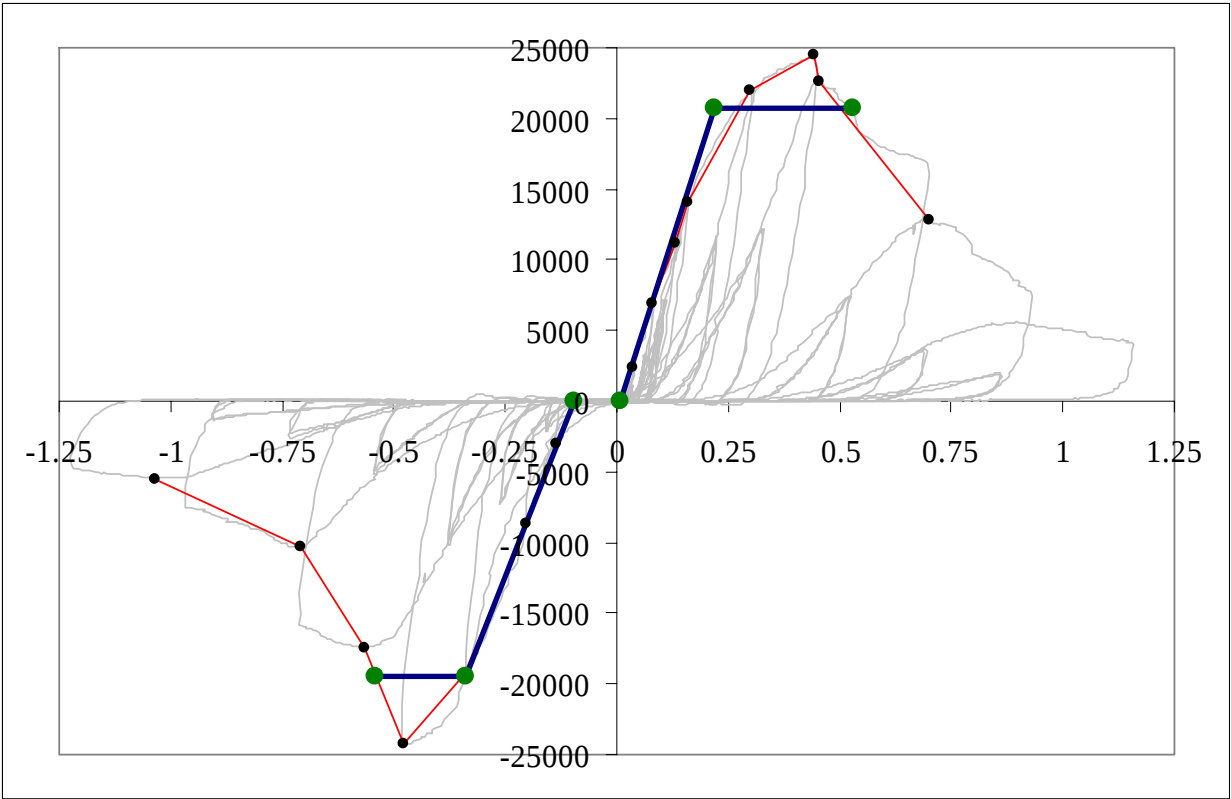


Figure B.61 H8C10 Load (lbs) – Deflection (in) Plot

Table B.7: H7 Connection and Member Properties

	H7 Series												
	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	Mean	St. Dev.	COV(%)
Max Load (lbs)	23100	20000	17550	17550	17150	21150	16050	9250	20550	23650	18600	4167	22.4
@ Displ. (in)	0.38	0.24	0.28	0.36	0.32	0.61	0.61	0.24	0.43	0.48	0.396	0.139	35.2
Failure Load (lbs)	18500	16000	14050	14050	13700	16950	12800	7400	16450	18900	14880	3339	22.4
@ Displ. (in)	0.41	0.30	0.46	0.58	0.44	0.64	0.64	0.30	0.46	0.52	0.475	0.124	26.0
40% Max (lbs)	6700	6550	5750	5000	5000	6000	4550	2300	4800	7900	5455	1518	27.8
@ Displ. (in)	0.11	0.10	0.11	0.12	0.11	0.11	0.13	0.09	0.11	0.13	0.113	0.011	9.97
E.E.P. Yield (lbs)	18650	17400	14450	14900	15000	17450	13100	7400	16900	19950	15520	3530	22.7
@ Displ. (in)	0.24	0.23	0.19	0.22	0.27	0.26	0.30	0.16	0.22	0.27	0.237	0.043	17.9
5% Offset (lbs)	19000	17500	14650	14250	16300	13000	9500	7250	14500	17250	14320	3646	25.5
@ Displ. (in)	0.28	0.27	0.22	0.25	0.32	0.24	0.26	0.18	0.22	0.27	0.251	0.038	15.1
Elastic Stiff. (lb/in)	93450	81500	110000	91800	62800	76550	52150	82000	113600	83700	84755	18934	22.3
Slack (in)	0.04	0.02	0.06	0.06	0.03	0.03	0.05	0.07	0.07	0.03	0.046	0.018	38.8
E.E.P. Energy (lb*in)	5250	3200	5150	6750	4450	8950	6300	1450	5650	7500	5465	2137	39.1
Ductility Ratio	1.70	1.27	2.52	2.58	1.59	2.64	2.22	1.90	2.31	1.91	2.06	0.46	22.5
Yield Mode	II	II	II	II	II	II,IV	II	II	II	II,IV			
Failure Mode	split	split	split	split	split	split	split	split	split	split			
Governing Member	B	B	B	B	B	B	B	B	B	B			

	H7 Series												
	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	Mean	St. Dev.	COV(%)
M.C. (%)	14	14	15	14	16	16	15	15	16	15	15.0	0.7	4.7
S.G.	0.20	0.23	0.16	0.20	0.32	0.28	0.25	0.22	0.24	0.22	0.232	0.044	19.0
D.E. 5% Yield (psi)	5427	4546	5746	5347	3960	5197	3060	3709	3609	4942	4554	917	20.1
D.E. Capacity (psi)	4936	4562	6651	4924	3735	4148	2845	3389	3392	4945	4353	1100	25.3

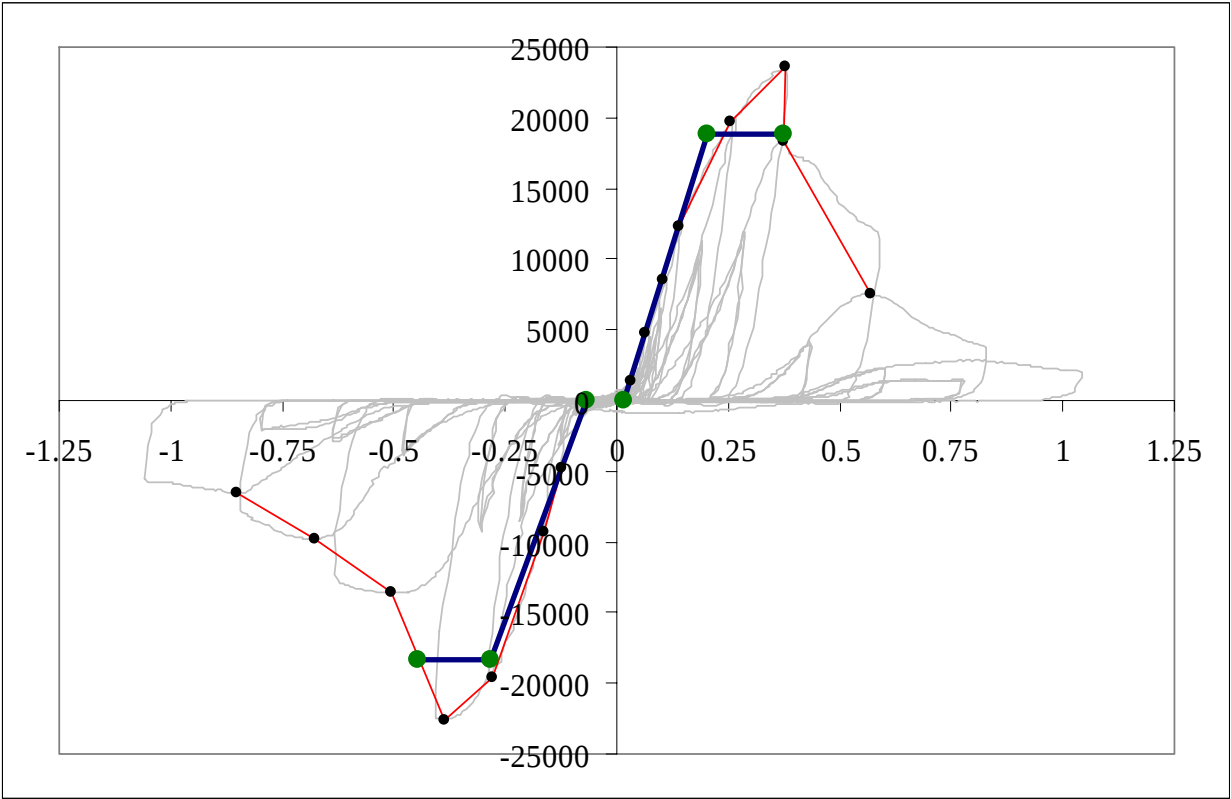


Figure B.62: H7C1 Load (lbs) – Deflection (in) Plot

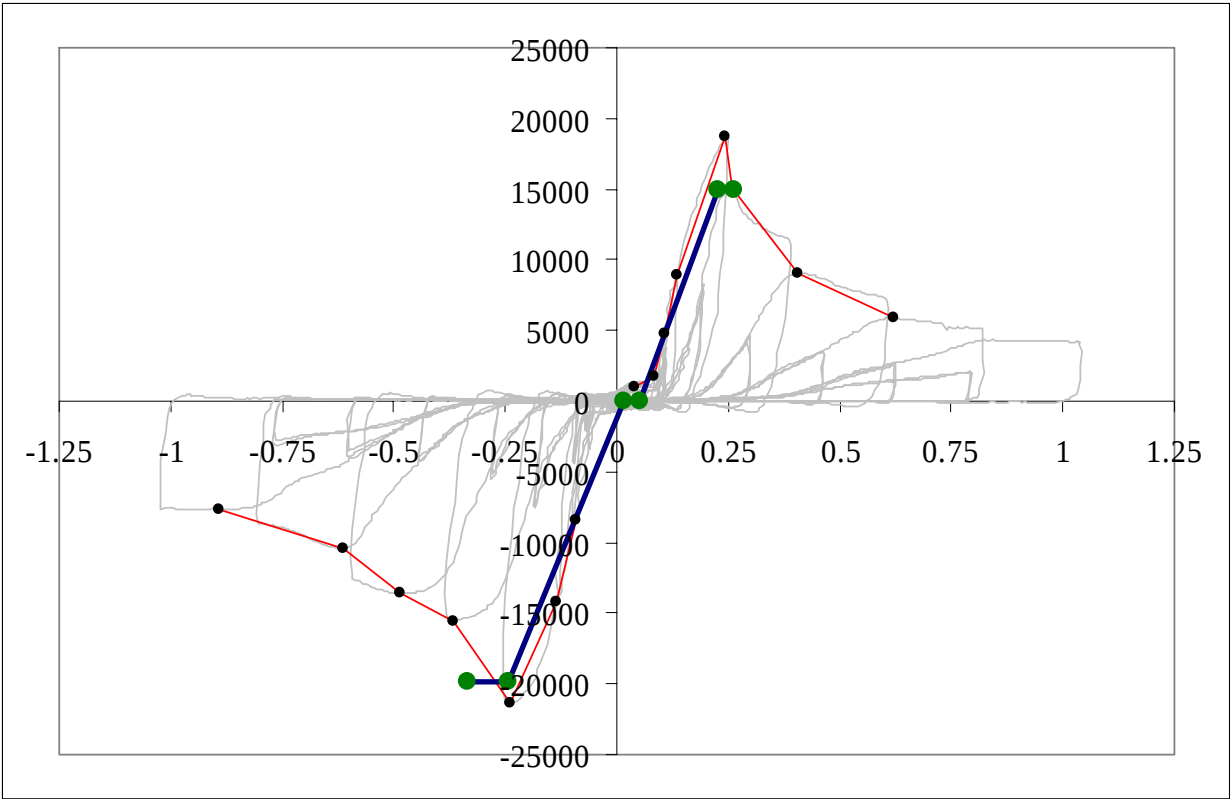


Figure B.63: H7C2 Load (lbs) – Deflection (in) Plot

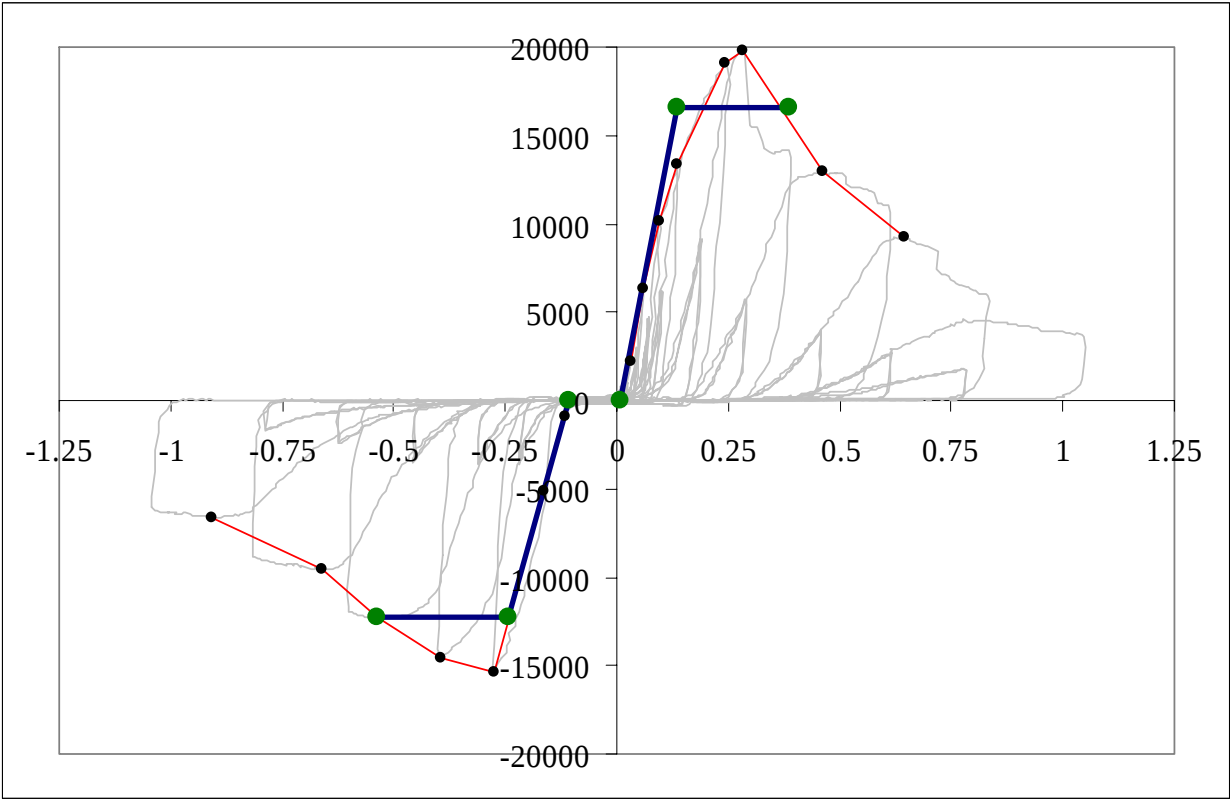


Figure B.64: H7C3 Load (lbs) – Deflection (in) Plot

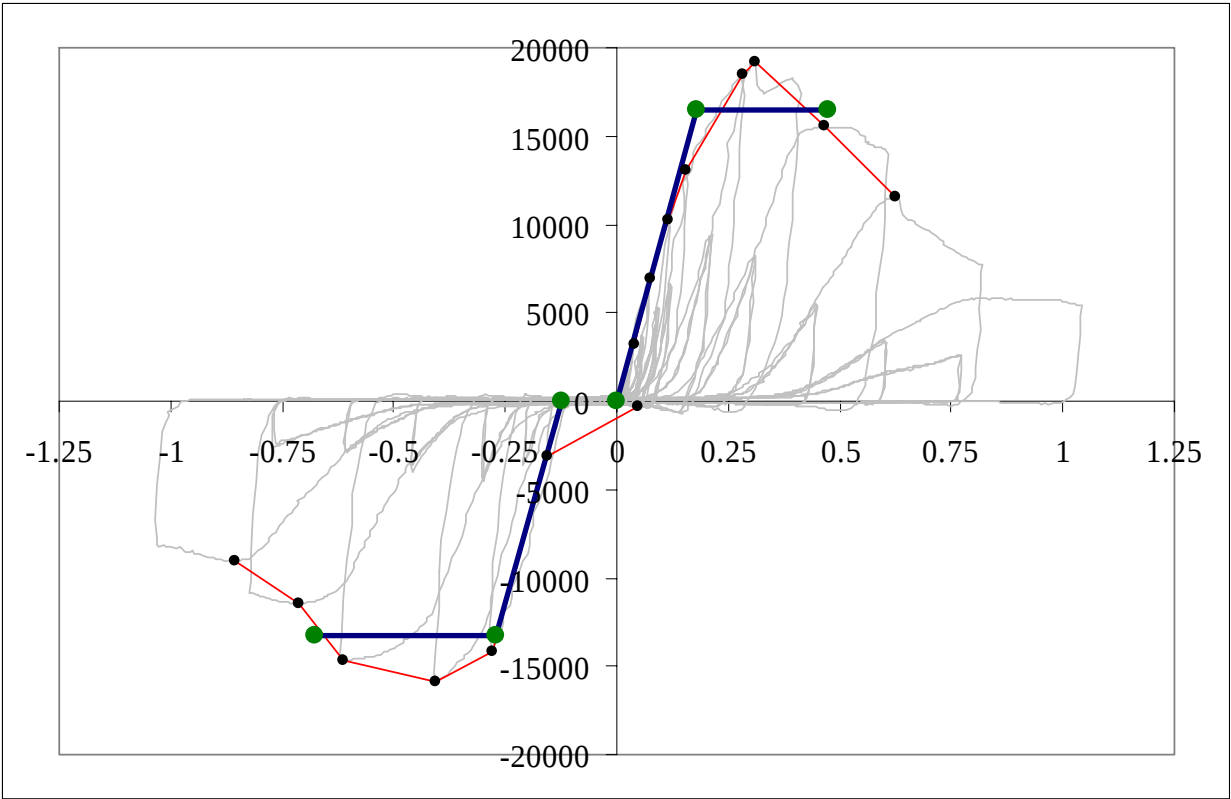


Figure B.65: H7C4 Load (lbs) – Deflection (in) Plot

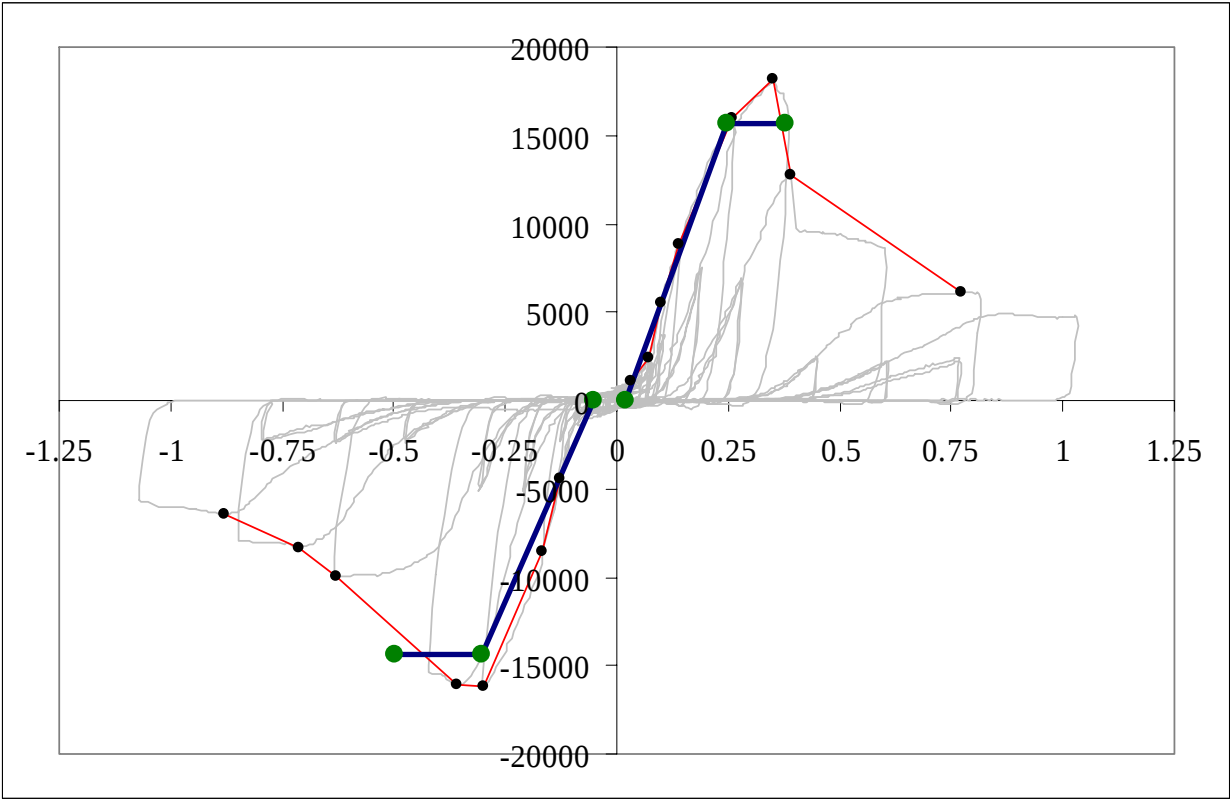


Figure B.66: H7C5 Load (lbs) – Deflection (in) Plot

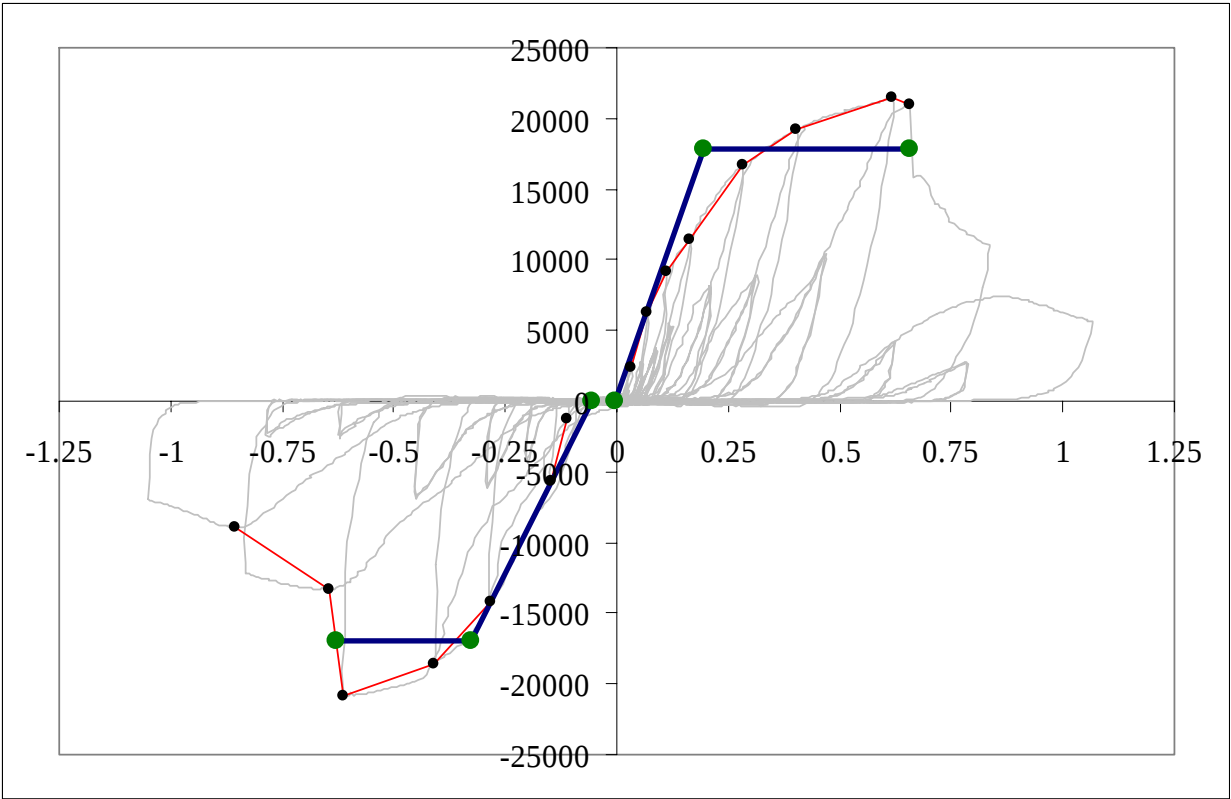


Figure B.67: H7C6 Load (lbs) – Deflection (in) Plot

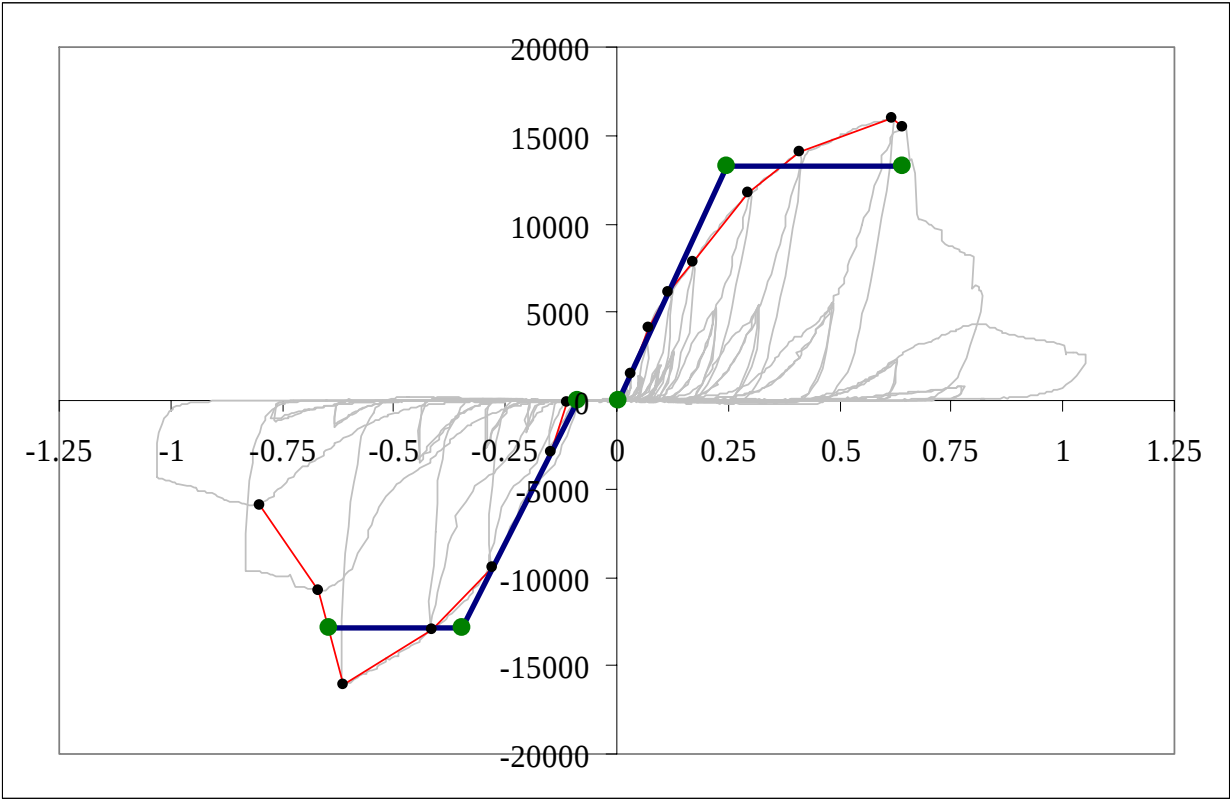


Figure B.68: H7C7 Load (lbs) – Deflection (in) Plot

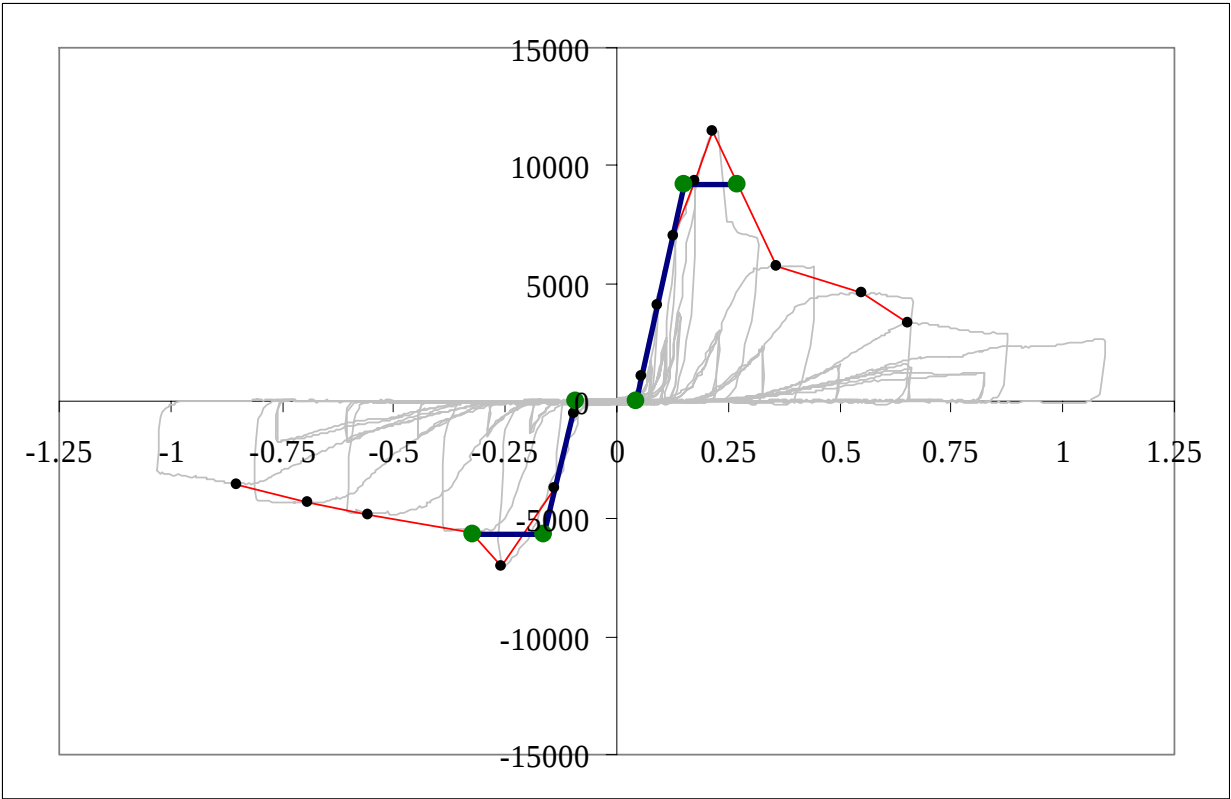


Figure B.69: H7C8 Load (lbs) – Deflection (in) Plot

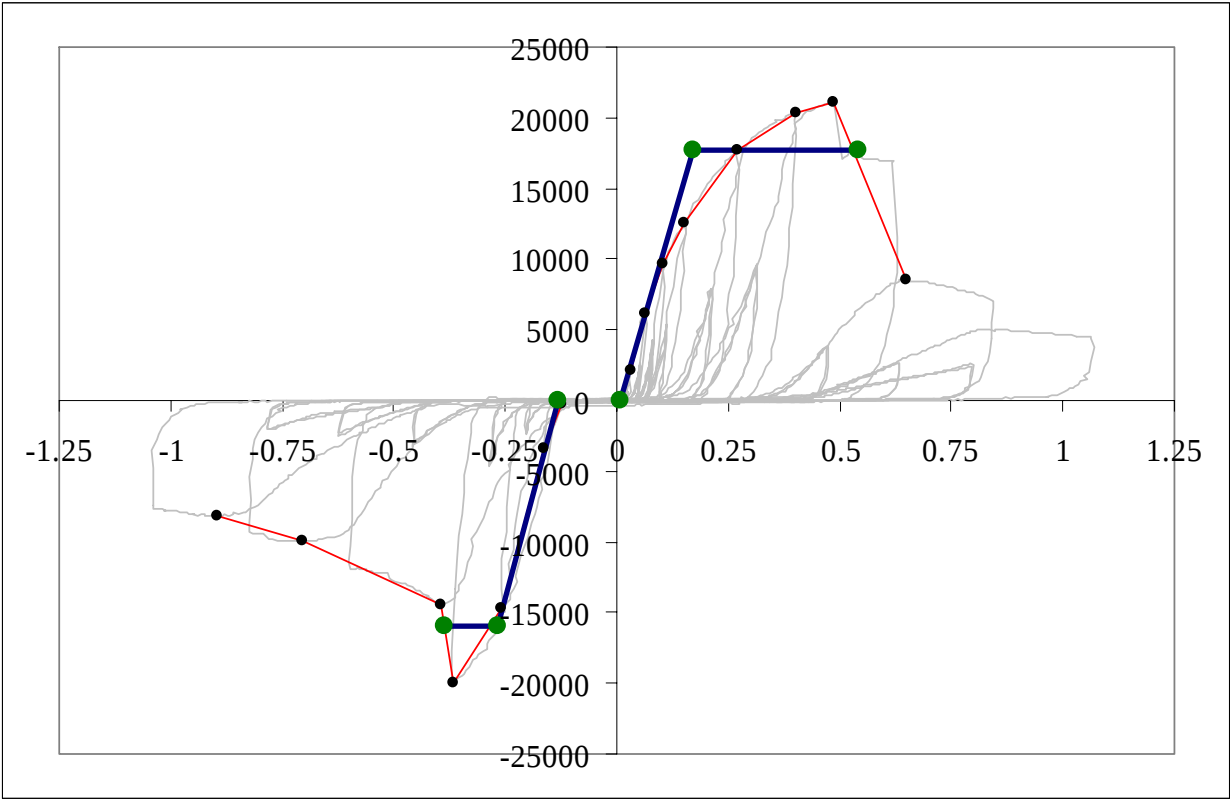


Figure B.70: H7C9 Load (lbs) – Deflection (in) Plot

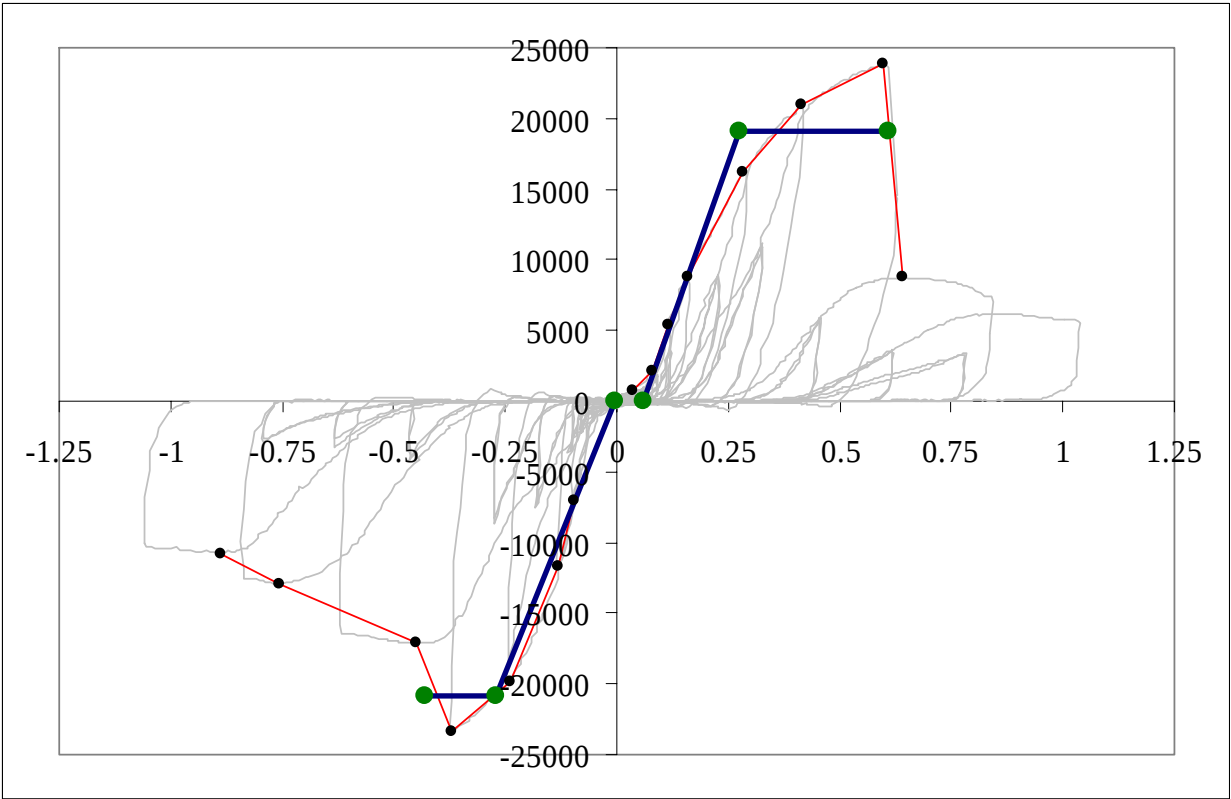


Figure B.71: H7C10 Load (lbs) – Deflection (in) Plot

Table B.8: H6 Connection and Member Properties

	H6 Series										Mean	St. Dev.	COV(%)
	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10			
Max Load (lbs)	13050	13800	12300	19000	22300	22550	20150	15950	19900	17100	17610	3750	21.3
@ Displ. (in)	0.37	0.23	0.27	0.36	0.42	0.38	0.38	0.34	0.44	0.31	0.350	0.065	18.7
Failure Load (lbs)	10400	11050	9850	15200	17850	18050	16100	12750	15900	13700	14085	3003	21.3
@ Displ. (in)	0.43	0.36	0.36	0.40	0.42	0.39	0.39	0.36	0.44	0.40	0.395	0.029	7.36
40% Max (lbs)	3200	1450	2800	3850	7300	7200	4450	3050	4250	2250	3980	1943	48.8
@ Displ. (in)	0.12	0.07	0.07	0.10	0.13	0.13	0.10	0.10	0.10	0.07	0.099	0.023	23.3
E.E.P. Yield (lbs)	10900	11450	10000	15350	17850	18050	16100	12750	15900	14050	14240	2871	20.2
@ Displ. (in)	0.25	0.16	0.16	0.26	0.24	0.24	0.20	0.21	0.25	0.17	0.215	0.039	18.0
5% Offset (lbs)	11000	13400	10000	16850	14750	17500	14250	12250	15150	14750	13990	2388	17.1
@ Displ. (in)	0.28	0.21	0.19	0.30	0.24	0.27	0.21	0.24	0.27	0.21	0.241	0.039	16.2
Elastic Stiff. (lb/in)	59600	110200	77700	76100	97350	100800	117750	86300	76450	117050	91930	19746	21.5
Slack (in)	0.06	0.06	0.03	0.04	0.05	0.05	0.06	0.06	0.04	0.05	0.053	0.011	20.2
E.E.P. Energy (lb*in)	3150	3050	2750	4200	5000	4600	4400	3000	4750	4200	3910	835	21.3
Ductility Ratio	1.83	2.12	2.23	1.59	1.76	1.67	2.13	1.71	1.74	2.28	1.91	0.26	13.4
Yield Mode	II	II	II	II	II	II	II	II	II	II			
Failure Mode	split	split	split	split	split	split	split	split	split	split			
Governing Member	B	B	B	B	B	B	B	B	B	B			

	H6 Series										Mean	St. Dev.	COV(%)
	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10			
M.C. (%)	12	14	15	13	9	14	14	15	16	13	13.5	2.0	14.8
S.G.	0.20	0.23	0.26	0.25	0.14	0.24	0.24	0.29	0.29	0.23	0.237	0.044	18.3
D.E. 5% Yield (psi)	3046	4230	3044	3818	6594	4777	4246	3892	3439	5059	4215	1069	25.4
D.E. Capacity (psi)	2855	4090	2820	3533	5397	5180	3978	3970	3480	4064	3937	850	21.6

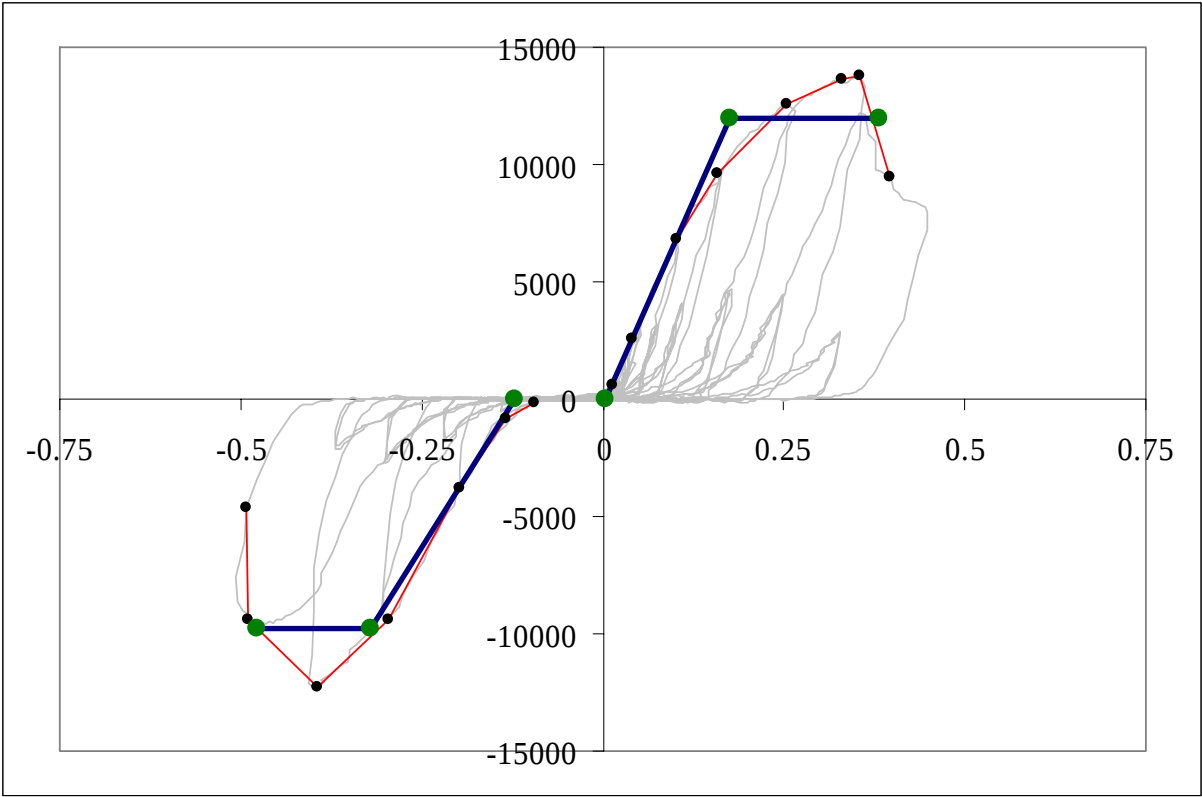


Figure B.72: H6C1 Load (lbs) – Deflection (in) Plot

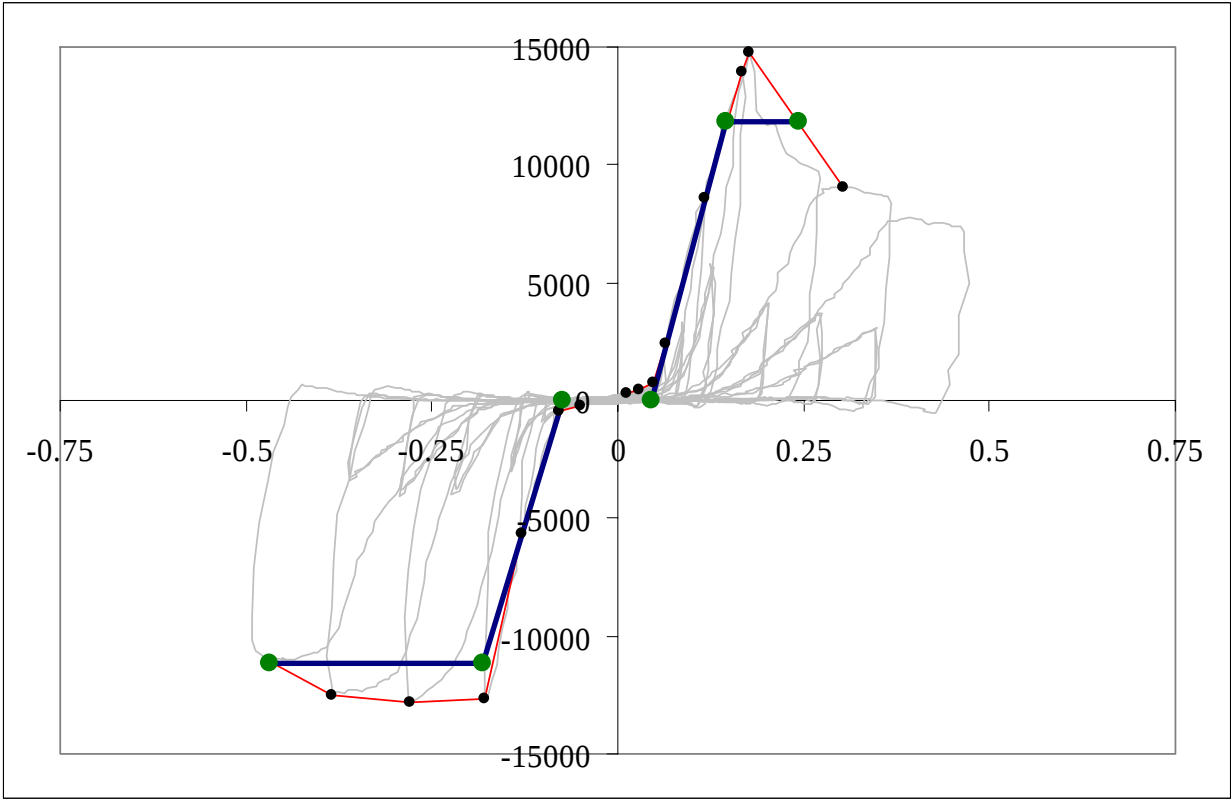


Figure B.73: H6C2 Load (lbs) – Deflection (in) Plot

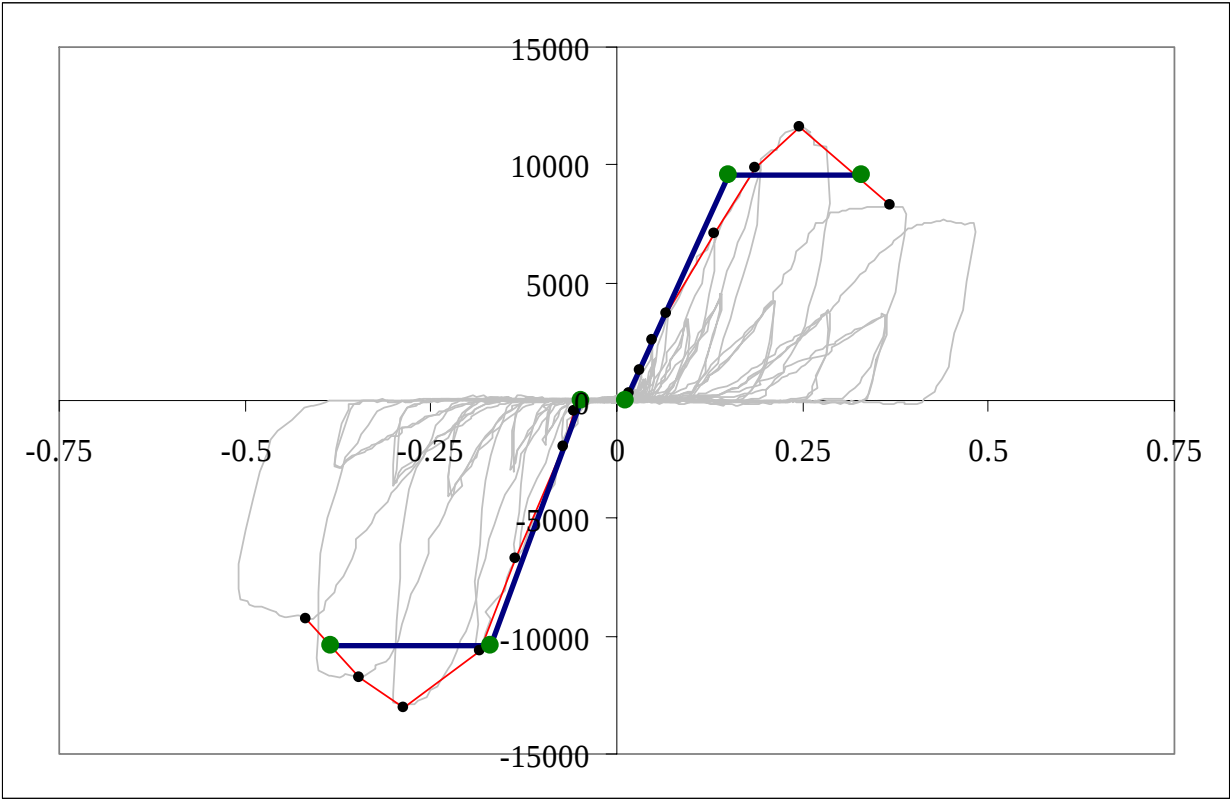


Figure B.74: H6C3 Load (lbs) – Deflection (in) Plot

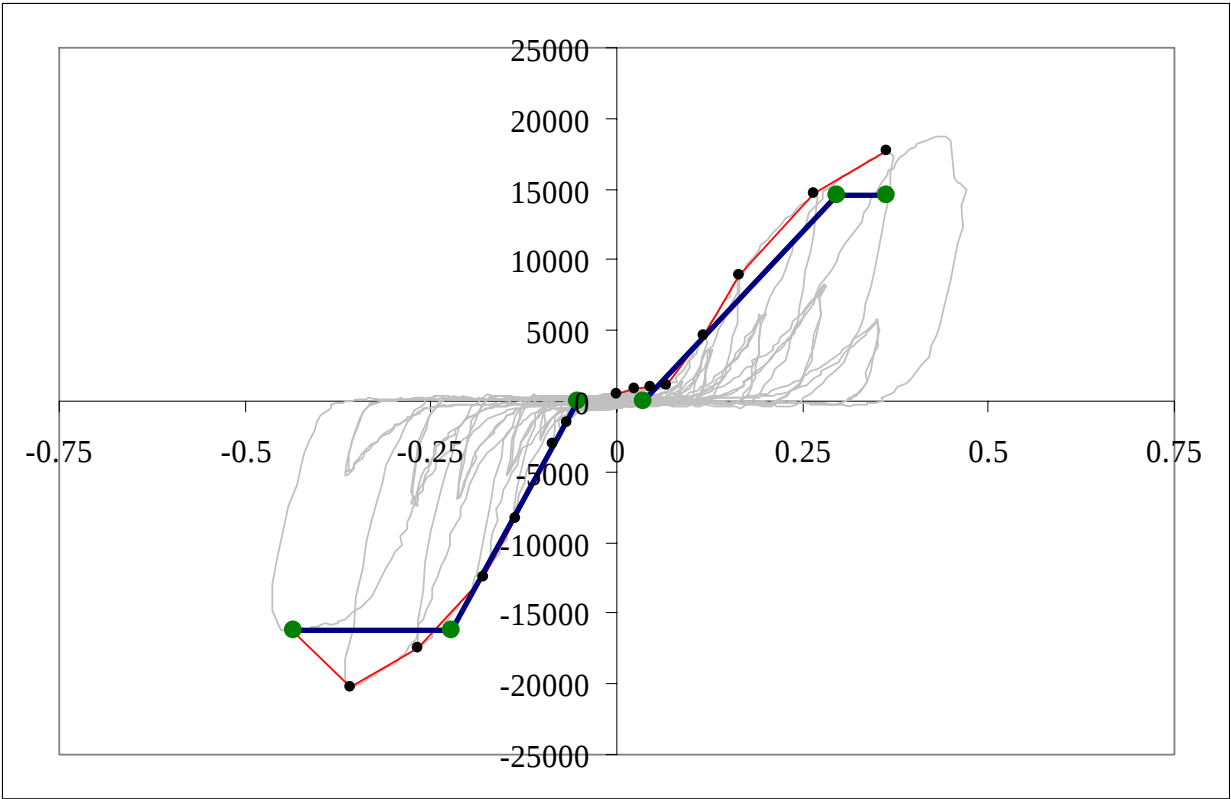


Figure B.75: H6C4 Load (lbs) – Deflection (in) Plot

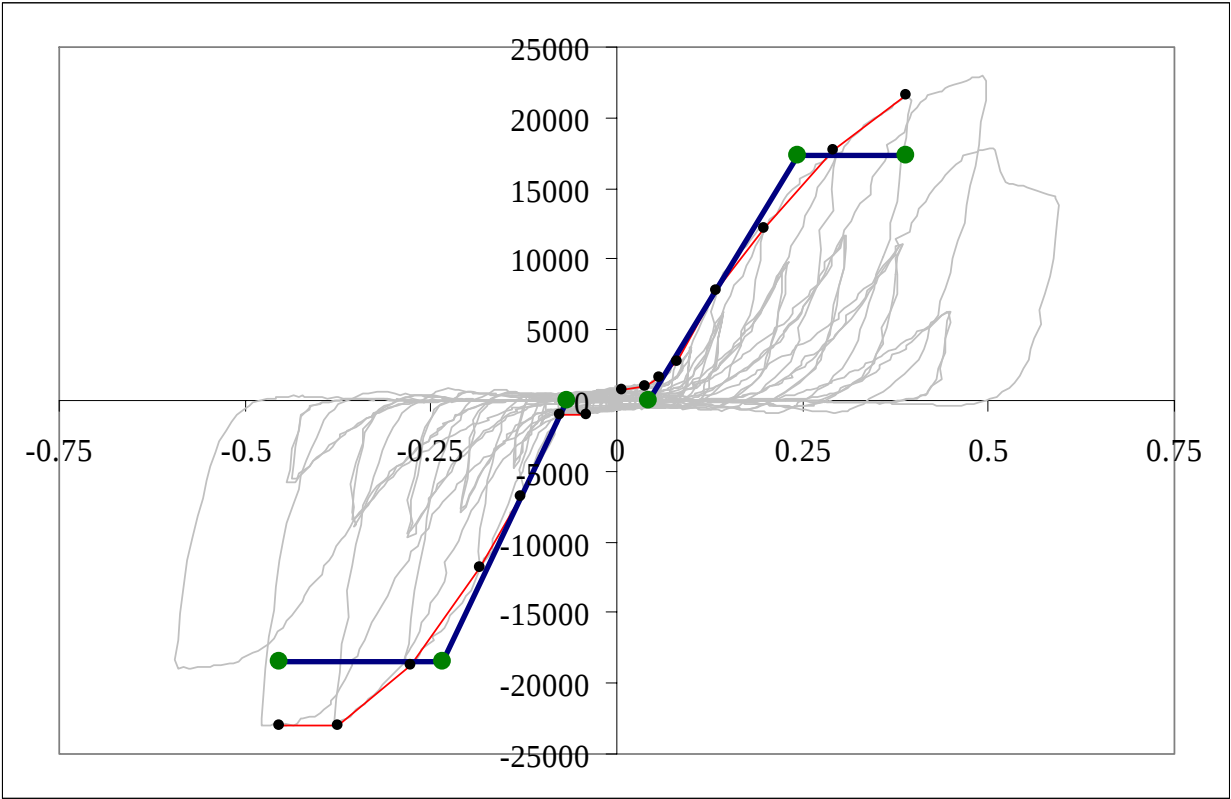


Figure B.76: H6C5 Load (lbs) – Deflection (in) Plot

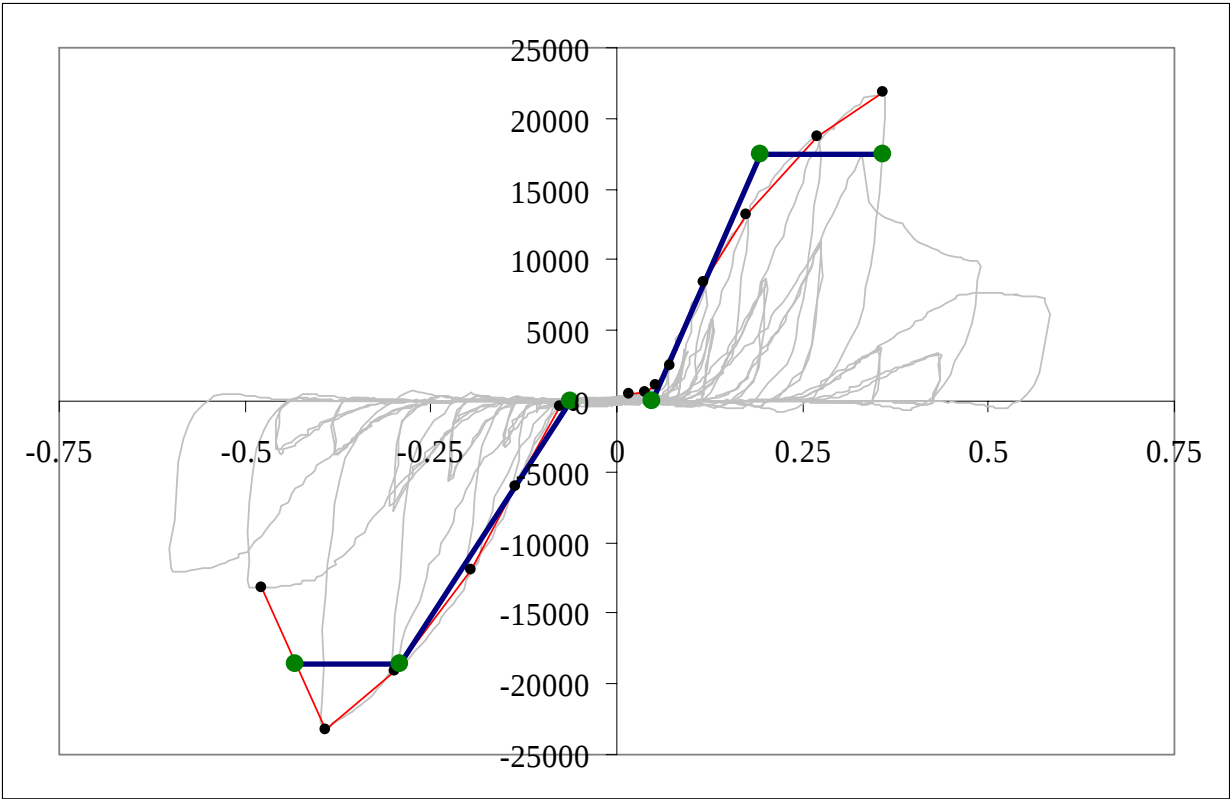


Figure B.77: H6C6 Load (lbs) – Deflection (in) Plot

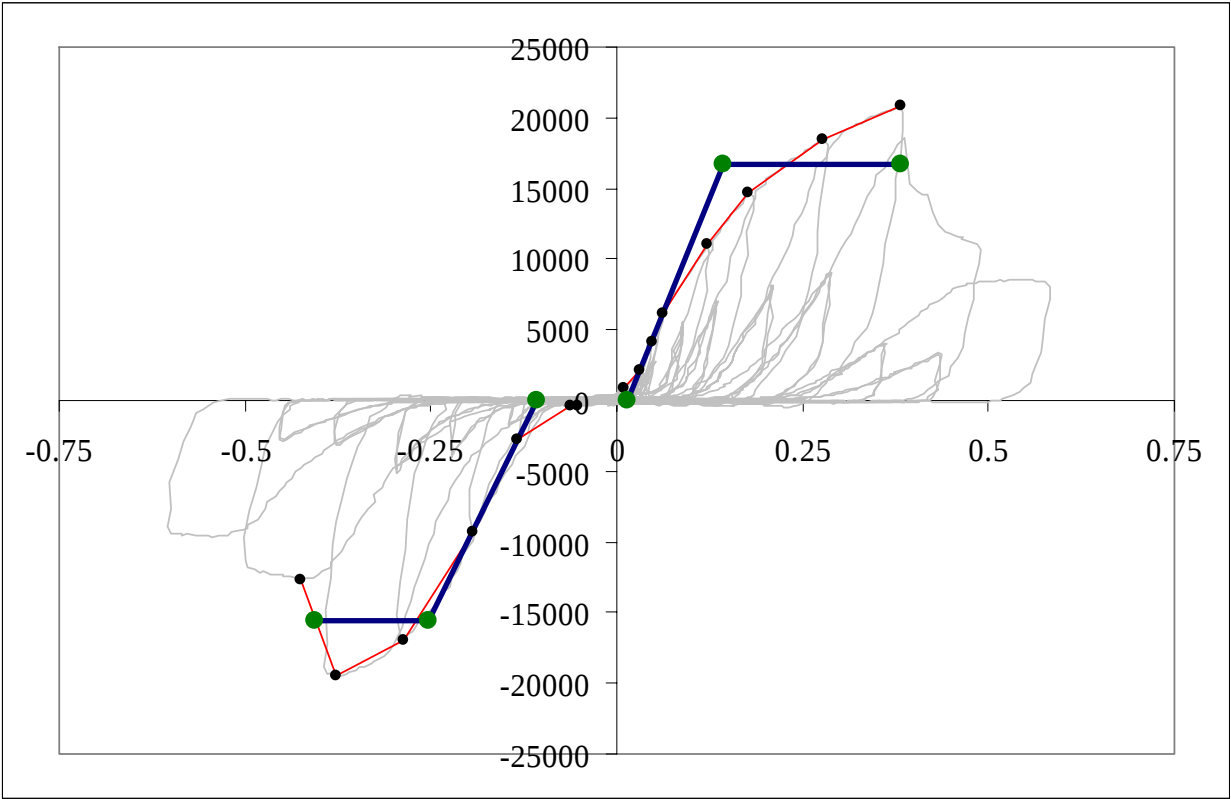


Figure B.78: H6C7 Load (lbs) – Deflection (in) Plot

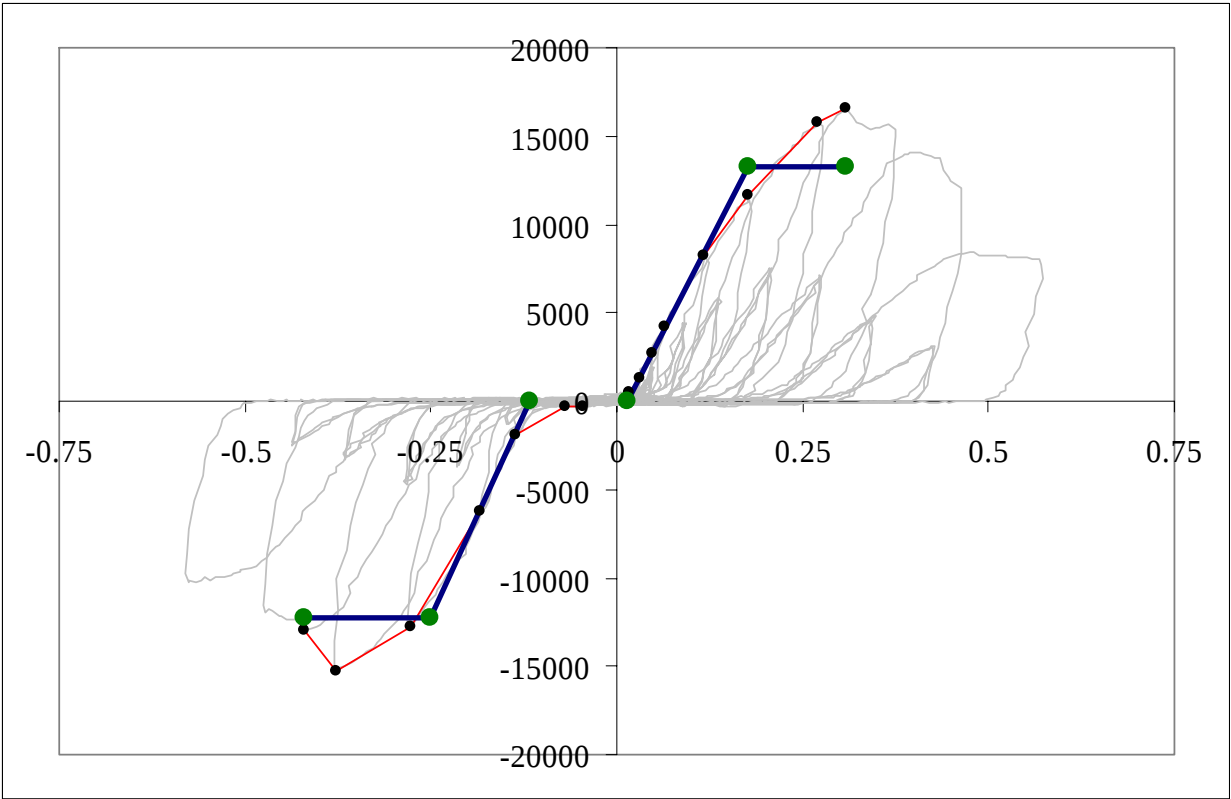


Figure B.79: H6C8 Load (lbs) – Deflection (in) Plot

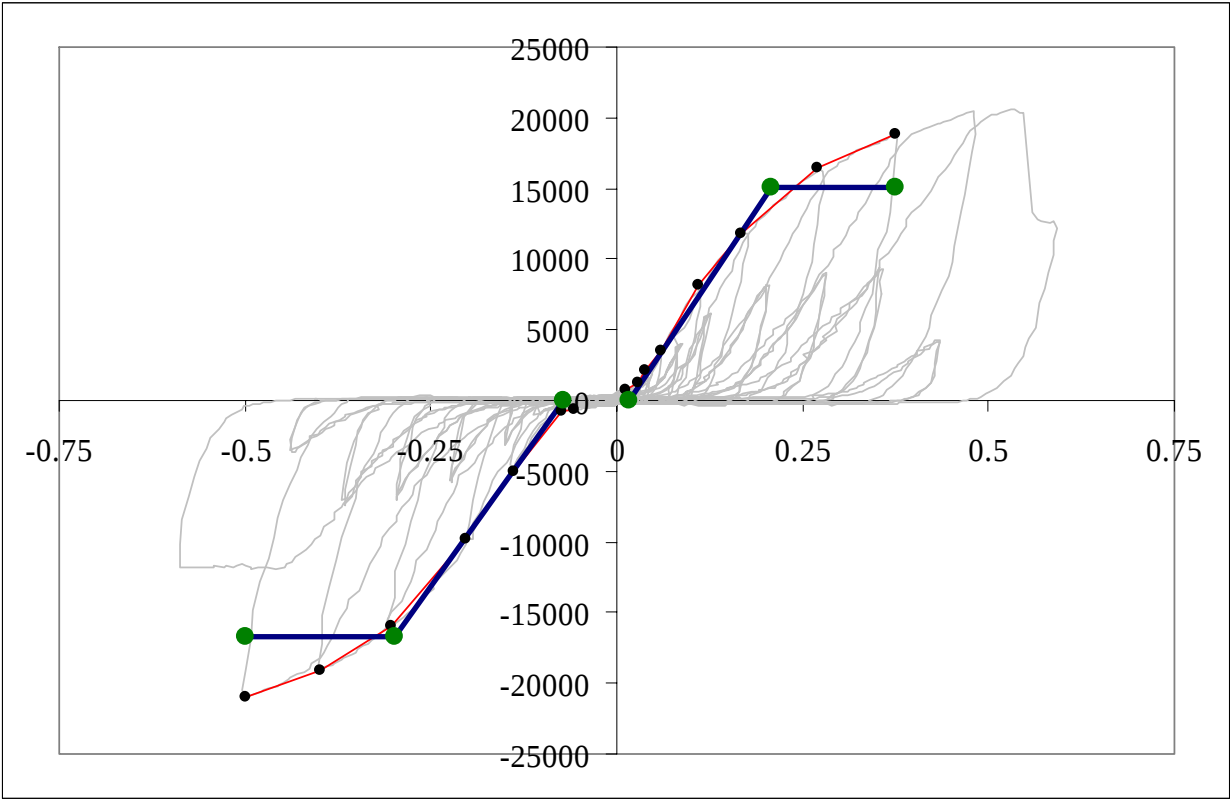


Figure B.80: H6C9 Load (lbs) – Deflection (in) Plot

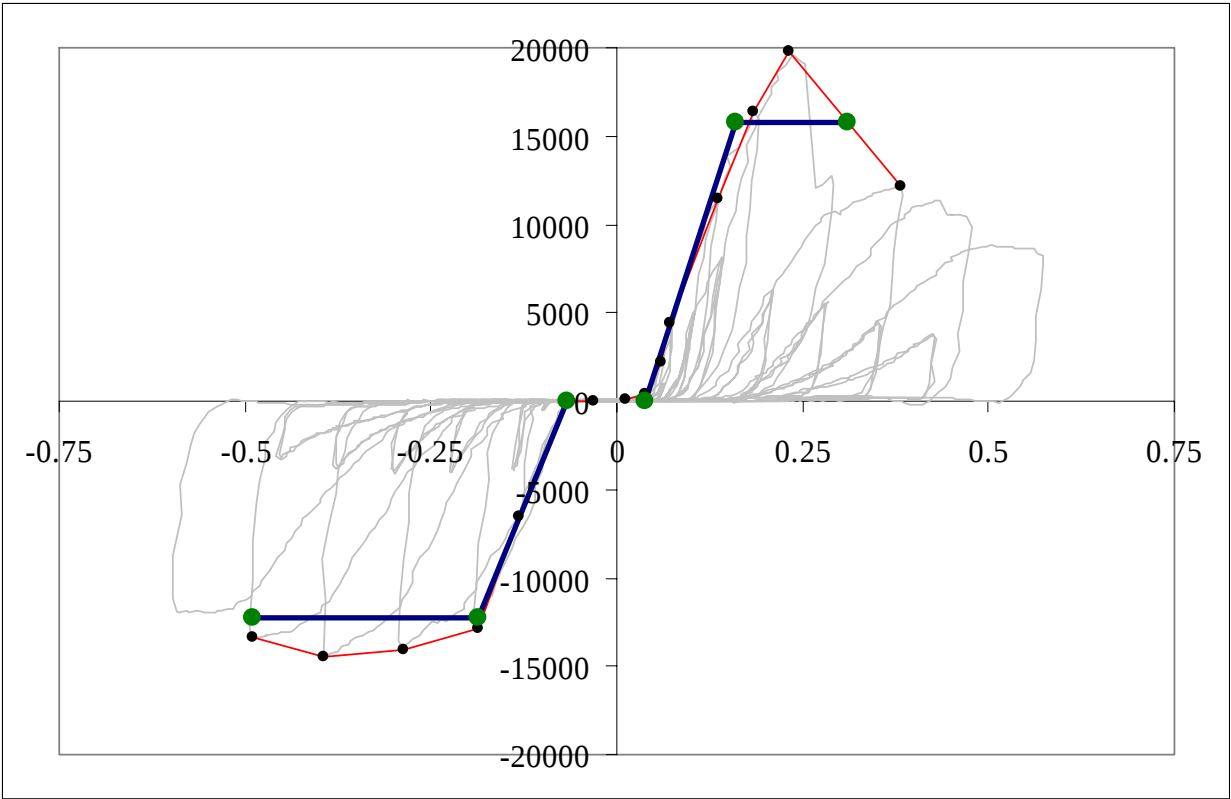


Figure B.81: H6C10 Load (lbs) – Deflection (in) Plot

Table B.9: H5 Connection and Member Properties

	H5 Series												
	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	Mean	St. Dev.	COV(%)
Max Load (lbs)	18250	15950	18450	13500	12000	13600	13450	12700	15800	11350	14505	2490	17.2
@ Displ. (in)	0.27	0.40	0.39	0.34	0.25	0.39	0.31	0.29	0.25	0.32	0.320	0.057	17.9
Failure Load (lbs)	14600	12750	14750	10800	9600	10900	10750	10150	12650	9050	11600	1995	17.2
@ Displ. (in)	0.32	0.47	0.39	0.42	0.29	0.42	0.39	0.35	0.34	0.44	0.383	0.056	14.5
40% Max (lbs)	3600	4200	2900	5150	2150	4300	3100	3200	3150	2100	3385	957	28.3
@ Displ. (in)	0.08	0.10	0.10	0.12	0.06	0.14	0.08	0.11	0.08	0.10	0.097	0.022	22.7
E.E.P. Yield (lbs)	14850	13100	14750	11200	9600	11550	11000	10150	12650	9050	11790	2017	17.1
@ Displ. (in)	0.19	0.28	0.24	0.21	0.16	0.30	0.21	0.23	0.17	0.24	0.221	0.047	21.1
5% Offset (lbs)	15150	12250	12750	9500	8600	13200	10750	12500	11000	10250	11595	1945	16.8
@ Displ. (in)	0.22	0.30	0.24	0.22	0.18	0.37	0.24	0.30	0.19	0.29	0.253	0.059	23.2
Elastic Stiff. (lb/in)	107450	50450	88650	66900	84750	44600	64550	56000	122100	52750	73820	26027	35.3
Slack (in)	0.05	0.02	0.07	0.04	0.04	0.04	0.04	0.05	0.06	0.06	0.047	0.014	30.0
E.E.P. Energy (lb*in)	3100	4250	3500	3350	1900	2800	2950	2250	2950	2800	2985	650	21.8
Ductility Ratio	1.74	1.69	1.66	2.04	2.07	1.40	1.84	1.52	2.10	1.85	1.79	0.24	13.2
Yield Mode	II	II	II	II	II	II	II	II	II	II			
Failure Mode	split	split	split	split	split	split	split	split	split	split			
Governing Member	B	B	B	B	B	B	B	B	B	B			

	H5 Series												
	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	Mean	St. Dev.	COV(%)
M.C. (%)	14	15	13	13	13	14	13	15	14	14	13.8	0.9	6.8
S.G.	0.28	0.38	0.24	0.26	0.30	0.36	0.24	0.28	0.28	0.30	0.293	0.047	15.9
D.E. 5% Yield (psi)	4580	4037	3144	3141	3140	3299	3483	3441	4960	2811	3604	698	19.4
D.E. Capacity (psi)	4626	3932	2769	2926	2764	3065	3161	3200	4831	2793	3407	777	22.8

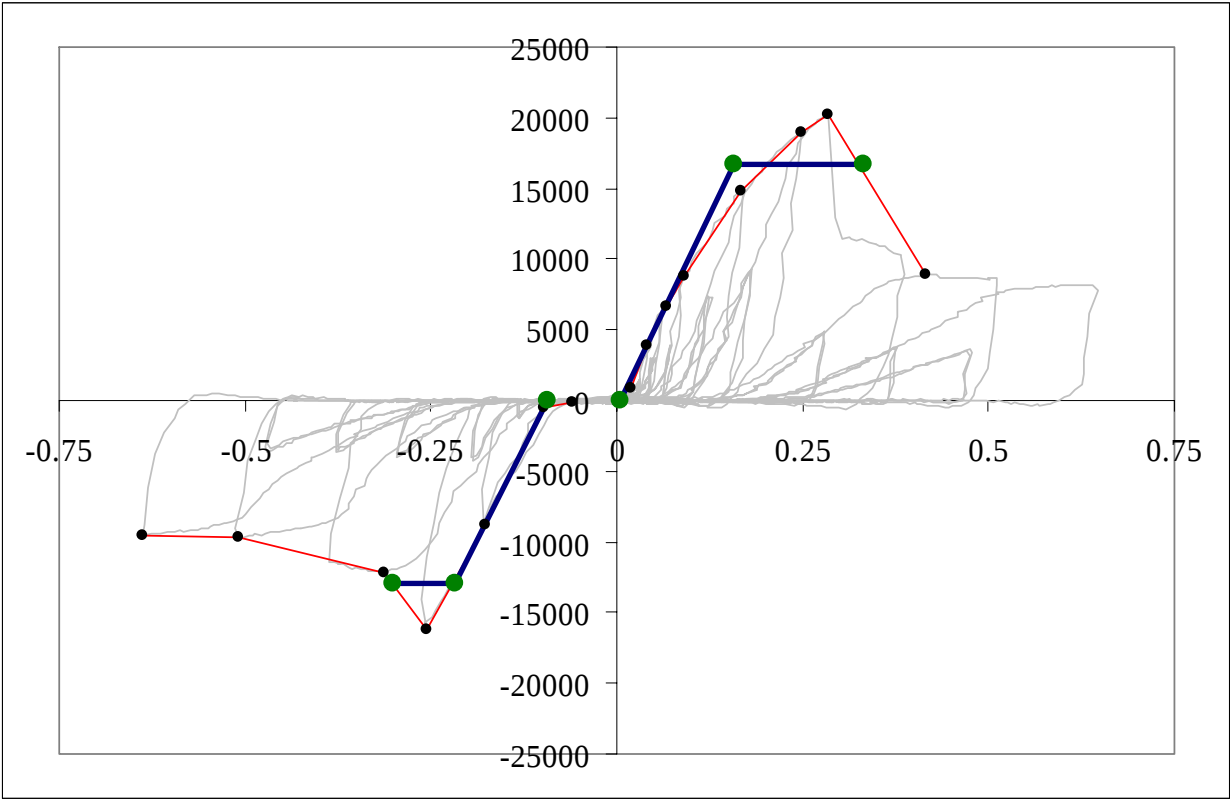


Figure B.82: H5C1 Load (lbs) – Deflection (in) Plot

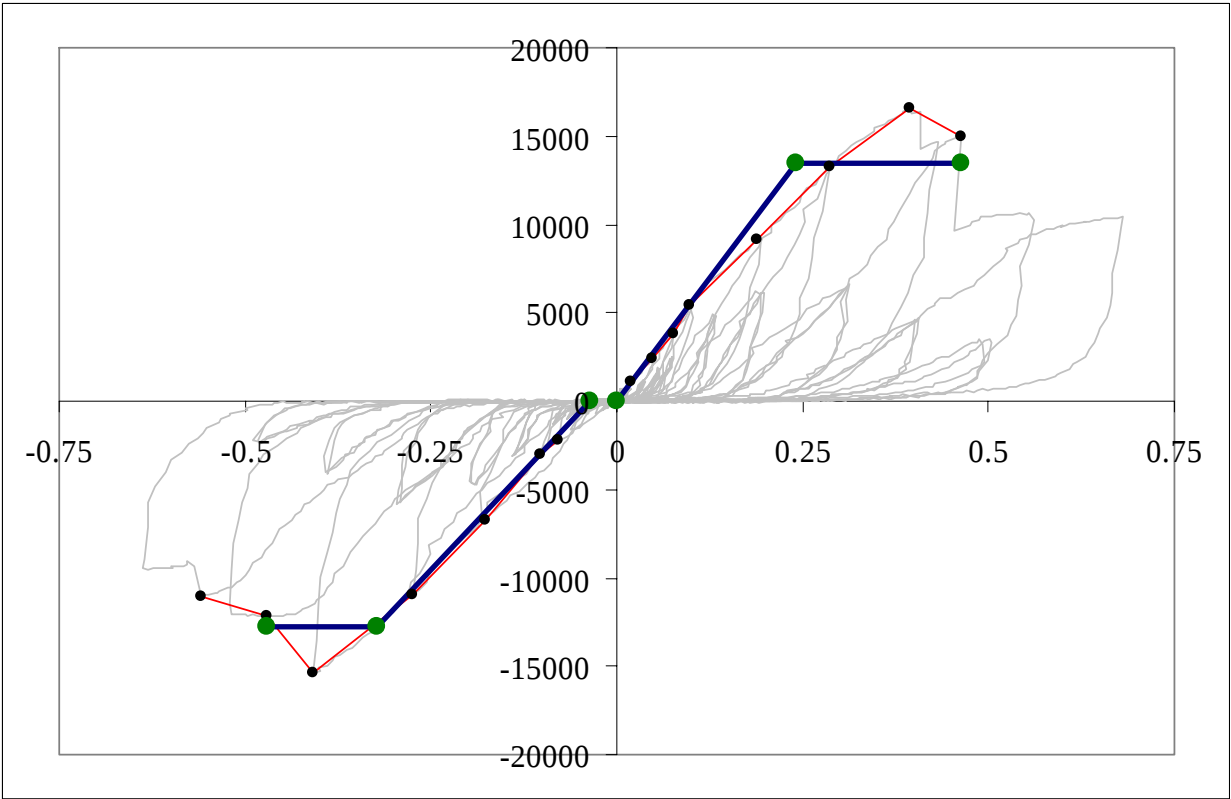


Figure B.83: H5C2 Load (lbs) – Deflection (in) Plot

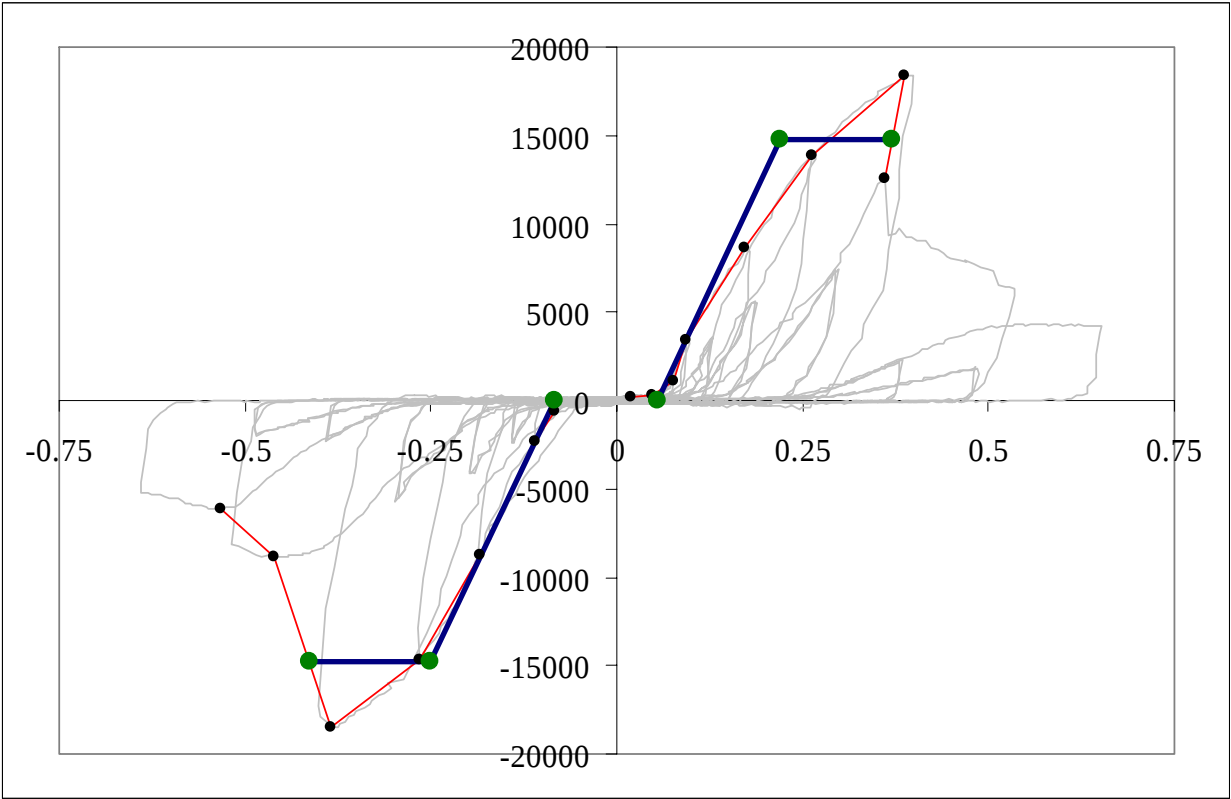


Figure B.84: H5C3 Load (lbs) – Deflection (in) Plot

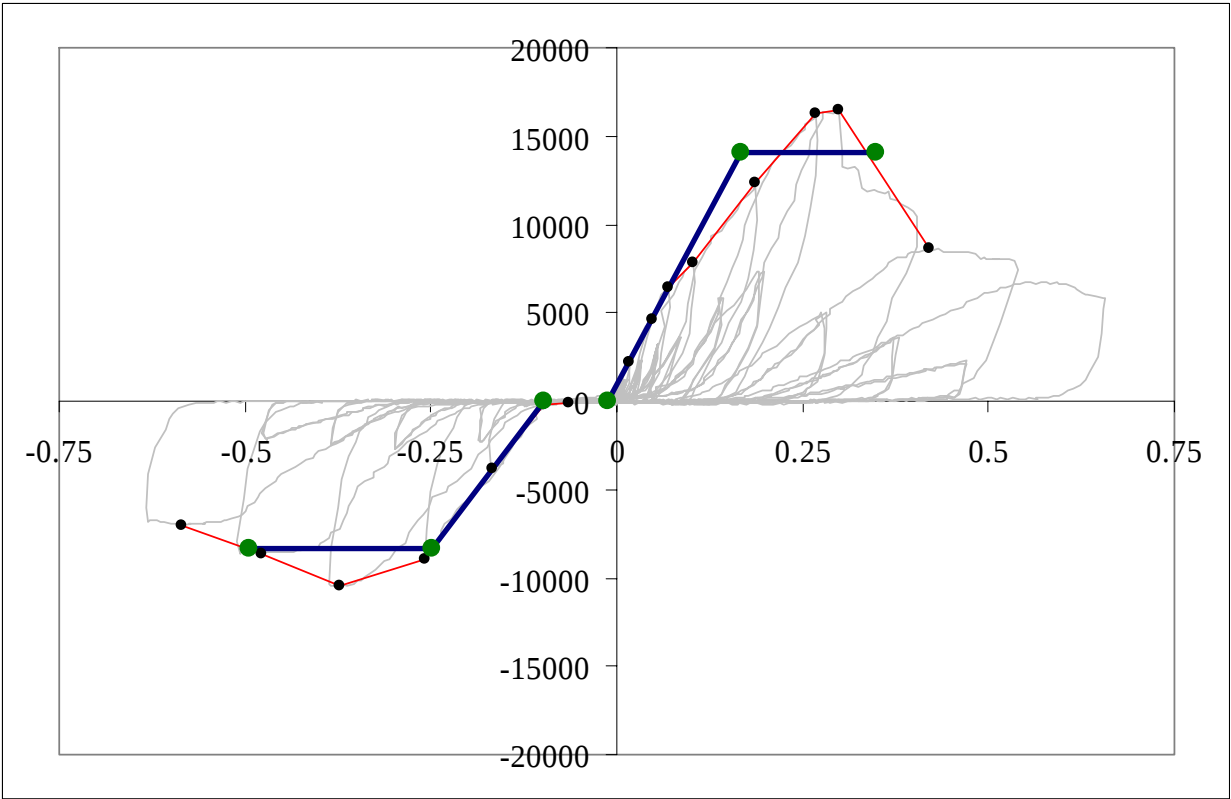


Figure B.85: H5C4 Load (lbs) – Deflection (in) Plot

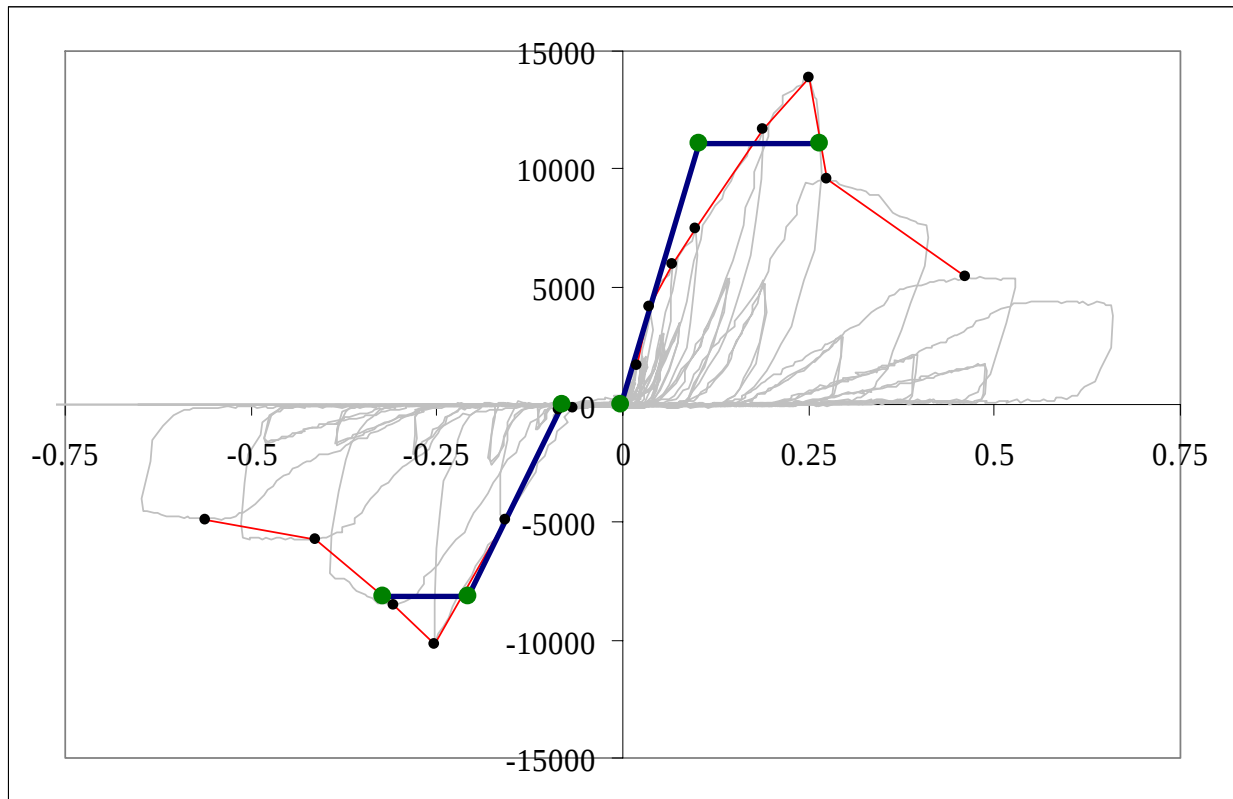


Figure B.86: H5C5 Load (lbs) – Deflection (in) Plot

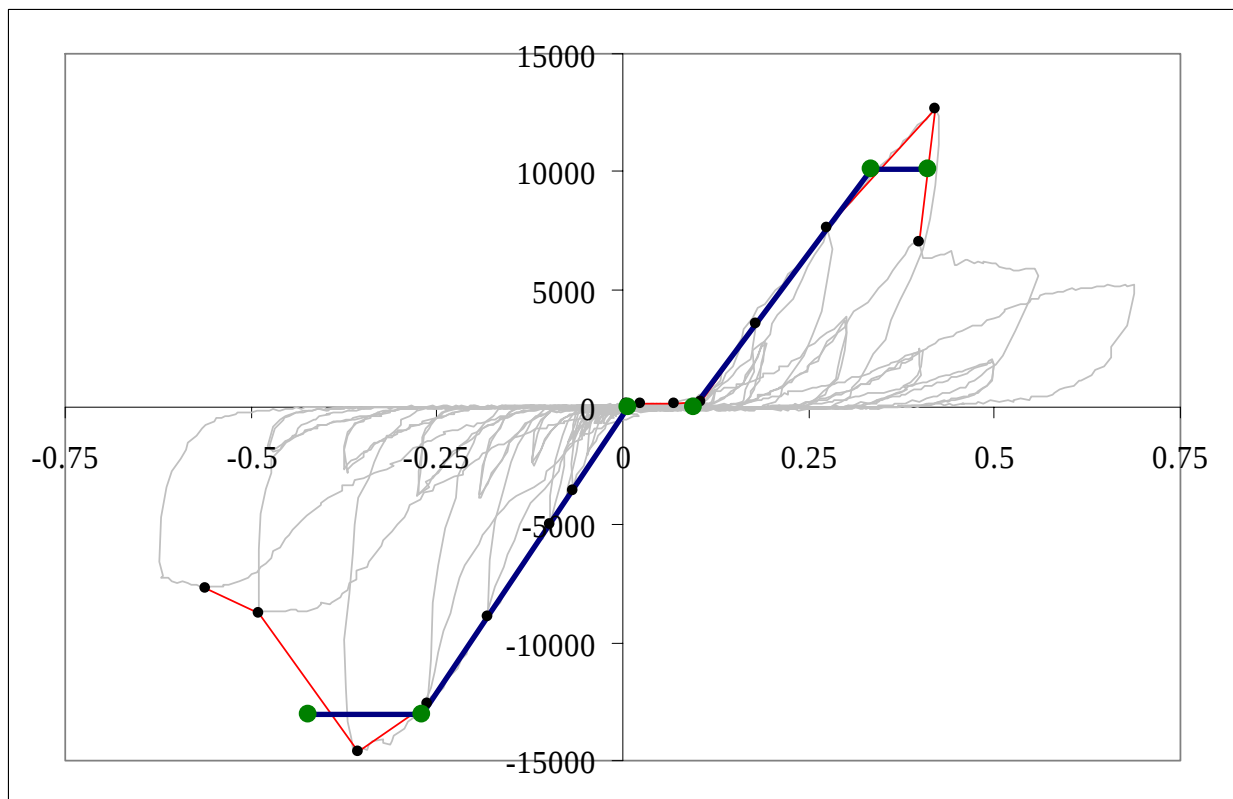


Figure B.87: H5C6 Load (lbs) – Deflection (in) Plot

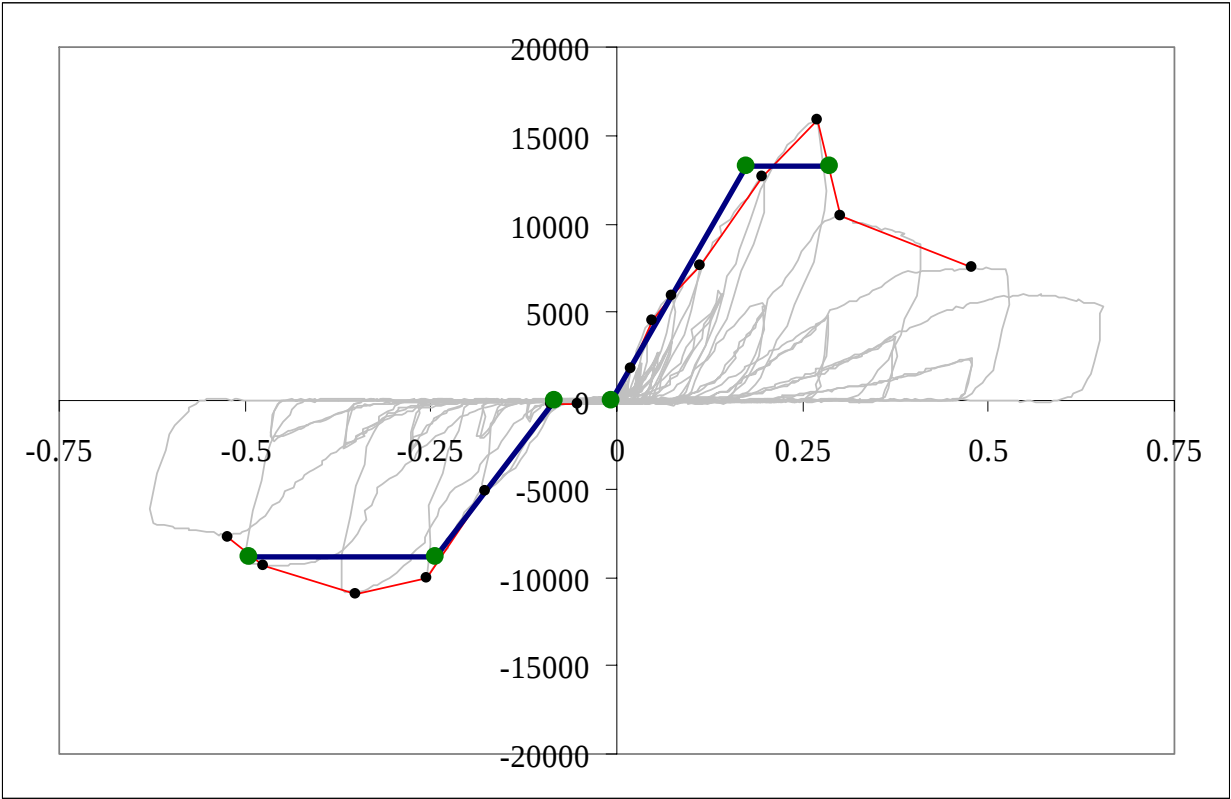


Figure B.88: H5C7 Load (lbs) – Deflection (in) Plot

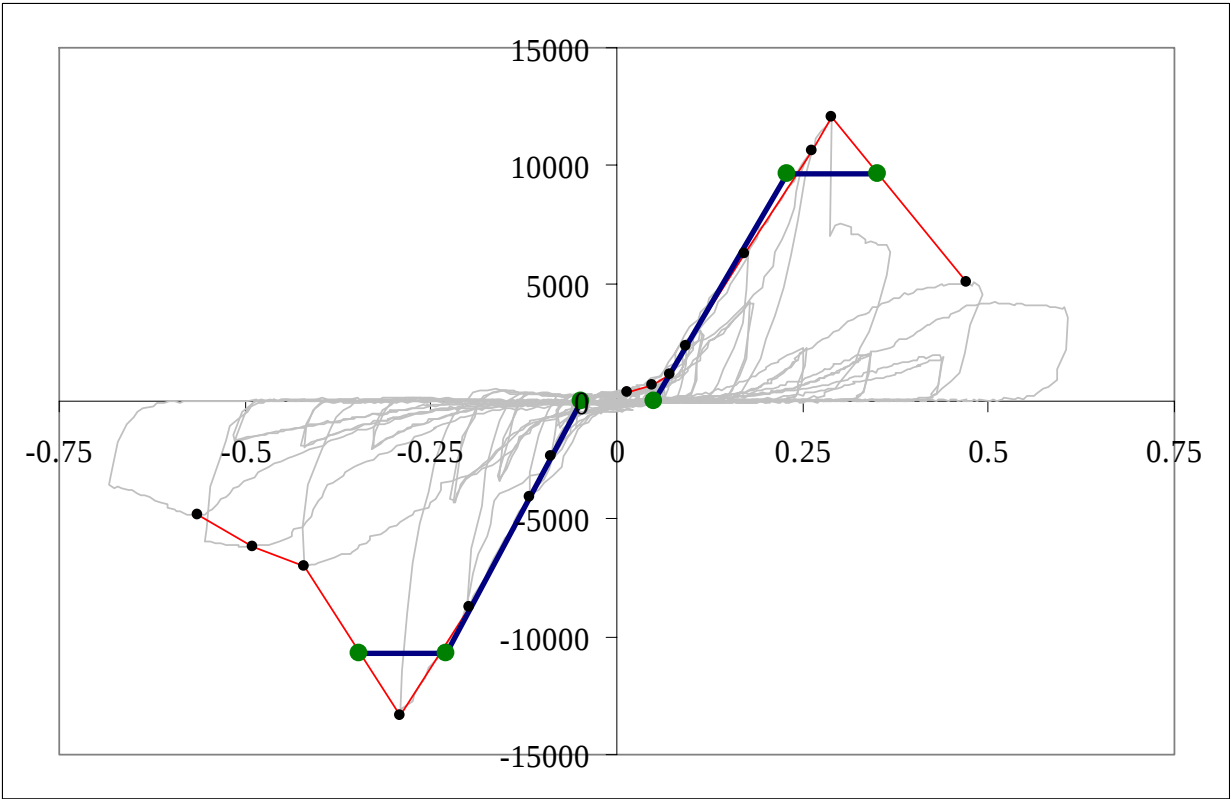


Figure B.89: H5C8 Load (lbs) – Deflection (in) Plot

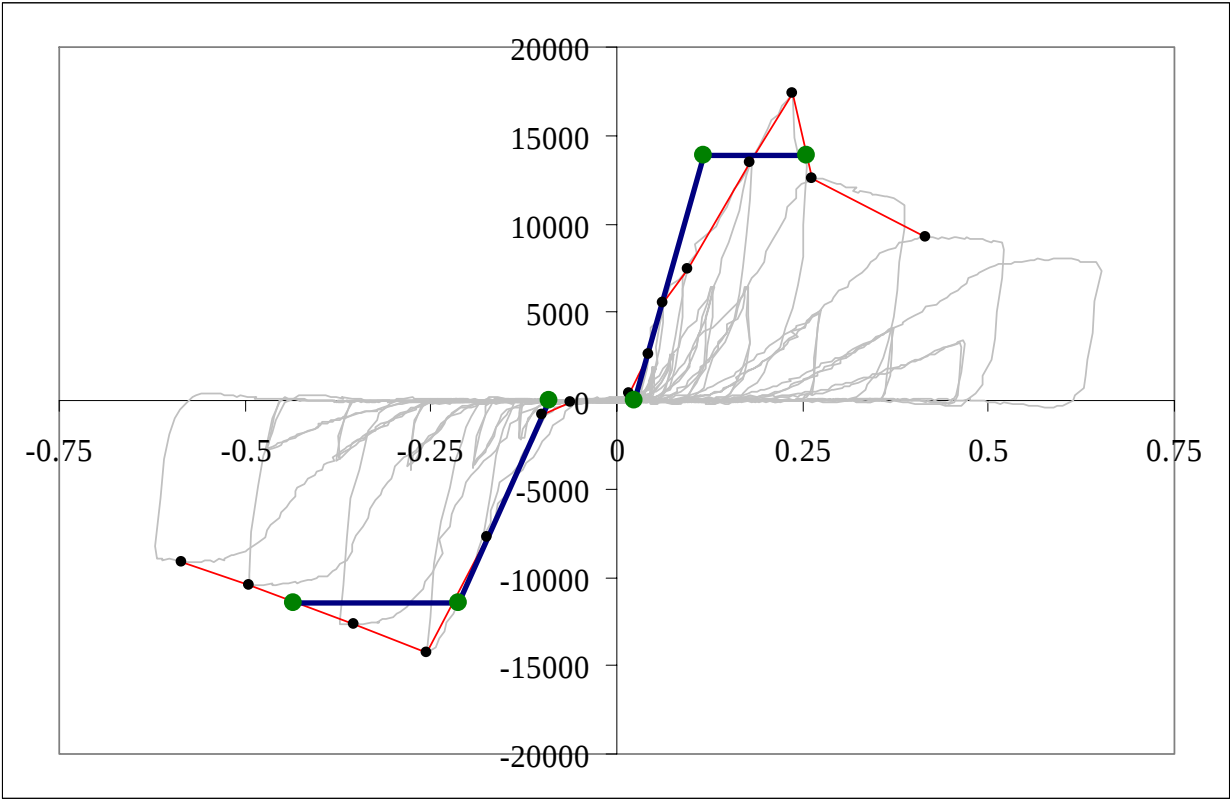


Figure B.90: H5C9 Load (lbs) – Deflection (in) Plot

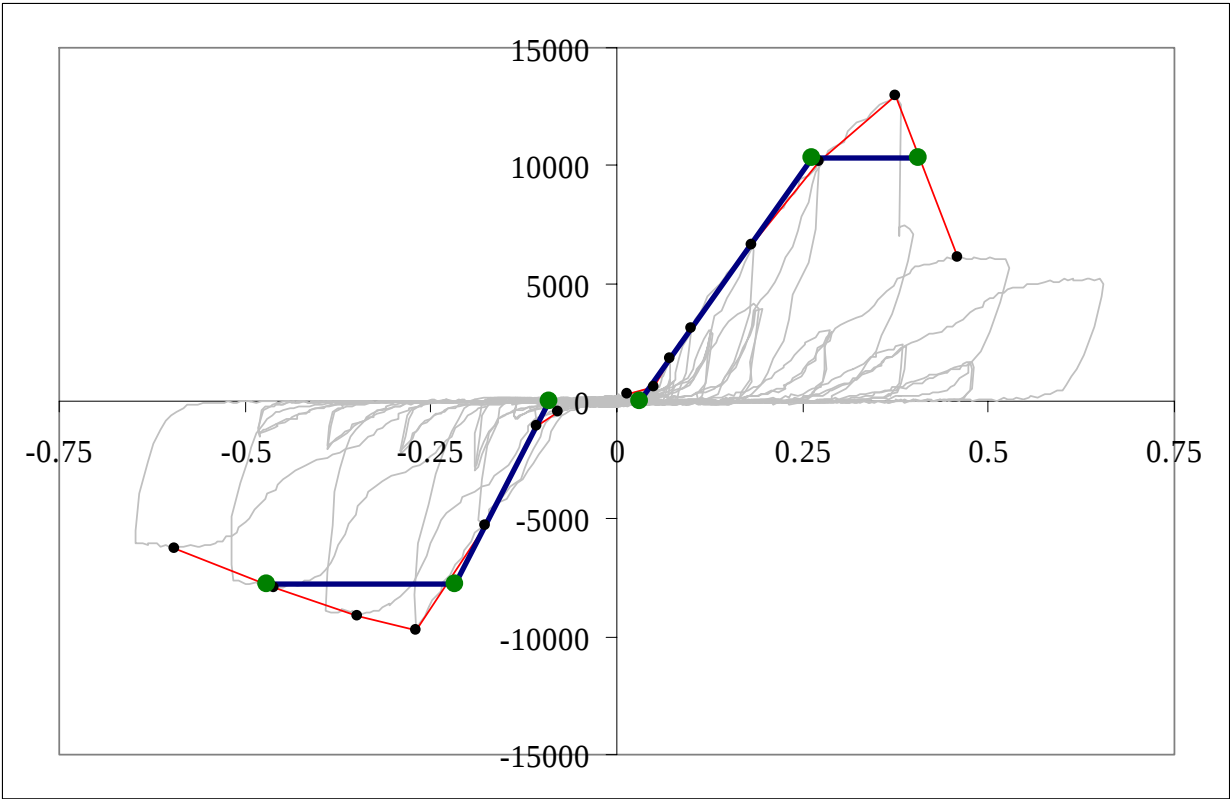


Figure B.91: H5C10 Load (lbs) – Deflection (in) Plot

Table B.10: H3 Connection and Member Properties

	H3 Series										Mean	St. Dev.	COV(%)
	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10			
Max Load (lbs)	16850	6850	8900	5500	8050	8150	13200	9750	8150	9900	9530	3284	34.5
@ Displ. (in)	0.29	0.33	0.24	0.24	0.24	0.28	0.29	0.43	0.28	0.24	0.285	0.059	20.6
Failure Load (lbs)	13500	5500	7100	4400	6450	6500	10550	7800	6500	7900	7620	2631	34.5
@ Displ. (in)	0.44	0.44	0.28	0.36	0.38	0.43	0.37	0.43	0.39	0.30	0.383	0.056	14.7
40% Max (lbs)	5050	1800	3000	900	2450	2950	2450	2400	2150	2750	2590	1061	41.0
@ Displ. (in)	0.10	0.04	0.09	0.07	0.09	0.09	0.09	0.07	0.06	0.08	0.078	0.019	24.8
E.E.P. Yield (lbs)	14500	6150	7100	4650	6500	6750	10950	9200	6800	7900	8050	2850	35.4
@ Displ. (in)	0.26	0.14	0.15	0.18	0.15	0.14	0.22	0.22	0.14	0.16	0.175	0.042	24.0
5% Offset (lbs)	15500	6050	7750	5150	6500	8000	12750	8700	5250	6400	8205	3387	41.3
@ Displ. (in)	0.30	0.16	0.18	0.22	0.19	0.19	0.28	0.24	0.16	0.17	0.207	0.050	24.3
Elastic Stiff. (lb/in)	62200	42300	71450	36800	68950	70650	63550	49900	96750	68650	63120	17074	27.0
Slack (in)	0.02	-0.01	0.05	0.05	0.05	0.04	0.05	0.03	0.04	0.05	0.038	0.018	48.8
E.E.P. Energy (lb*in)	4400	2400	1400	1250	1900	2050	2700	2150	2000	1550	2180	897	41.2
Ductility Ratio	1.72	3.92	1.92	2.08	2.50	2.69	1.67	1.85	2.80	1.89	2.30	0.70	30.2
Yield Mode	II	II	II	II	II	II	II	II	II	II			
Failure Mode	split	split	split	split	split	split	split	split	split	split			
Governing Member	B	B	B	B	B	B	B	B	B	B			

	H3 Series										Mean	St. Dev.	COV(%)
	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10			
M.C. (%)	14	15	14	15	15	15	16	15	14	16	14.8	0.8	5.5
S.G.	0.32	0.35	0.26	0.25	0.31	0.27	0.27	0.32	0.26	0.33	0.294	0.038	13.0
D.E. 5% Yield (psi)	4685	4290	2093	2879	3722	5364	3848	4756	5214	4195	4105	1021	24.9
D.E. Capacity (psi)	4293	4168	3000	2924	3337	5287	3454	4774	5224	3838	4030	868	21.5

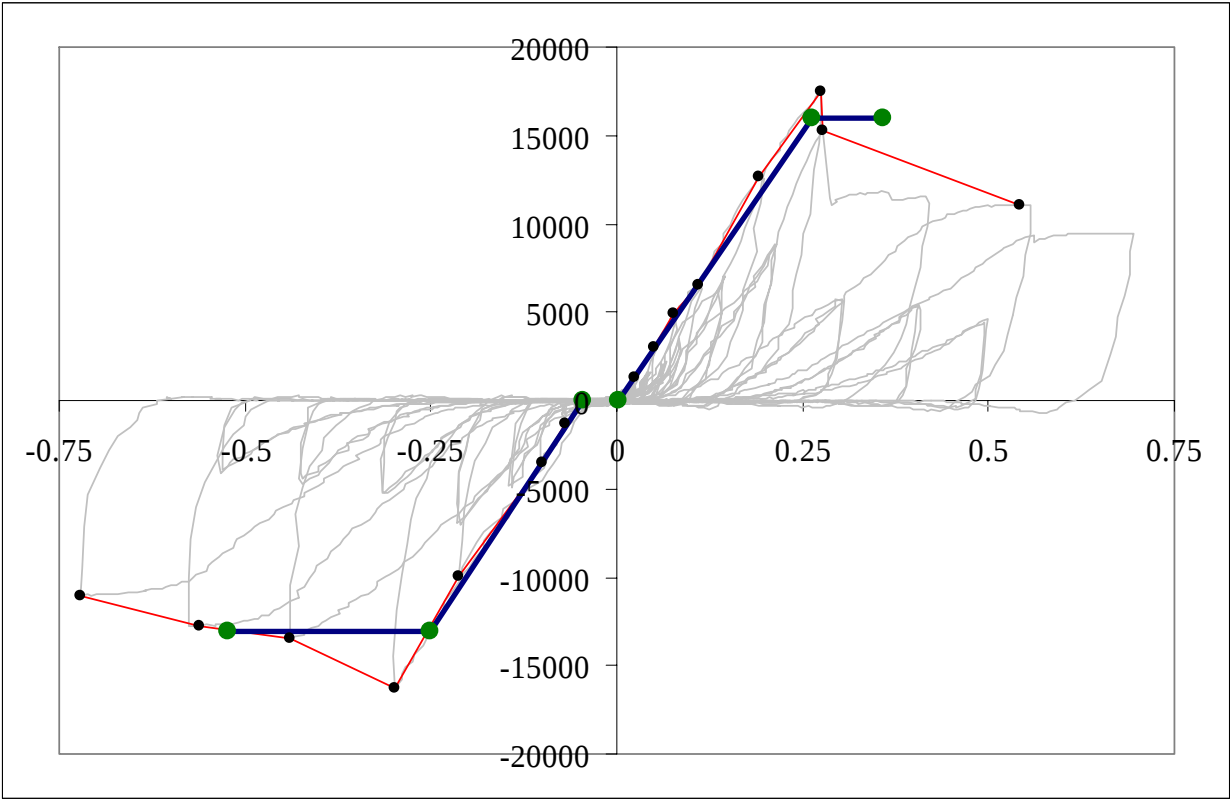


Figure B.92: H3C1 Load (lbs) – Deflection (in) Plot

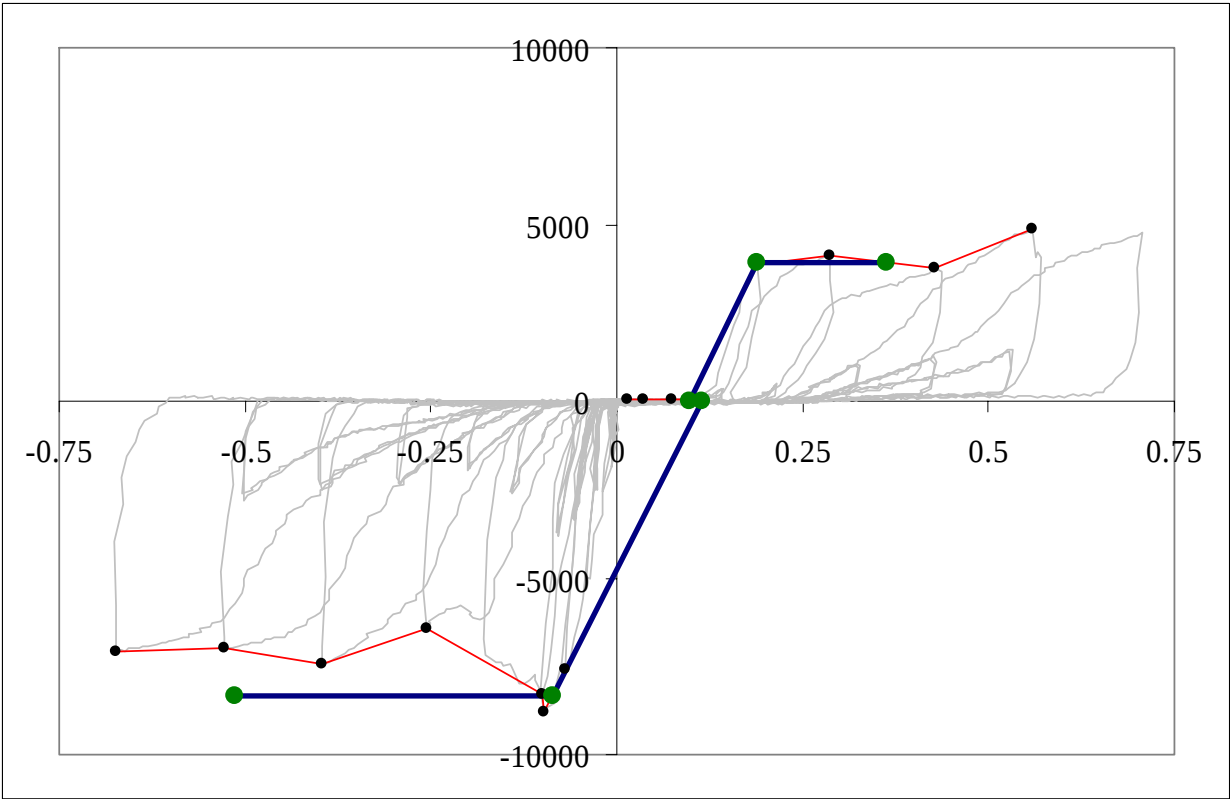


Figure B.93: H3C2 Load (lbs) – Deflection (in) Plot

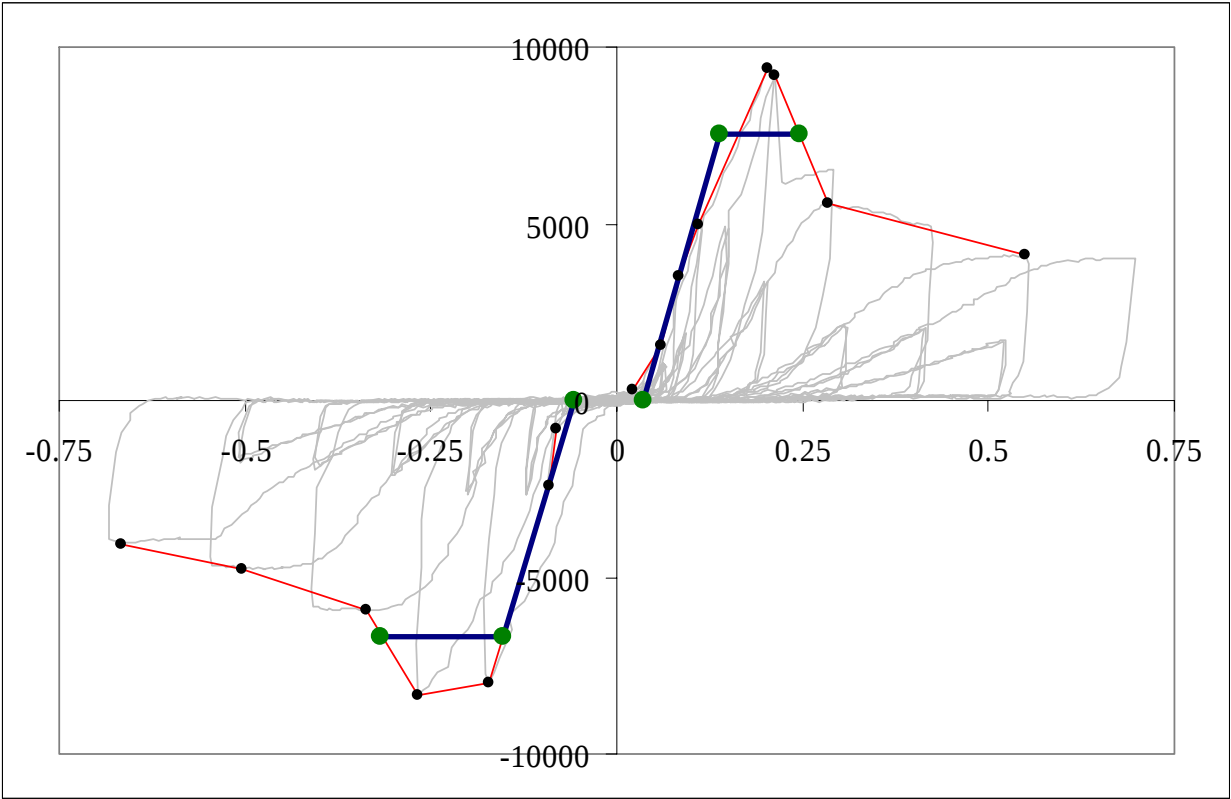


Figure B.94: H3C3 Load (lbs) – Deflection (in) Plot

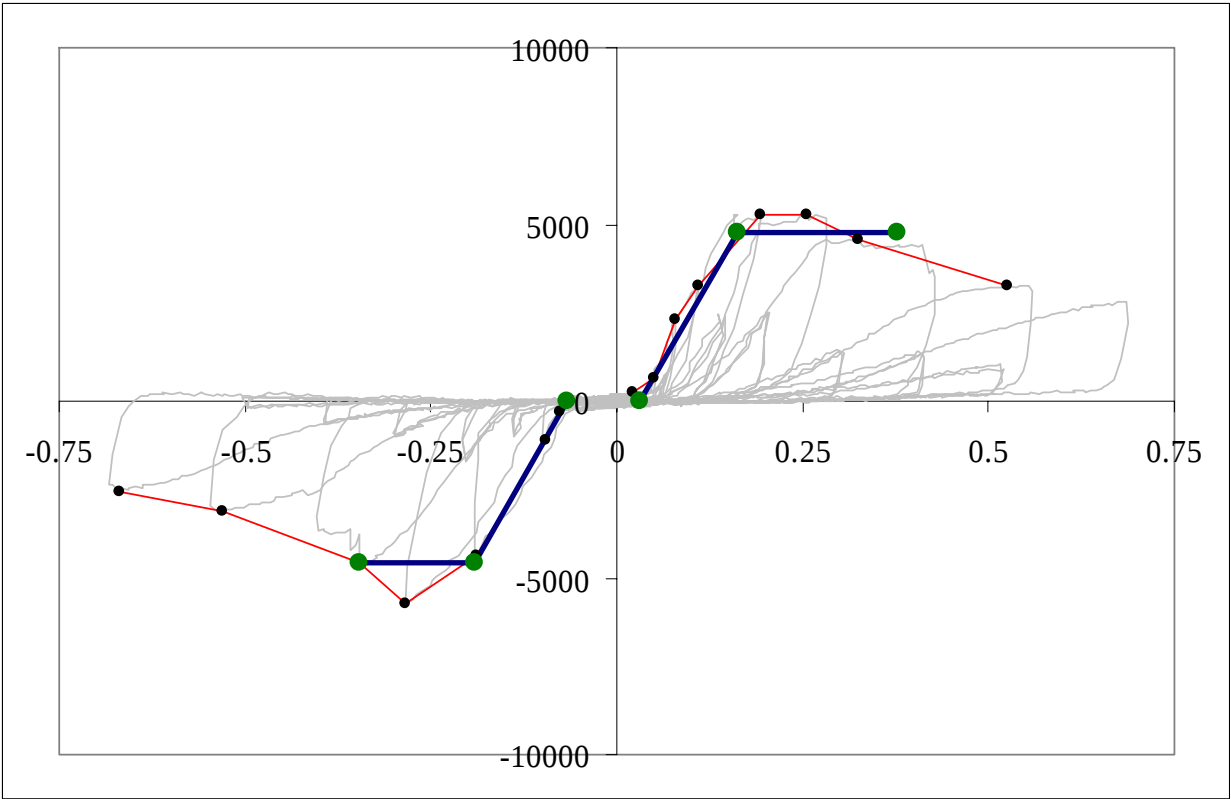


Figure B.95: H3C4 Load (lbs) – Deflection (in) Plot

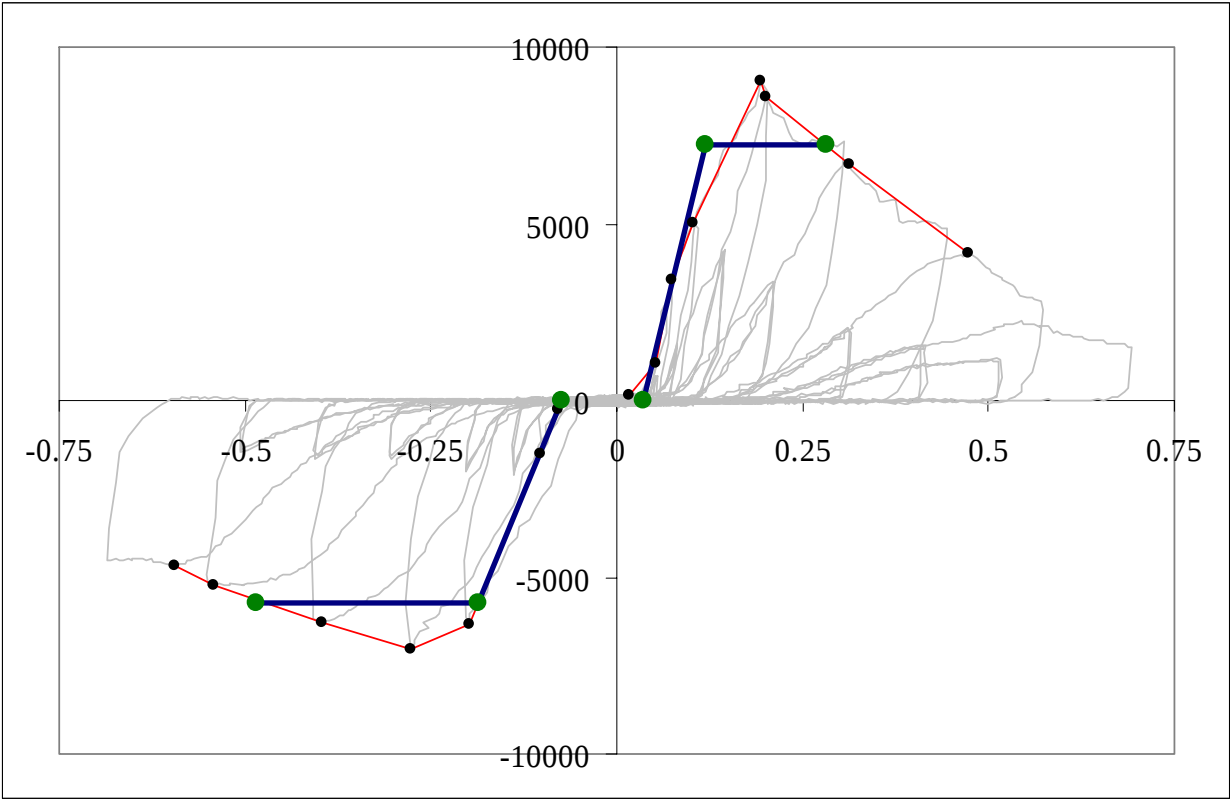


Figure B.96: H3C5 Load (lbs) – Deflection (in) Plot

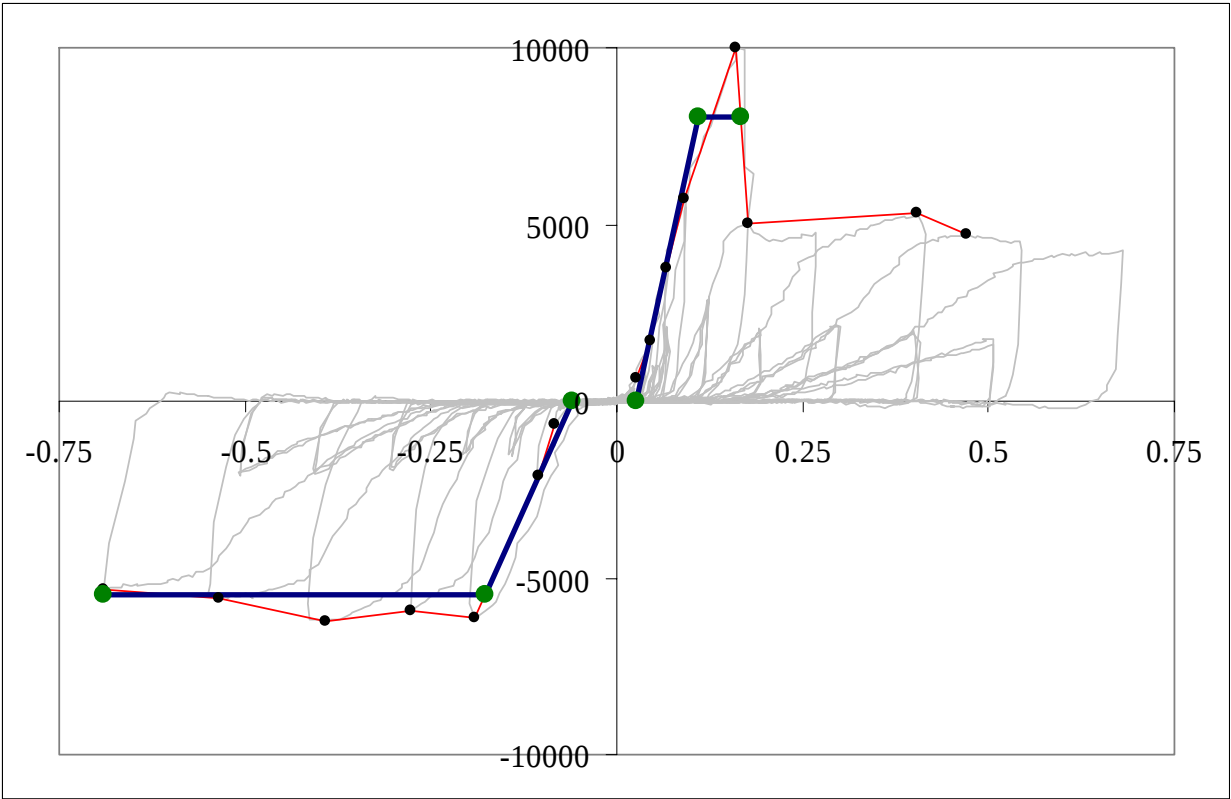


Figure B.97: H3C6 Load (lbs) – Deflection (in) Plot

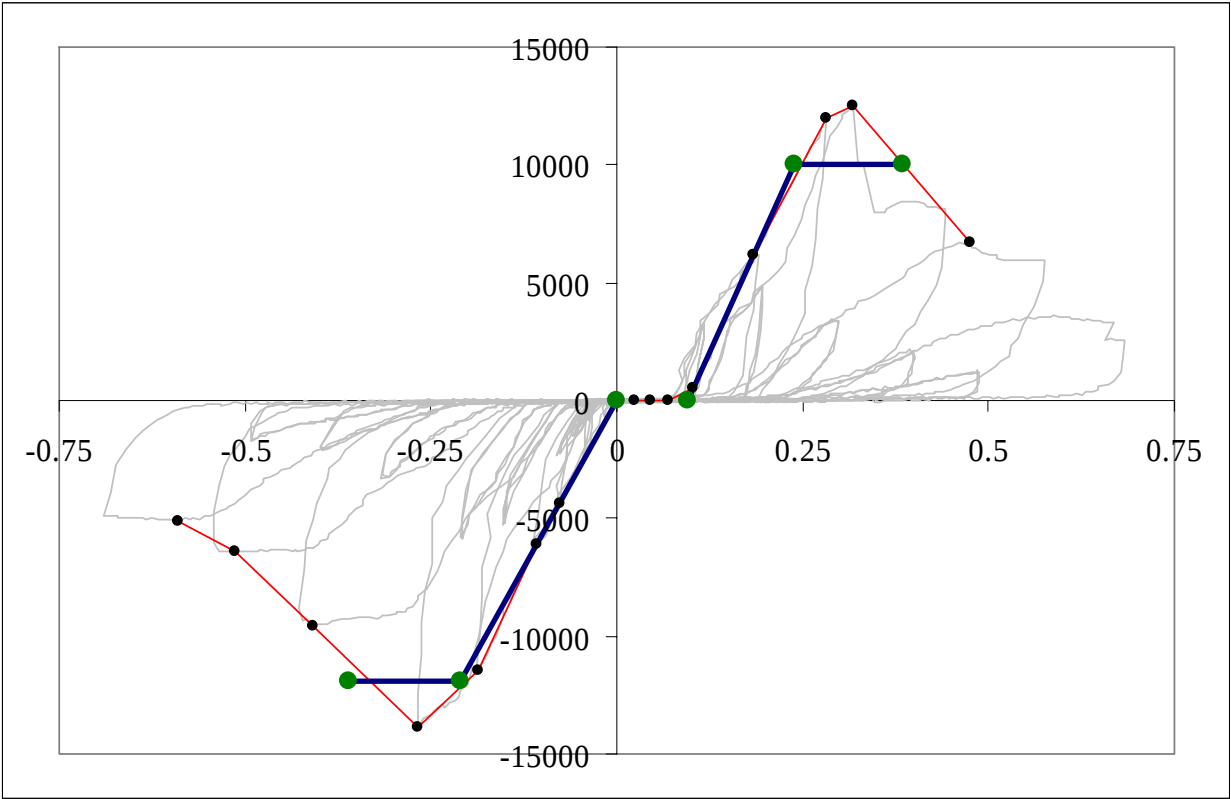


Figure B.98: H3C7 Load (lbs) – Deflection (in) Plot

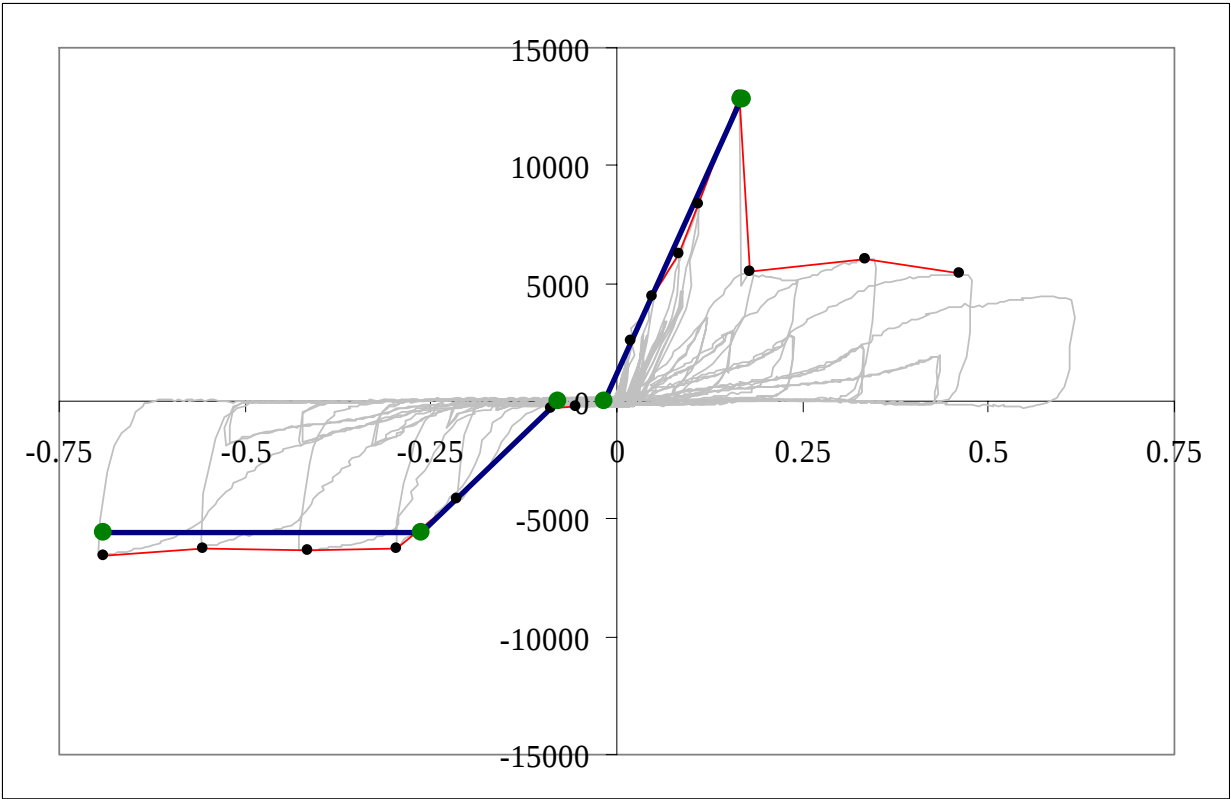


Figure B.99: H3C8 Load (lbs) – Deflection (in) Plot

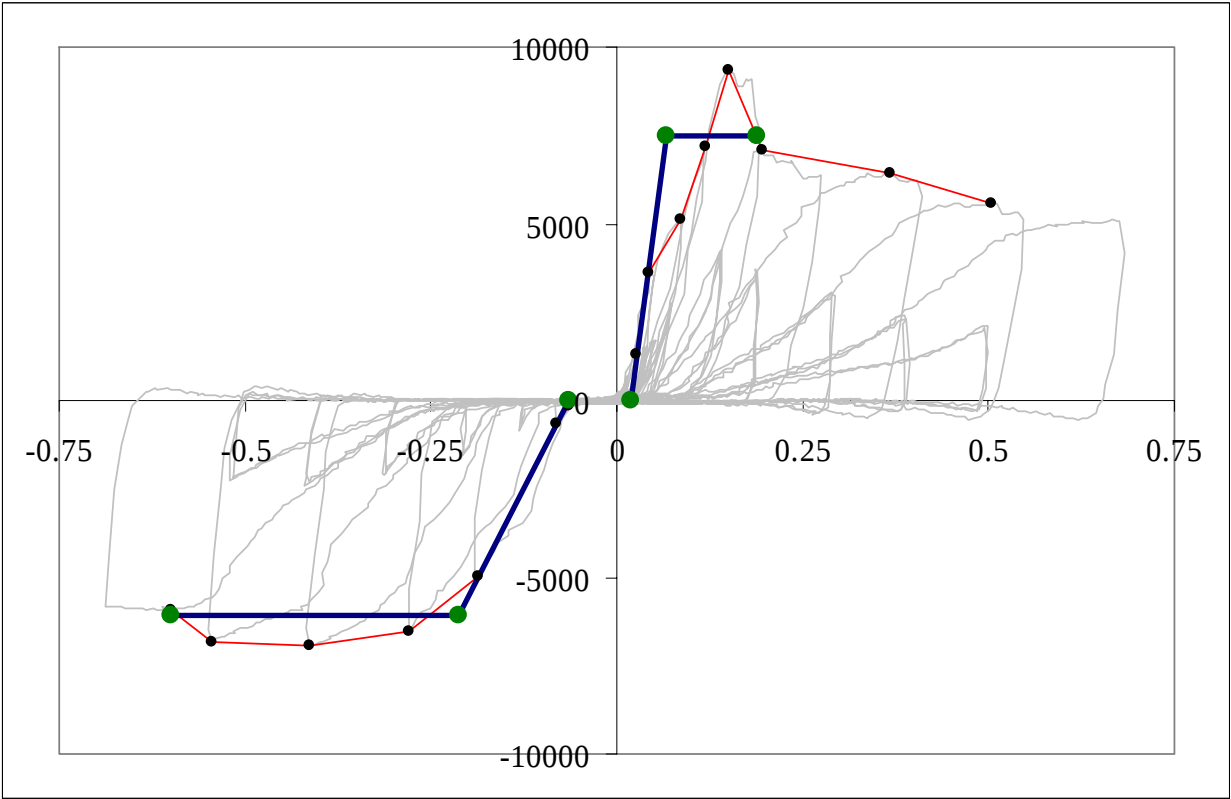


Figure B.100: H3C9 Load (lbs) – Deflection (in) Plot

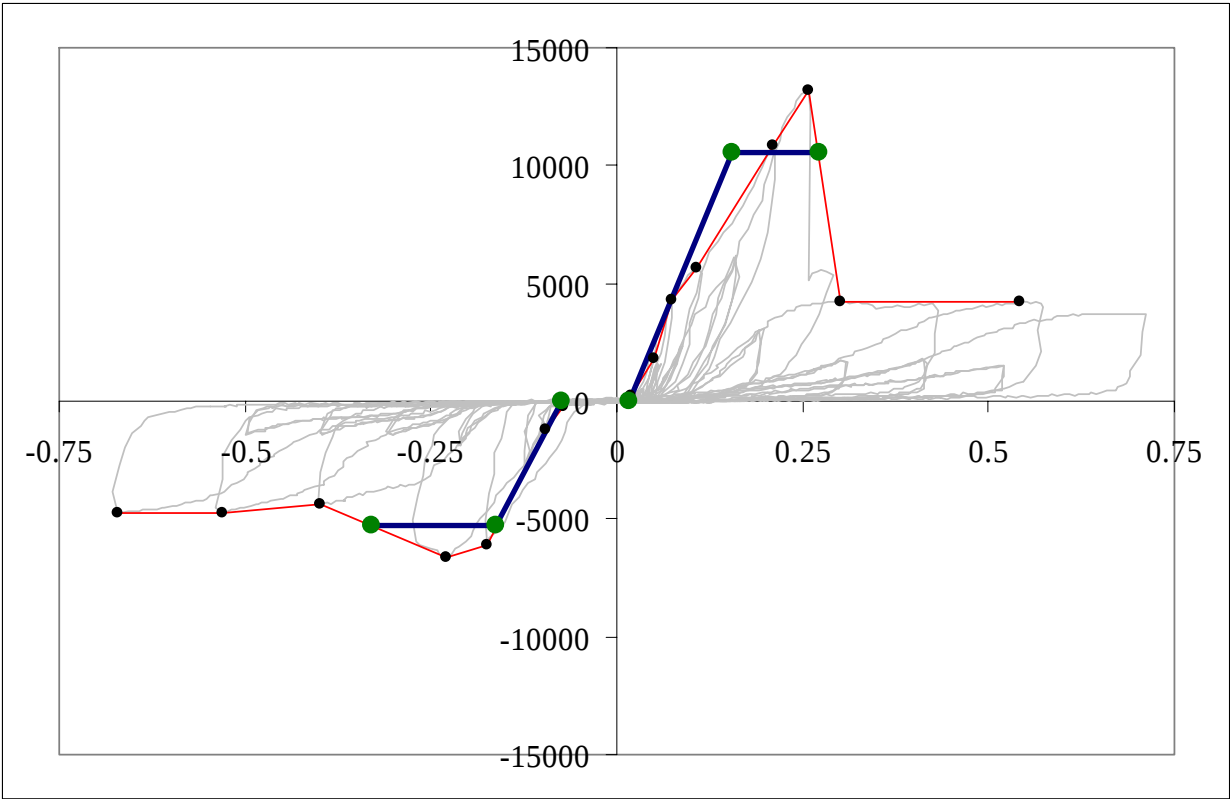


Figure B.101: H3C10 Load (lbs) – Deflection (in) Plot

B.3 Expected Yield Mode IV

Table B.11: E8 Connection and Member Properties

	E8 Series												
	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	Mean	St. Dev.	COV(%)
Max Load (lbs)	6750	8450	6400	7750	8950	9150	8350	7850	7650	6950	7825	924	11.8
@ Displ. (in)	0.28	0.45	0.37	0.46	0.62	0.48	0.32	0.47	0.64	0.47	0.454	0.113	25.0
Failure Load (lbs)	5400	6750	5100	6200	7150	7350	6650	6300	6100	5550	6255	745	11.9
@ Displ. (in)	0.32	0.47	0.39	0.52	0.62	0.51	0.35	0.53	0.63	0.49	0.483	0.102	21.2
40% Max (lbs)	2050	2550	2400	2450	3150	2700	3250	2300	2050	2400	2530	406	16.1
@ Displ. (in)	0.11	0.14	0.13	0.15	0.14	0.12	0.12	0.13	0.13	0.13	0.131	0.011	8.71
E.E.P. Yield (lbs)	5700	6750	5400	6200	7200	7750	7100	6300	6350	6150	6490	715	11.0
@ Displ. (in)	0.20	0.28	0.24	0.25	0.25	0.26	0.23	0.22	0.33	0.29	0.255	0.038	15.1
5% Offset (lbs)	4850	6000	4800	5200	4850	6550	6850	4250	4950	5400	5370	837	15.6
@ Displ. (in)	0.20	0.28	0.24	0.25	0.21	0.25	0.24	0.19	0.30	0.29	0.244	0.035	14.4
Elastic Stiff. (lb/in)	39950	30800	28550	37050	36900	39050	36800	41750	22000	23250	33610	7028	20.9
Slack (in)	0.05	0.06	0.05	0.07	0.06	0.06	0.04	0.07	0.04	0.03	0.051	0.014	26.6
E.E.P. Energy (lb*in)	1150	2050	1400	2400	3350	2800	1600	2550	2750	2100	2215	690	31.1
Ductility Ratio	1.63	1.67	1.67	2.13	2.45	2.05	1.55	2.38	1.97	1.69	1.92	0.33	17.0
Yield Mode	II,III	II	II	II	II	II	II,III	II	II	II			
Failure Mode	split	split	split	split	split	split	split	split	split	split			
Governing Member	B	B	T	T	T	T	T	T	B	T			

	E8 Series												
Member Top	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	Mean	St. Dev.	COV(%)
M.C. (%)	14	15	15	16	16	15	12	14	15	15	14.6	1.0	7.1
S.G.	0.58	0.61	0.64	0.65	0.64	0.60	0.50	0.56	0.64	0.61	0.604	0.047	7.8
D.E. 5% Yield (psi)	7206	6829	3881	4350	5072	4110	4567	4852	4069	3766	4870	1207	24.8
D.E. Capacity (psi)	7383	7270	3634	4679	4923	4041	4392	4734	4323	3882	4926	1326	26.9

Member Bottom	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	Mean	St. Dev.	COV(%)
M.C. (%)	15	14	14	16	13	12	13	15	16	15	14.3	1.3	9.0
S.G.	0.64	0.59	0.56	0.65	0.52	0.51	0.54	0.62	0.68	0.62	0.592	0.057	9.7
D.E. 5% Yield (psi)	4708	6441	6951	4314	5074	5677	5980	4218	3924	4536	5182	1028	19.8
D.E. Capacity (psi)	4816	7349	7370	4300	4596	5649	5908	4271	3876	4670	5281	1256	23.8

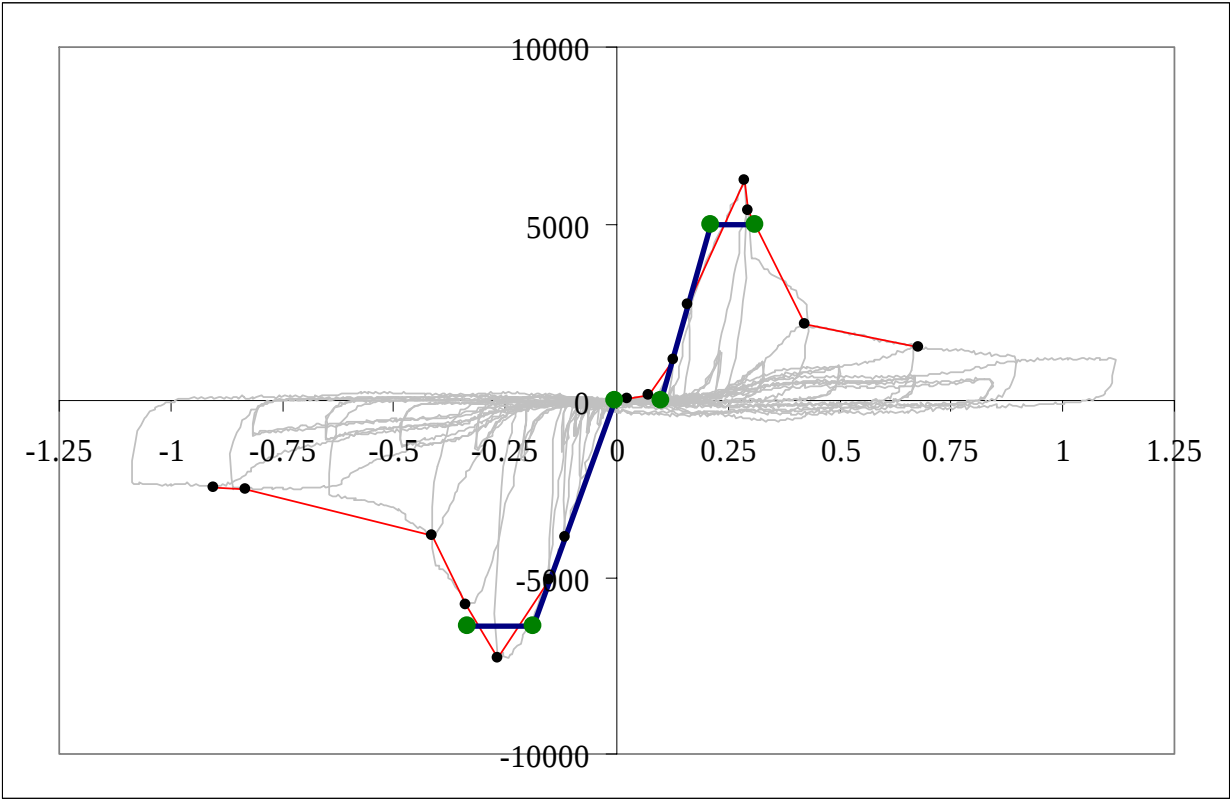


Figure B.102: E8C1 Load (lbs) – Deflection (in) Plot

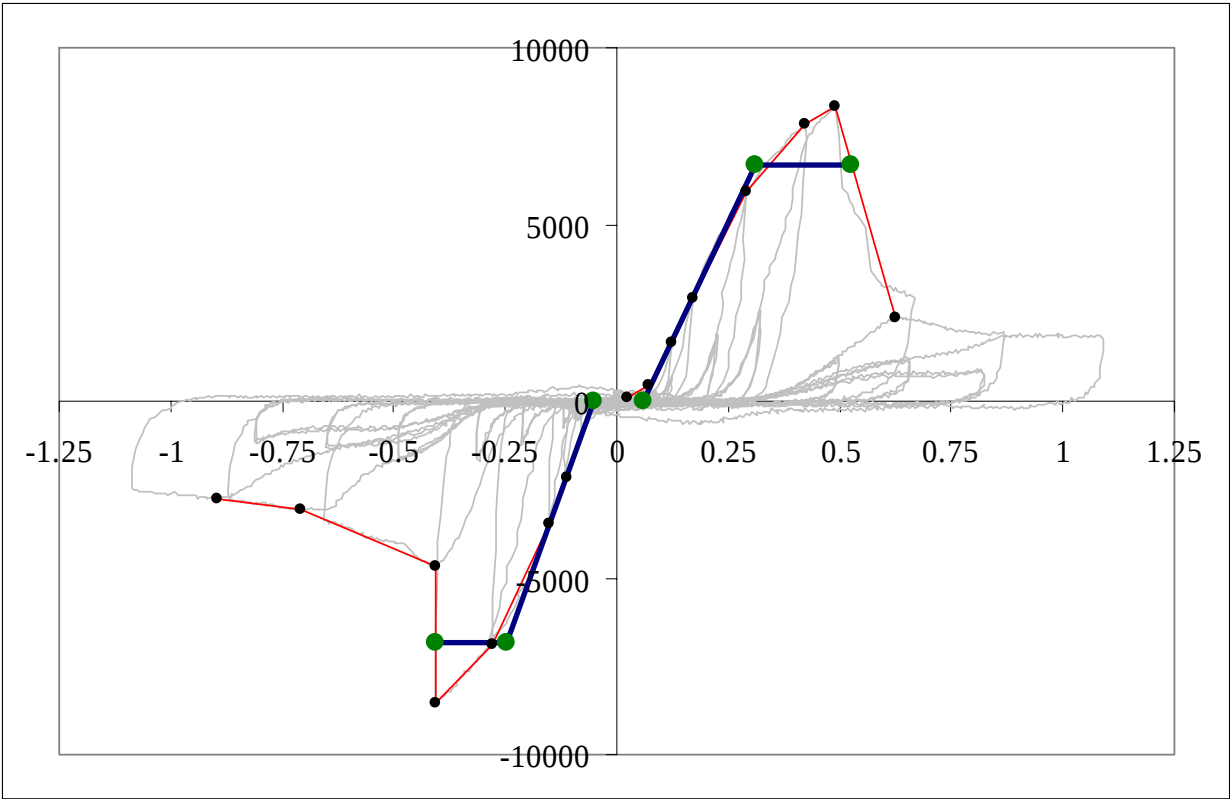


Figure B.103 E8C2 Load (lbs) – Deflection (in) Plot

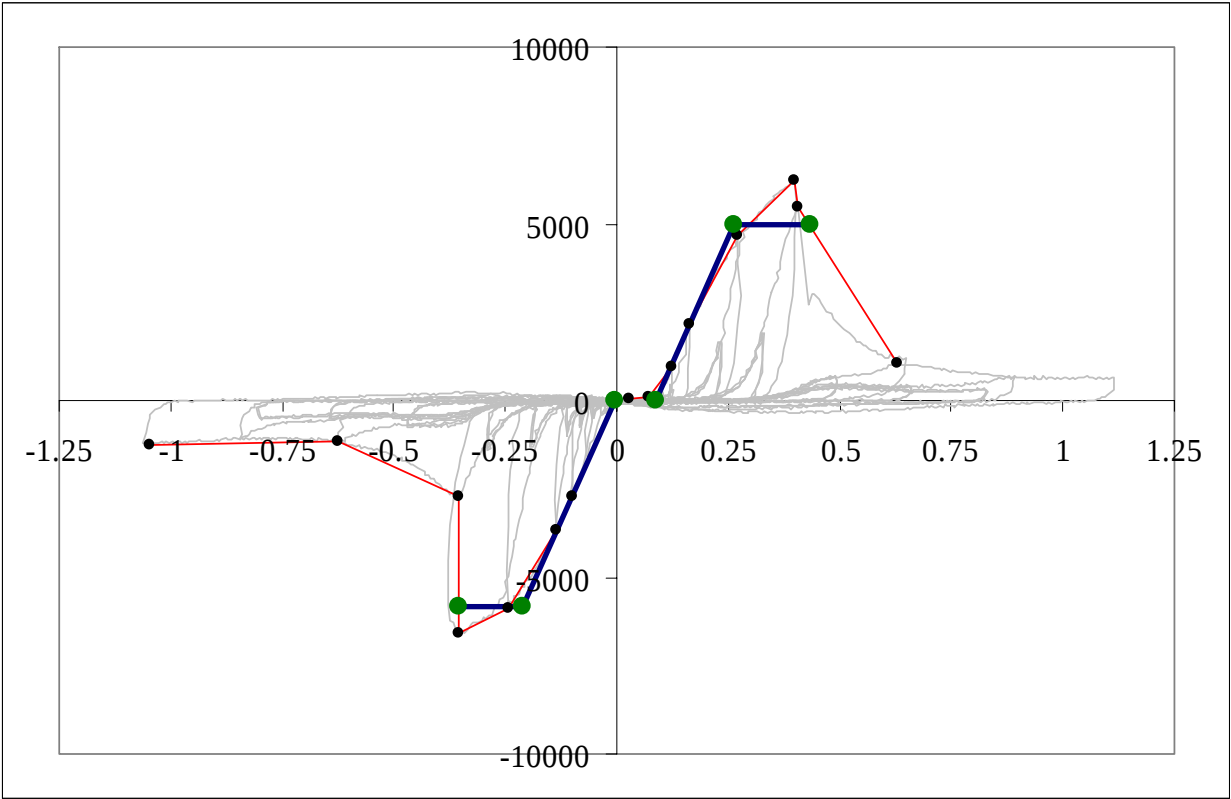


Figure B.104 E8C3 Load (lbs) – Deflection (in) Plot

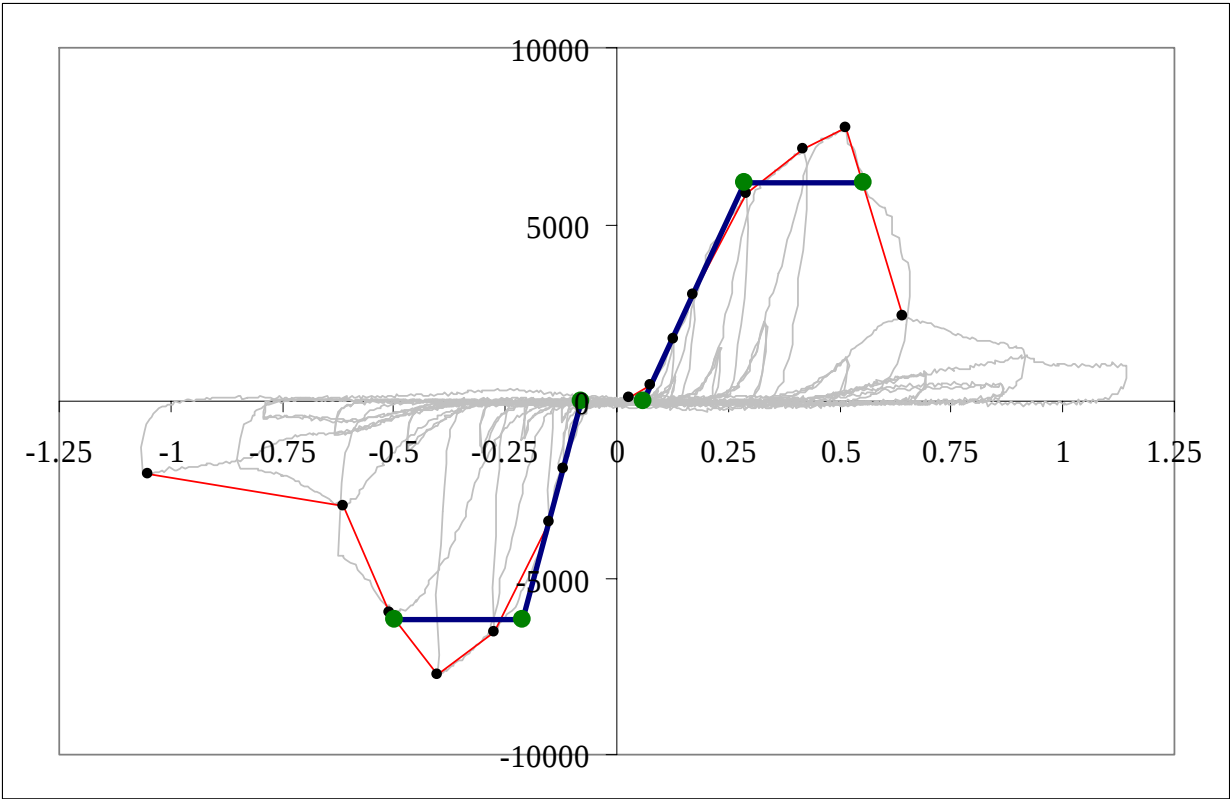


Figure B.105 E8C4 Load (lbs) – Deflection (in) Plot

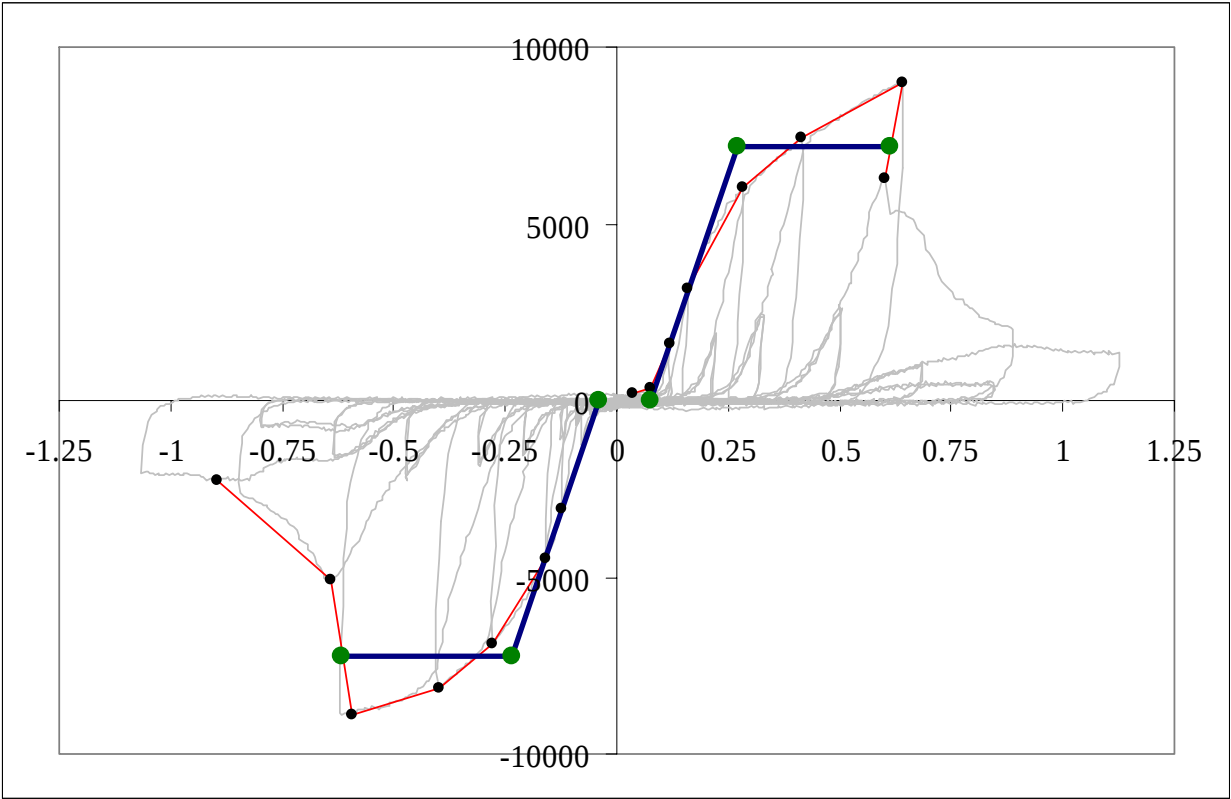


Figure B.106 E8C5 Load (lbs) – Deflection (in) Plot

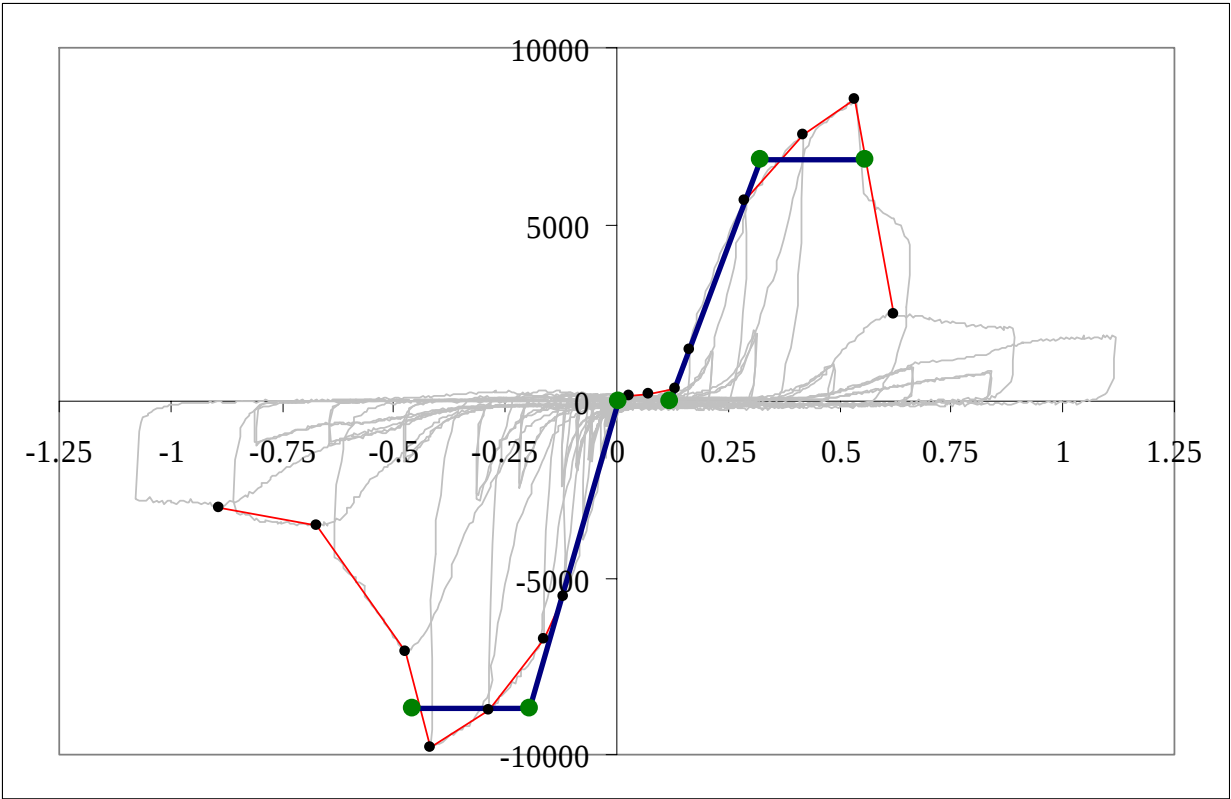


Figure B.107 E8C6 Load (lbs) – Deflection (in) Plot

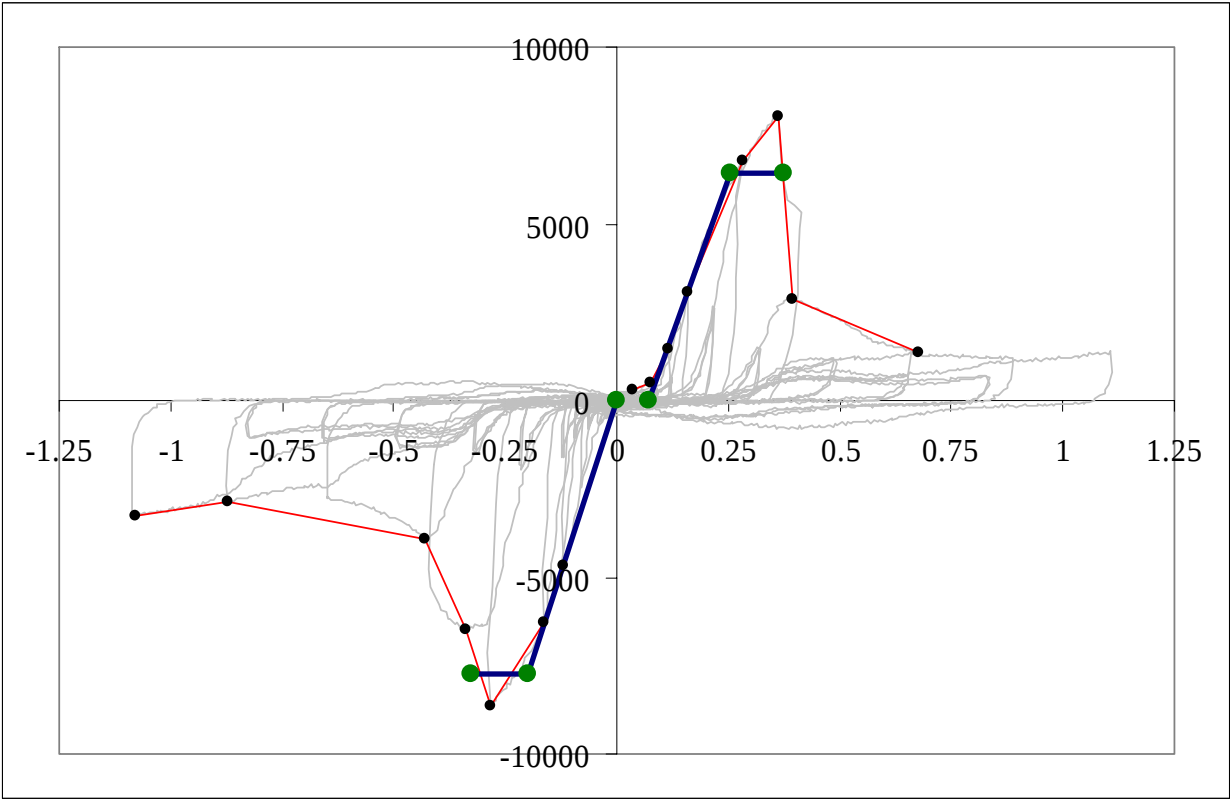


Figure B.108 E8C7 Load (lbs) – Deflection (in) Plot

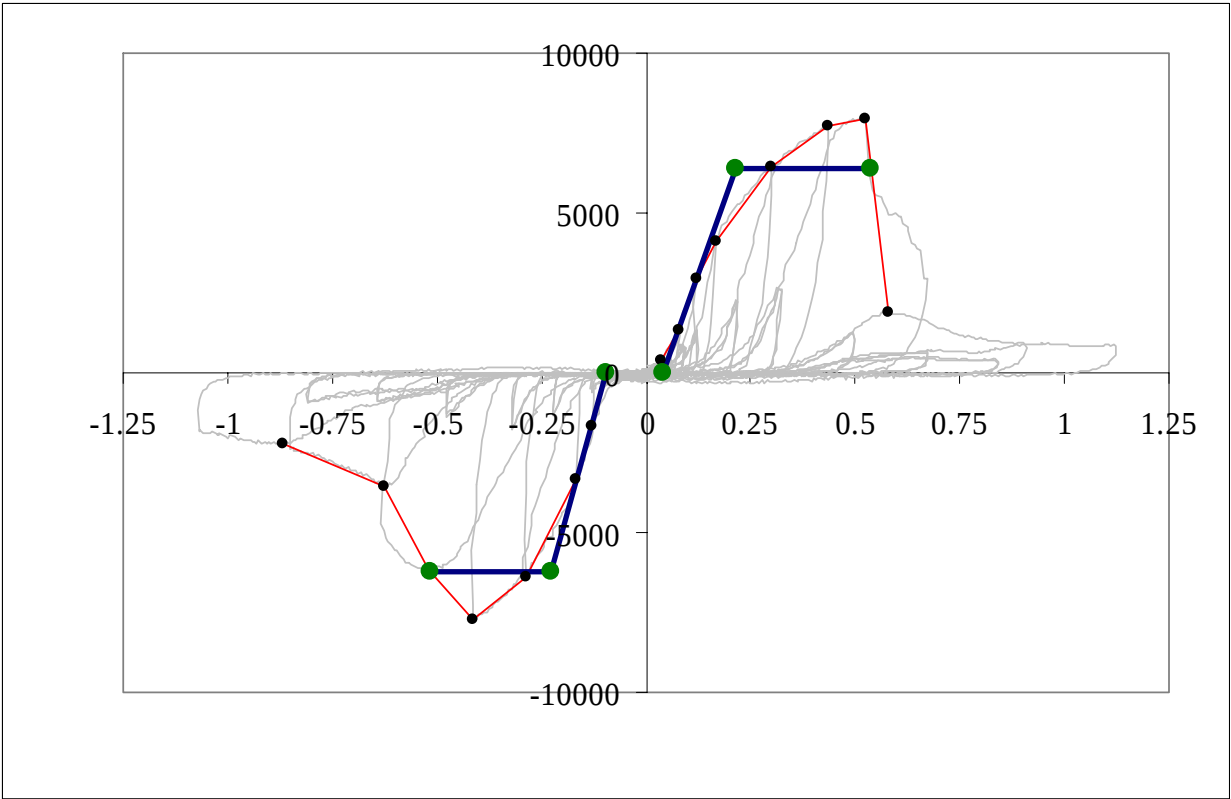


Figure B.109 E8C8 Load (lbs) – Deflection (in) Plot

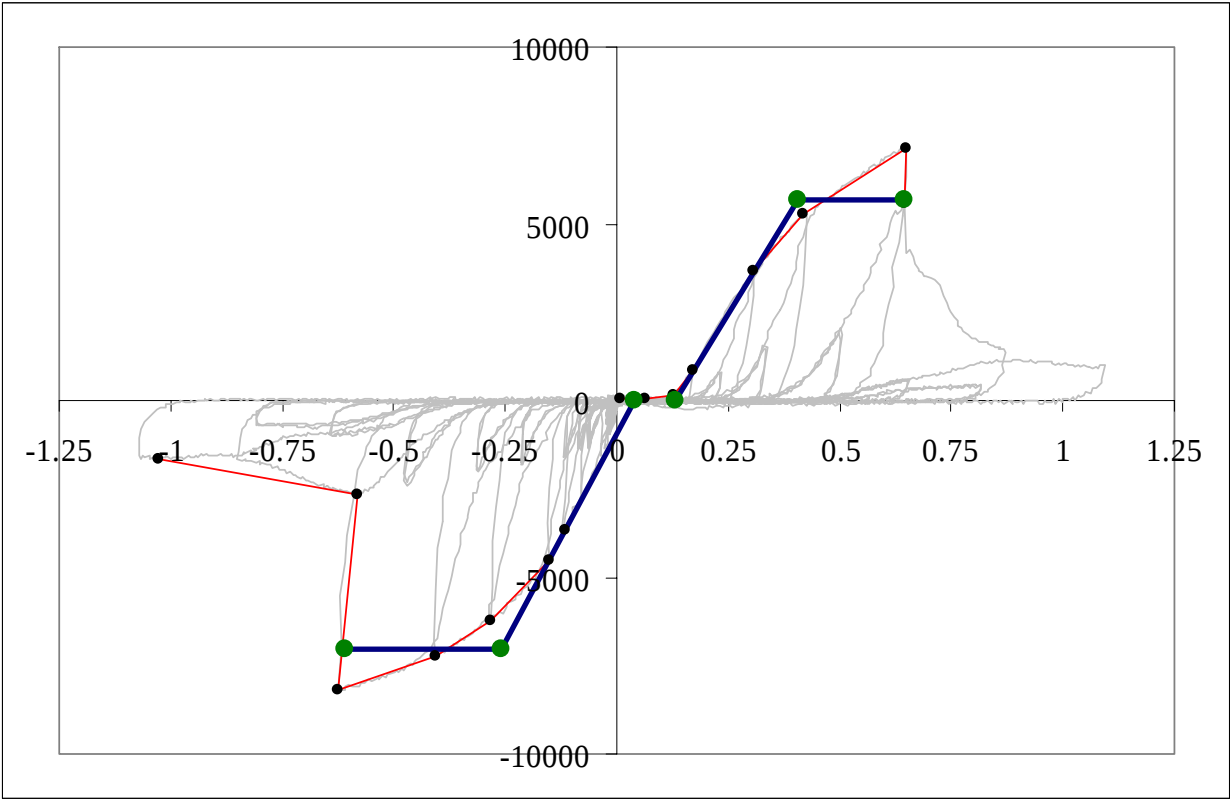


Figure B.110 E8C9 Load (lbs) – Deflection (in) Plot

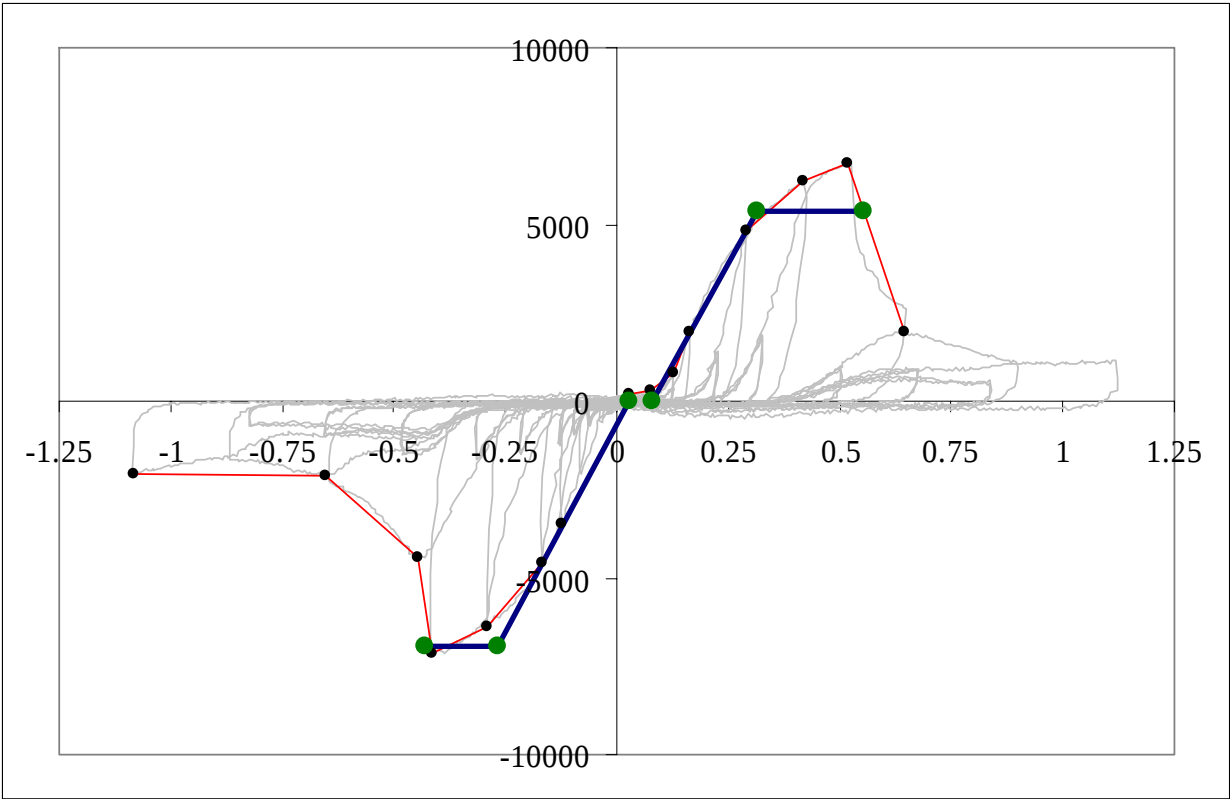


Figure B.111 E8C10 Load (lbs) – Deflection (in) Plot

Table B.12: E7 Connection and Member Properties

	E7 Series										Mean	St. Dev.	COV(%)
	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10			
Max Load (lbs)	9250	7400	5700	5250	8150	4800	7000	4500	6850	9700	6860	1811	26.4
@ Displ. (in)	0.52	0.39	0.25	0.26	0.39	0.35	0.43	0.23	0.34	0.63	0.380	0.125	32.9
Failure Load (lbs)	7400	5950	4550	4200	6500	3850	5600	3600	5450	7750	5485	1446	26.4
@ Displ. (in)	0.55	0.42	0.28	0.31	0.46	0.37	0.55	0.28	0.36	0.65	0.423	0.128	30.3
40% Max (lbs)	3350	2300	1350	1650	2700	1250	2400	800	2100	3150	2105	839	39.8
@ Displ. (in)	0.13	0.13	0.10	0.10	0.11	0.10	0.13	0.08	0.12	0.12	0.110	0.018	16.5
E.E.P. Yield (lbs)	7450	5950	4550	4550	6650	4050	5800	3850	6400	7750	5700	1395	24.5
@ Displ. (in)	0.21	0.23	0.16	0.18	0.21	0.19	0.24	0.16	0.28	0.19	0.207	0.038	18.6
5% Offset (lbs)	4950	4700	4000	4050	4900	3600	5350	3750	6350	3950	4560	859	18.8
@ Displ. (in)	0.19	0.22	0.17	0.19	0.19	0.20	0.25	0.18	0.31	0.16	0.205	0.045	21.7
Elastic Stiff. (lb/in)	51500	37750	54700	37100	39200	30500	29400	39800	26400	64450	41080	12185	29.7
Slack (in)	0.06	0.07	0.07	0.04	0.04	0.06	0.05	0.06	0.04	0.07	0.056	0.013	23.2
E.E.P. Energy (lb*in)	3100	1700	800	900	2300	950	2450	700	1250	4050	1820	1129	62.0
Ductility Ratio	2.61	1.94	1.73	1.69	2.20	1.99	2.24	1.73	1.25	3.45	2.08	0.61	29.1
Yield Mode	II,III	II	II	II	II	II	II,III	II	II	II			
Failure Mode	split	split	split	split	split	split	split	split	split	split			
Governing Member	B	T	B	T	T	T	B	B	T	T			

	E7 Series										Mean	St. Dev.	COV(%)
Member Top	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10			
M.C. (%)	14	9	11	14	14	16	14	15	14	14	13.4	2.1	15.4
S.G.	0.56	0.38	0.45	0.58	0.61	0.80	0.58	0.67	0.65	0.60	0.589	0.115	19.4
D.E. 5% Yield (psi)	5247	5106	5413	2465	5450	4154	4691	3766	7322	4346	4796	1274	26.6
D.E. Capacity (psi)	4916	4846	5136	2195	5880	4292	4322	4135	6751	4256	4673	1200	25.7

Member Bottom	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	Mean	St. Dev.	COV(%)
M.C. (%)	15	14	15	16	16	15	15	15	15	16	15.3	0.5	3.3
S.G.	0.73	0.49	0.54	0.55	0.55	0.54	0.63	0.66	0.53	0.64	0.587	0.077	13.1
D.E. 5% Yield (psi)	5156	4665	4308	4287	4953	5019	4971	3662	5375	5099	4750	521	11.0
D.E. Capacity (psi)	4446	4942	4133	4163	5640	5002	4729	3477	5443	5095	4707	659	14.0

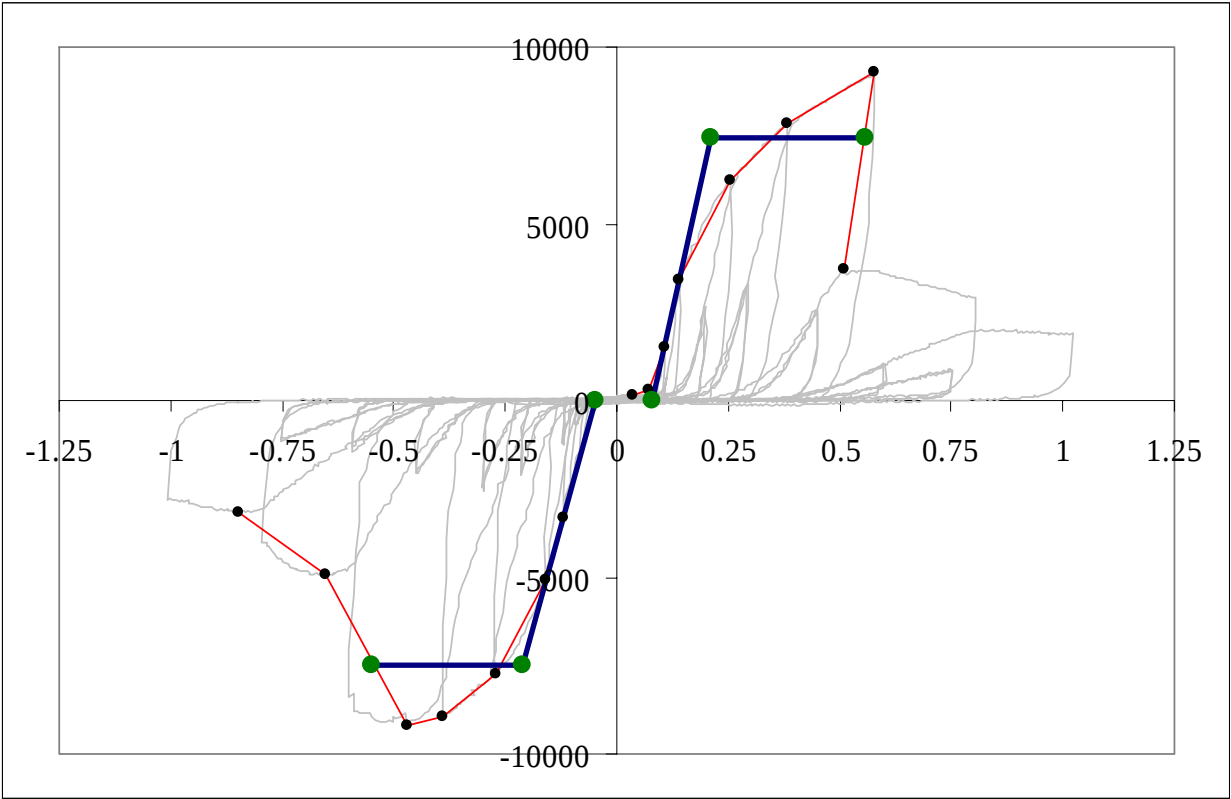


Figure B.112: E7C1 Load (lbs) – Deflection (in) Plot

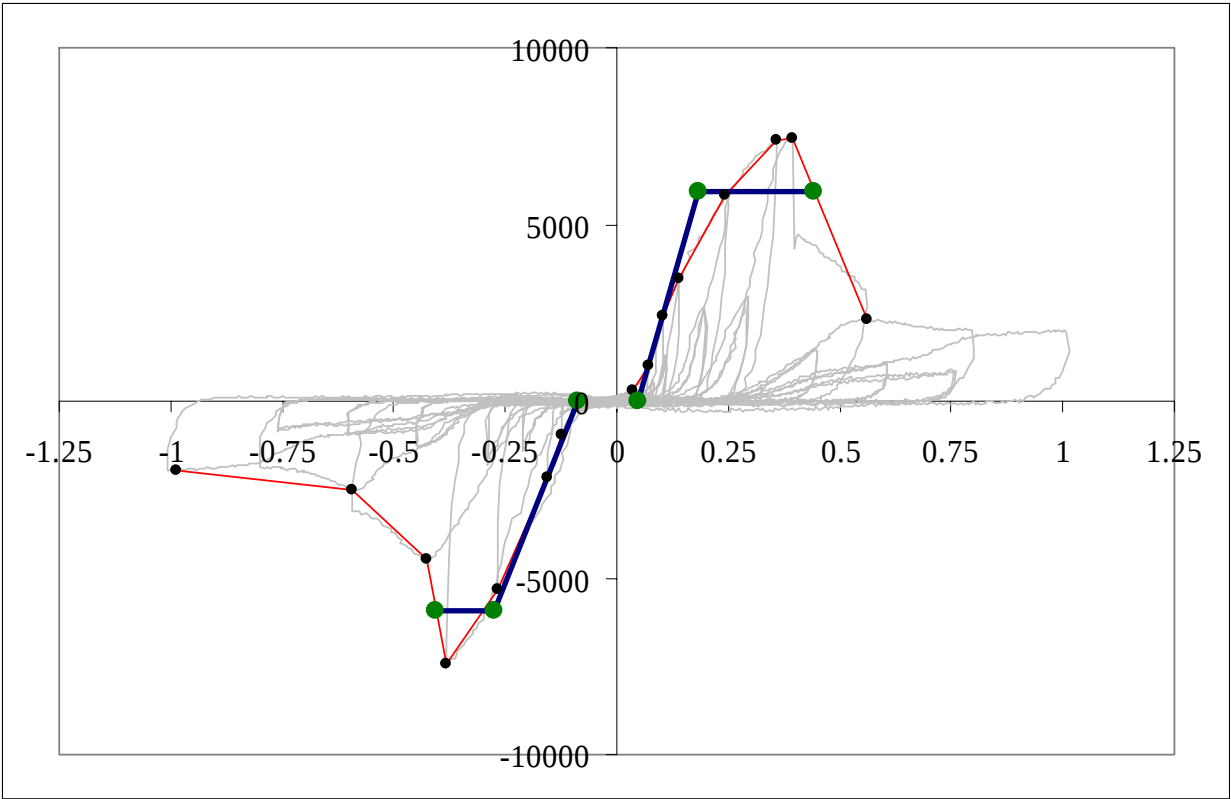


Figure B.113: E7C2 Load (lbs) – Deflection (in) Plot

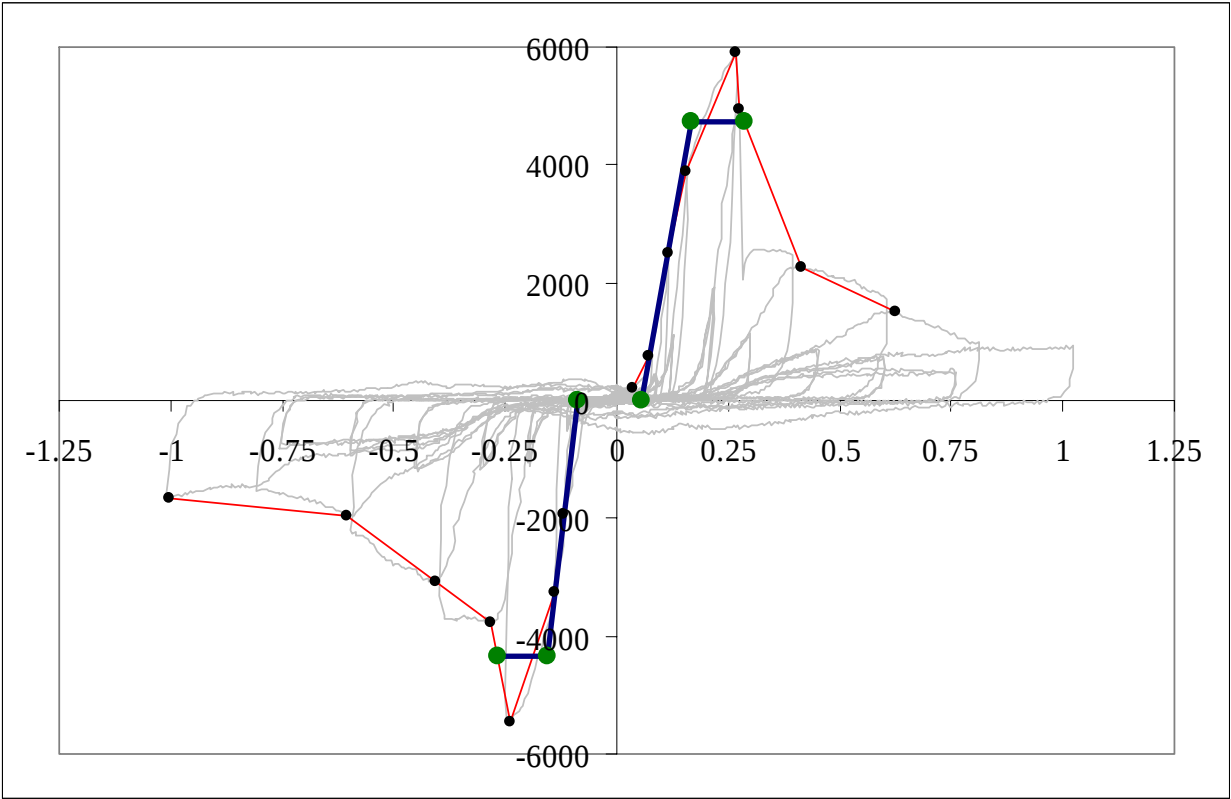


Figure B.114: E7C3 Load (lbs) – Deflection (in) Plot

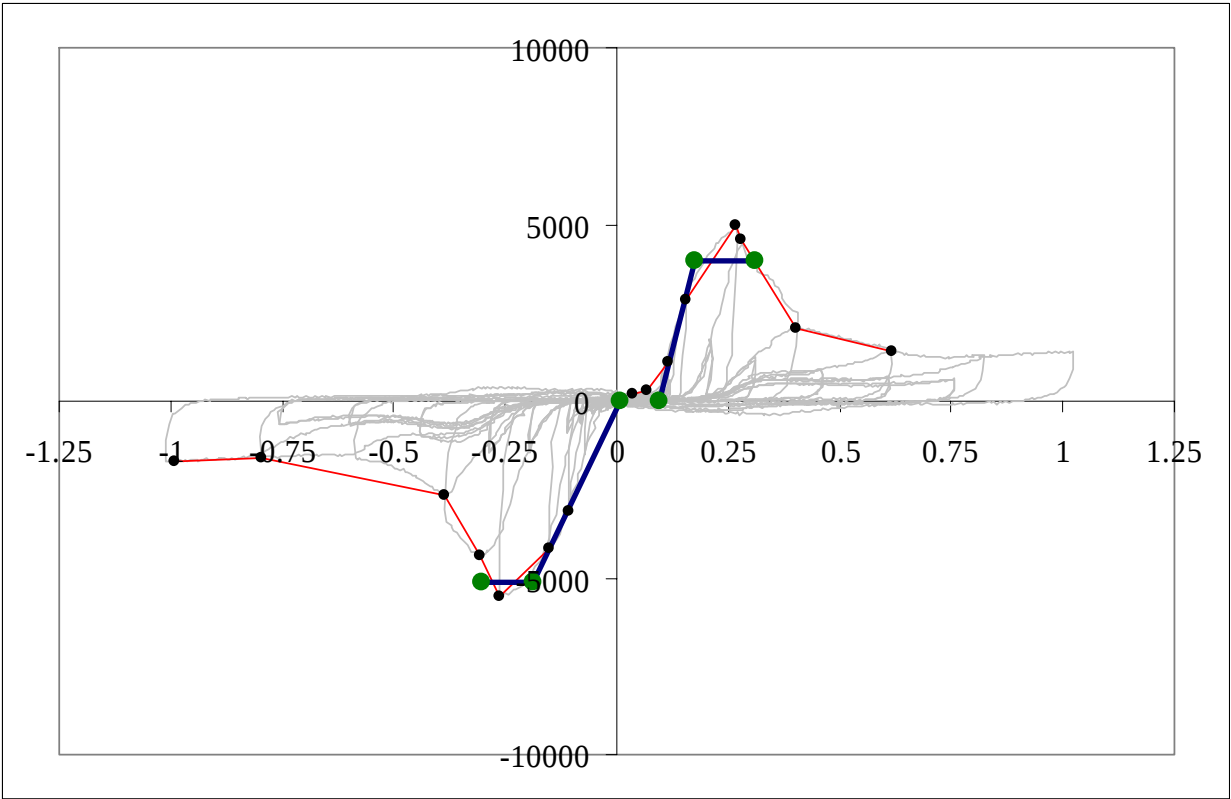


Figure B.115: E7C4 Load (lbs) – Deflection (in) Plot

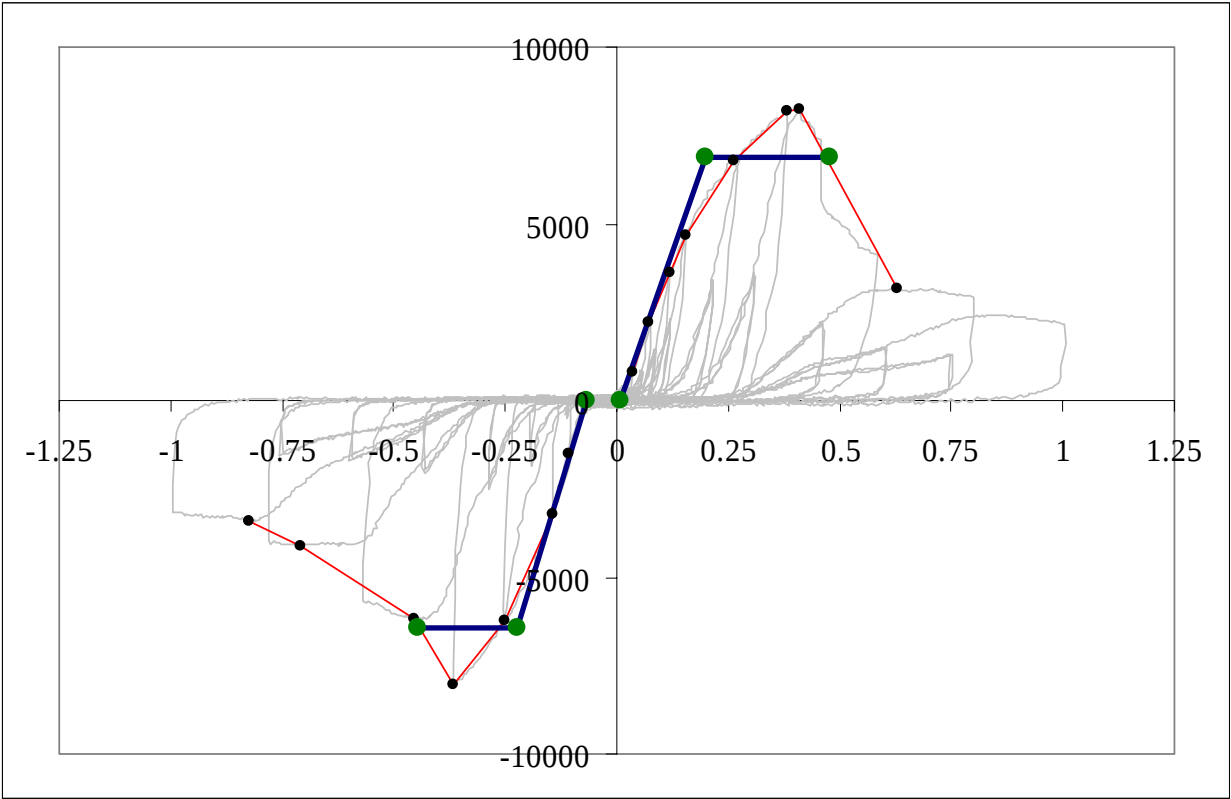


Figure B.116: E7C5 Load (lbs) – Deflection (in) Plot

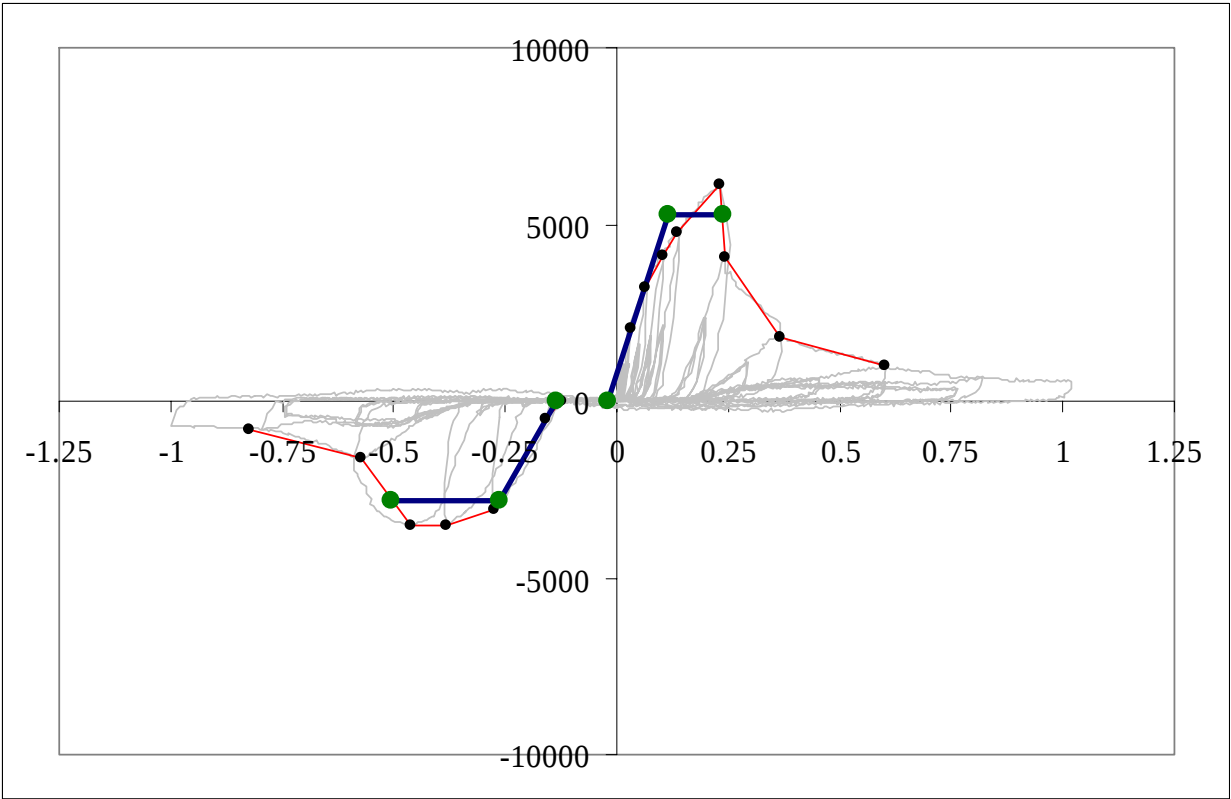


Figure B.117: E7C6 Load (lbs) – Deflection (in) Plot

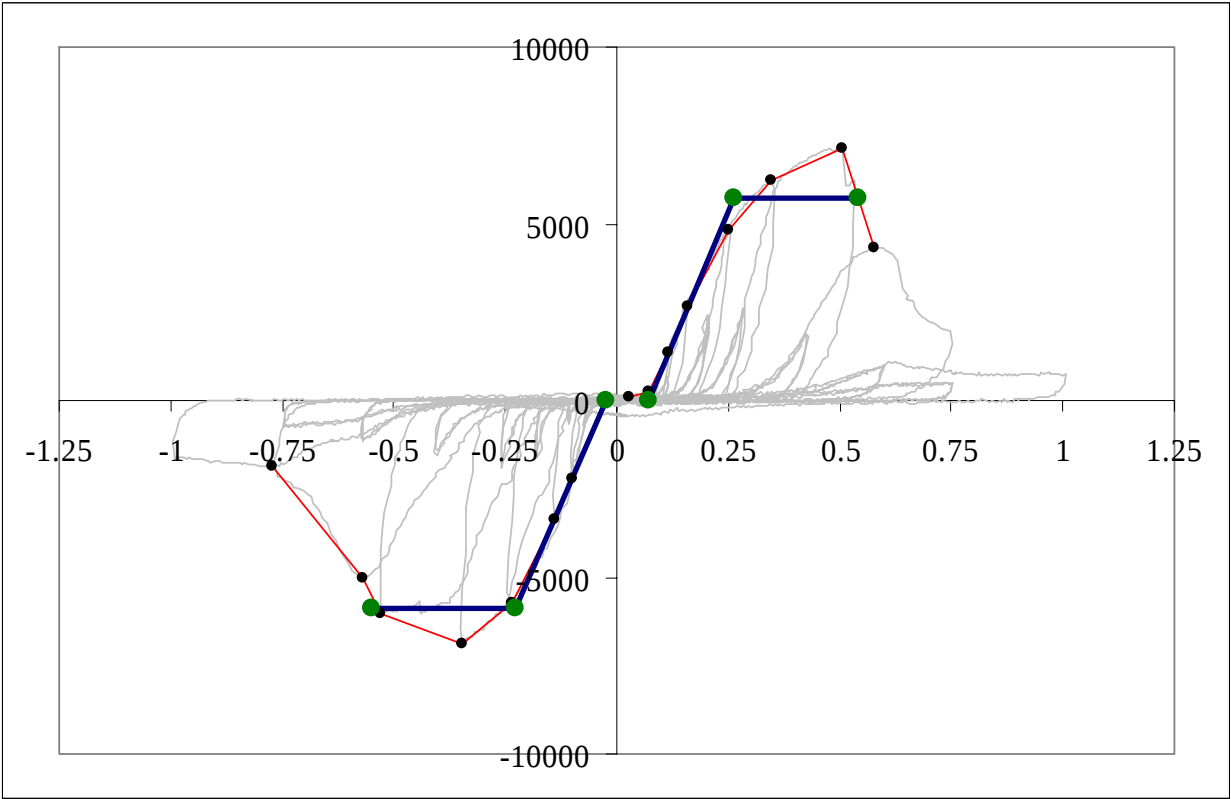


Figure B.118: E7C7 Load (lbs) – Deflection (in) Plot

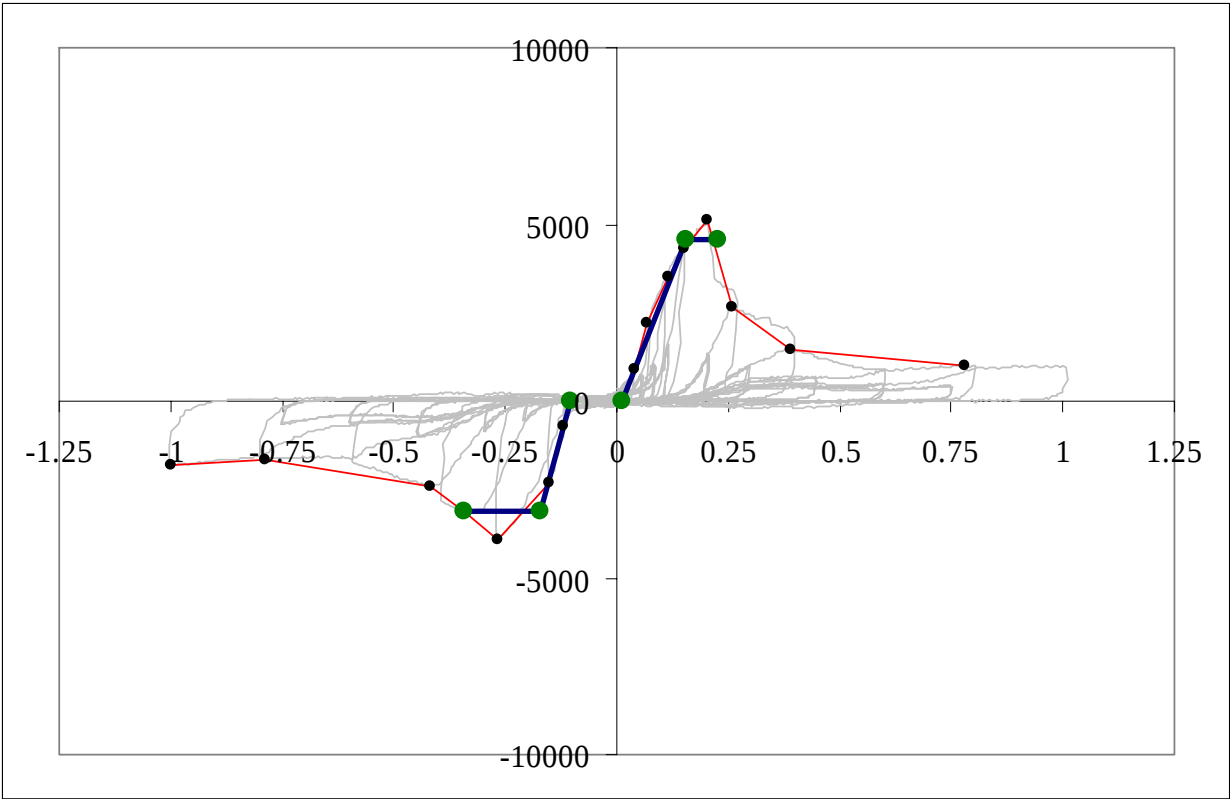


Figure B.119: E7C8 Load (lbs) – Deflection (in) Plot

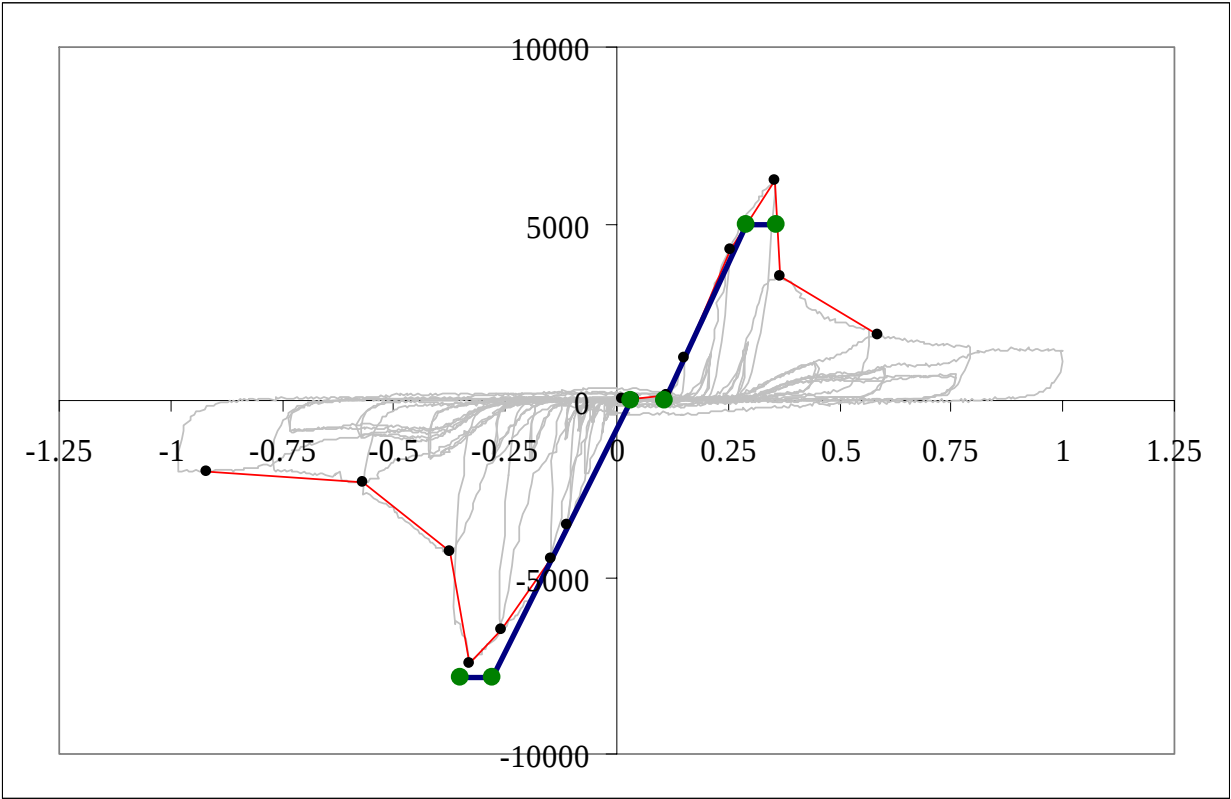


Figure B.120: E7C9 Load (lbs) – Deflection (in) Plot

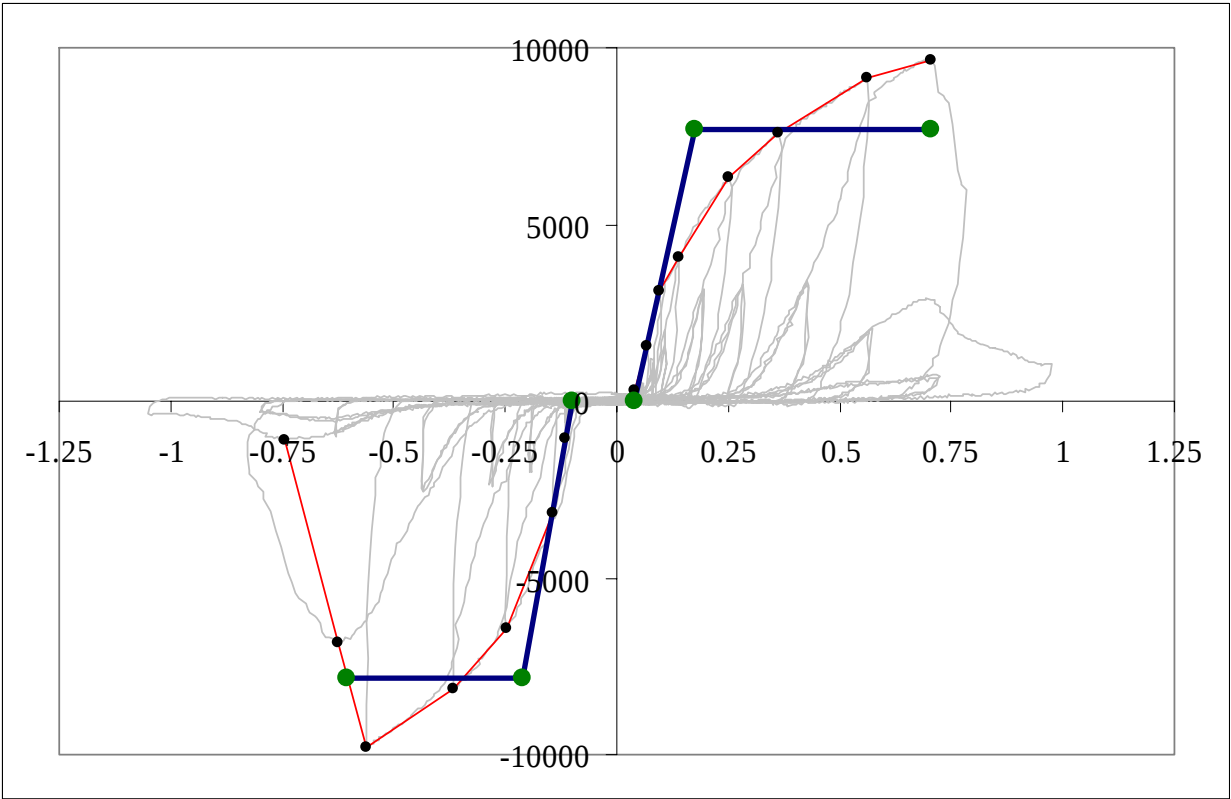


Figure B.121: E7C10 Load (lbs) – Deflection (in) Plot

Table B.13: E6 Connection and Member Properties

	E6 Series										Mean	St. Dev.	COV(%)
	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10			
Max Load (lbs)	6450	5800	7950	5550	4650	7850	5400	7500	5800	5650	6260	1135	18.1
@ Displ. (in)	0.31	0.23	0.34	0.27	0.32	0.33	0.31	0.35	0.41	0.28	0.317	0.050	15.8
Failure Load (lbs)	5150	4650	6350	4450	3750	6250	4300	6000	4650	4550	5010	895	17.9
@ Displ. (in)	0.32	0.34	0.36	0.31	0.37	0.37	0.35	0.37	0.43	0.28	0.350	0.040	11.6
40% Max (lbs)	1600	2050	2800	1950	1300	2200	1300	1900	1450	1350	1790	485	27.1
@ Displ. (in)	0.10	0.11	0.11	0.13	0.11	0.10	0.11	0.10	0.13	0.09	0.108	0.011	10.5
E.E.P. Yield (lbs)	5350	4750	7100	4450	4200	6400	4350	6000	4650	4800	5205	981	18.8
@ Displ. (in)	0.22	0.17	0.22	0.21	0.24	0.20	0.19	0.22	0.27	0.18	0.212	0.028	13.1
5% Offset (lbs)	5300	4550	6400	4700	3950	6850	3750	5000	3950	4000	4845	1069	22.1
@ Displ. (in)	0.24	0.19	0.23	0.24	0.26	0.24	0.20	0.21	0.26	0.19	0.224	0.026	11.52
Elastic Stiff. (lb/in)	32300	42950	37450	31650	21500	43200	34750	36900	23100	36550	34035	7269	21.4
Slack (in)	0.04	0.06	0.03	0.06	0.05	0.05	0.07	0.05	0.06	0.05	0.055	0.011	20.1
E.E.P. Energy (lb*in)	1050	1150	1650	850	900	1700	1000	1400	1250	800	1175	321	27.3
Ductility Ratio	1.77	1.98	1.61	1.52	1.52	1.85	1.85	1.79	1.63	1.59	1.71	0.16	9.2
Yield Mode	II	II	II	II	II	II	II,III	II	II	II,III			
Failure Mode	split	split	split	split	split	split	split	split	split	split			
Governing Member	B	T	T	B	T	B	B	T	T	B			

	E6 Series										Mean	St. Dev.	COV(%)
Member Top	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10			
M.C. (%)	15	15	15	15	14	14	15	16	15	15	14.9	0.7	4.4
S.G.	0.63	0.47	0.45	0.46	0.52	0.54	0.55	0.61	0.53	0.64	0.539	0.068	12.7
D.E. 5% Yield (psi)	5154	5895	5790	6229	6034	6730	6017	5369	4806	4858	5688	625	11.0
D.E. Capacity (psi)	5291	5930	5868	6393	5925	6597	6053	5213	4776	4989	5703	606	10.6

Member Bottom	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	Mean	St. Dev.	COV(%)
M.C. (%)	15	15	16	15	15	16	13	13	15	13	14.5	1.2	7.9
S.G.	0.68	0.42	0.49	0.45	0.58	0.58	0.54	0.49	0.65	0.55	0.544	0.084	15.4
D.E. 5% Yield (psi)	5687	5650	5401	3643	3602	6279	5598	4840	3596	6751	5105	1145	22.4
D.E. Capacity (psi)	5671	5877	4985	3496	3159	6570	5293	5095	3312	6557	5002	1278	25.6

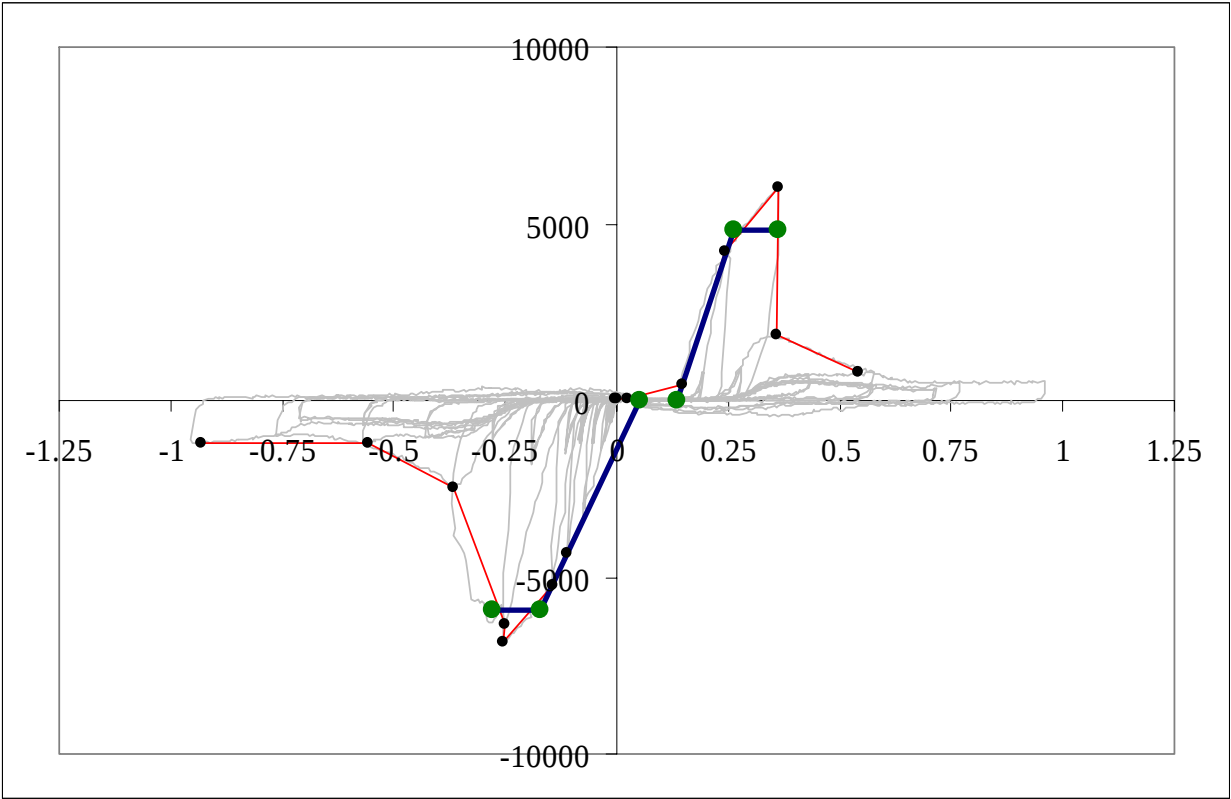


Figure B.122: E6C1 Load (lbs) – Deflection (in) Plot

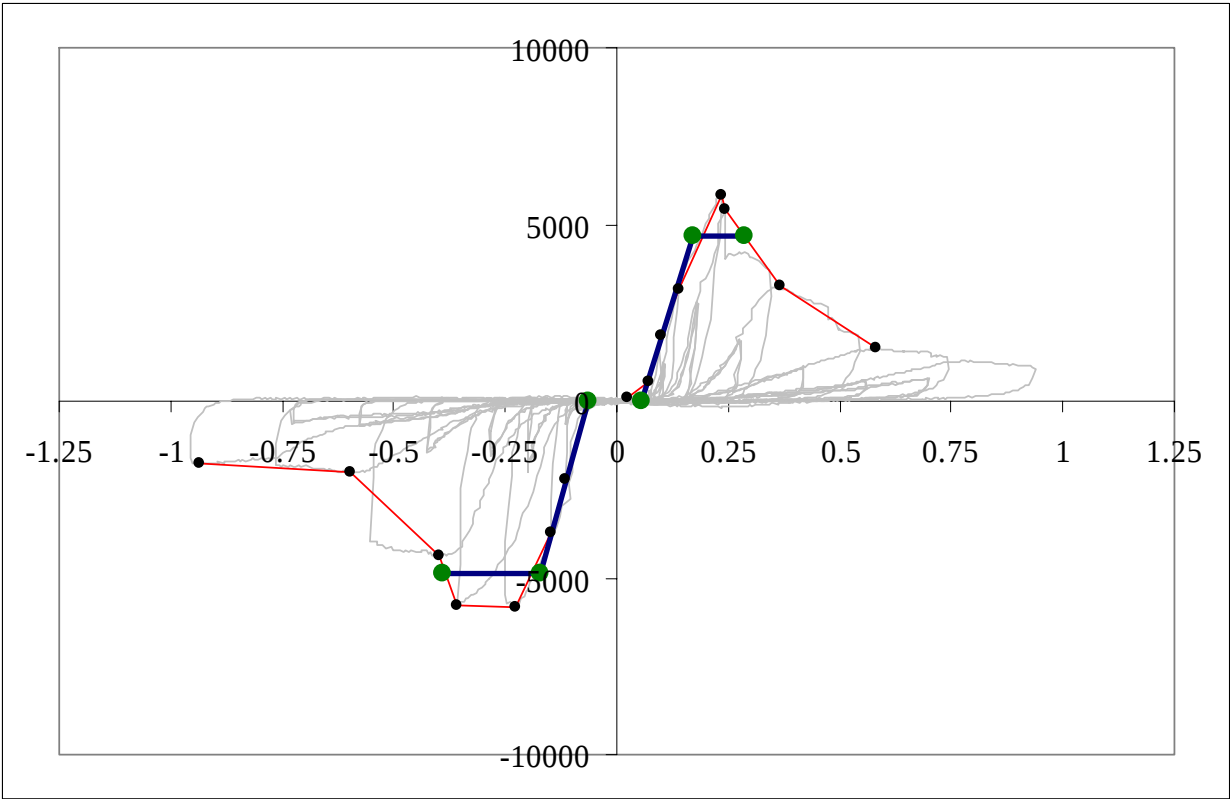


Figure B.123: E6C2 Load (lbs) – Deflection (in) Plot

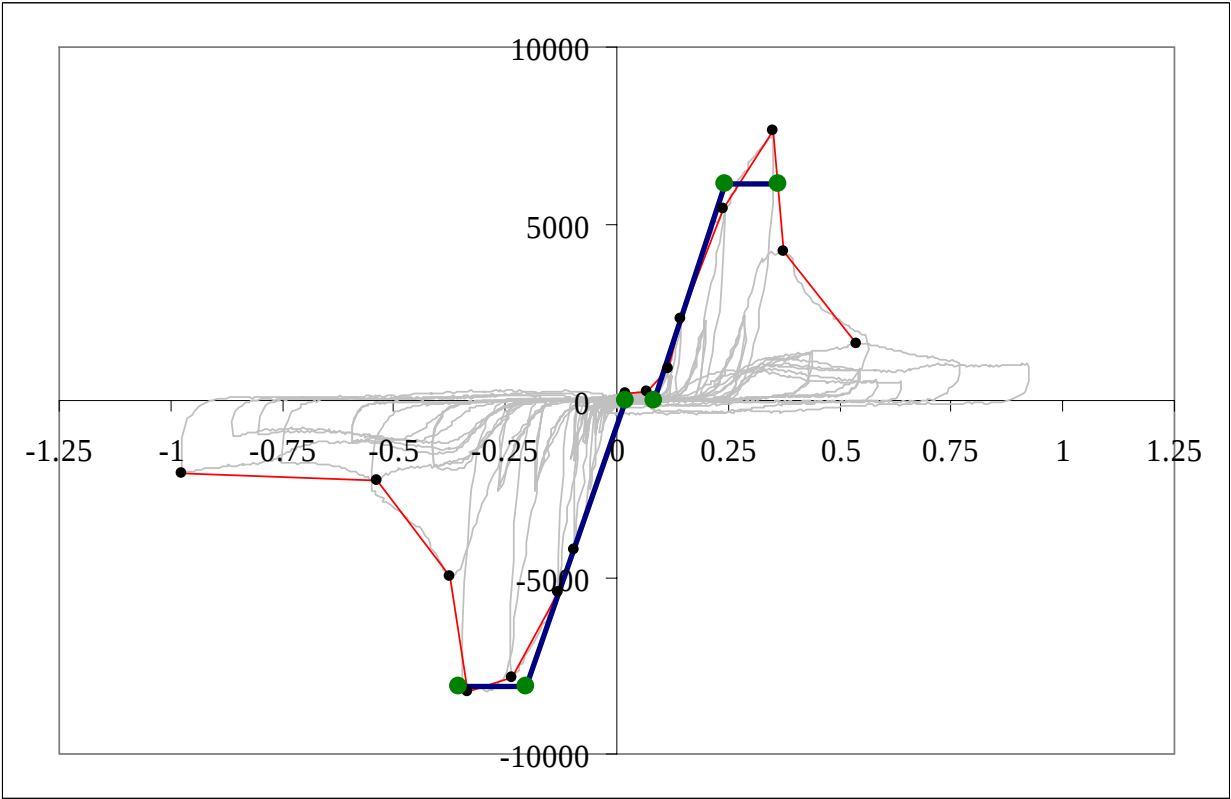


Figure B.124: E6C3 Load (lbs) – Deflection (in) Plot

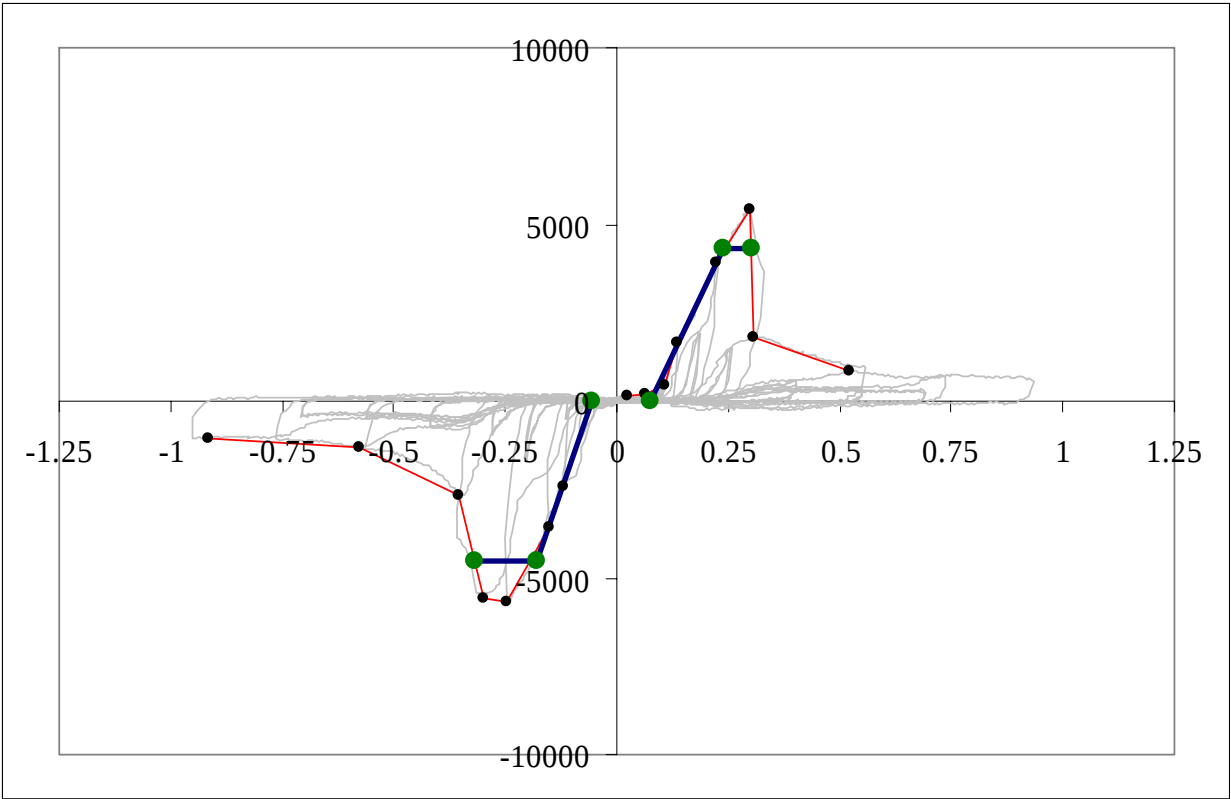


Figure B.125: E6C4 Load (lbs) – Deflection (in) Plot

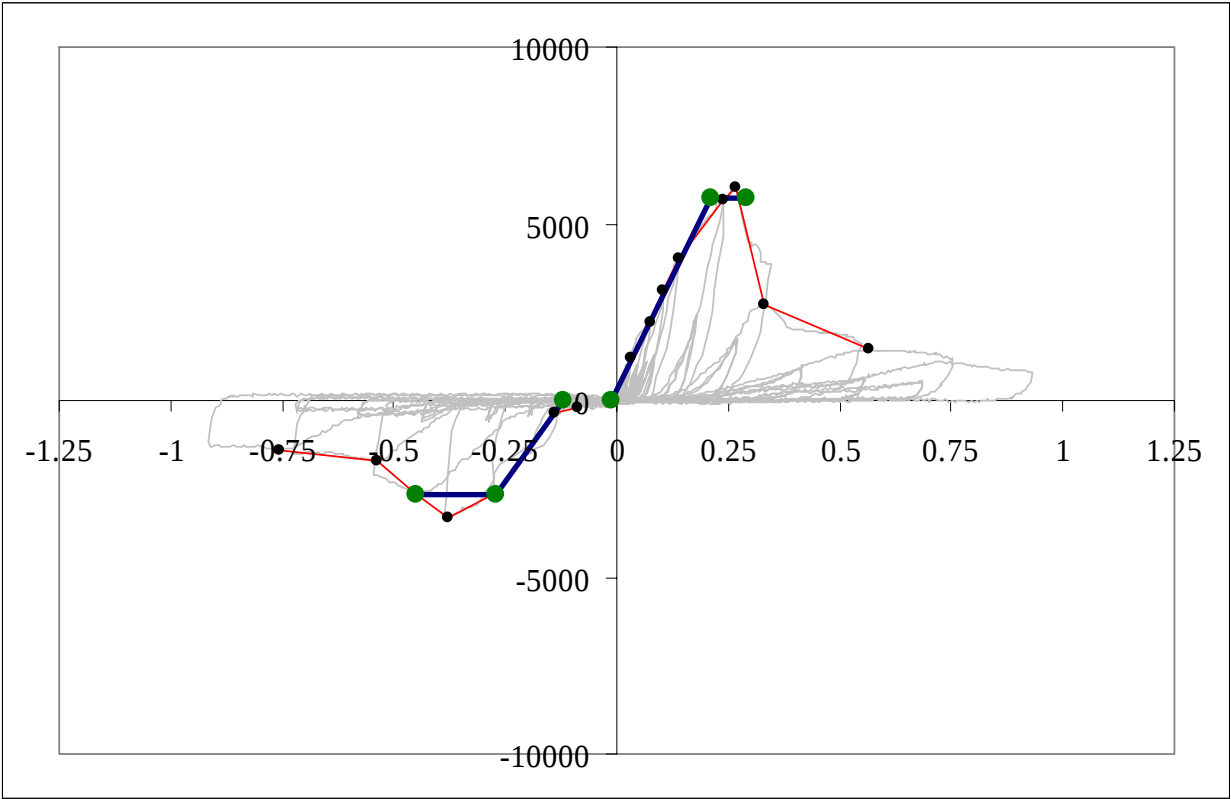


Figure B.126: E6C5 Load (lbs) – Deflection (in) Plot

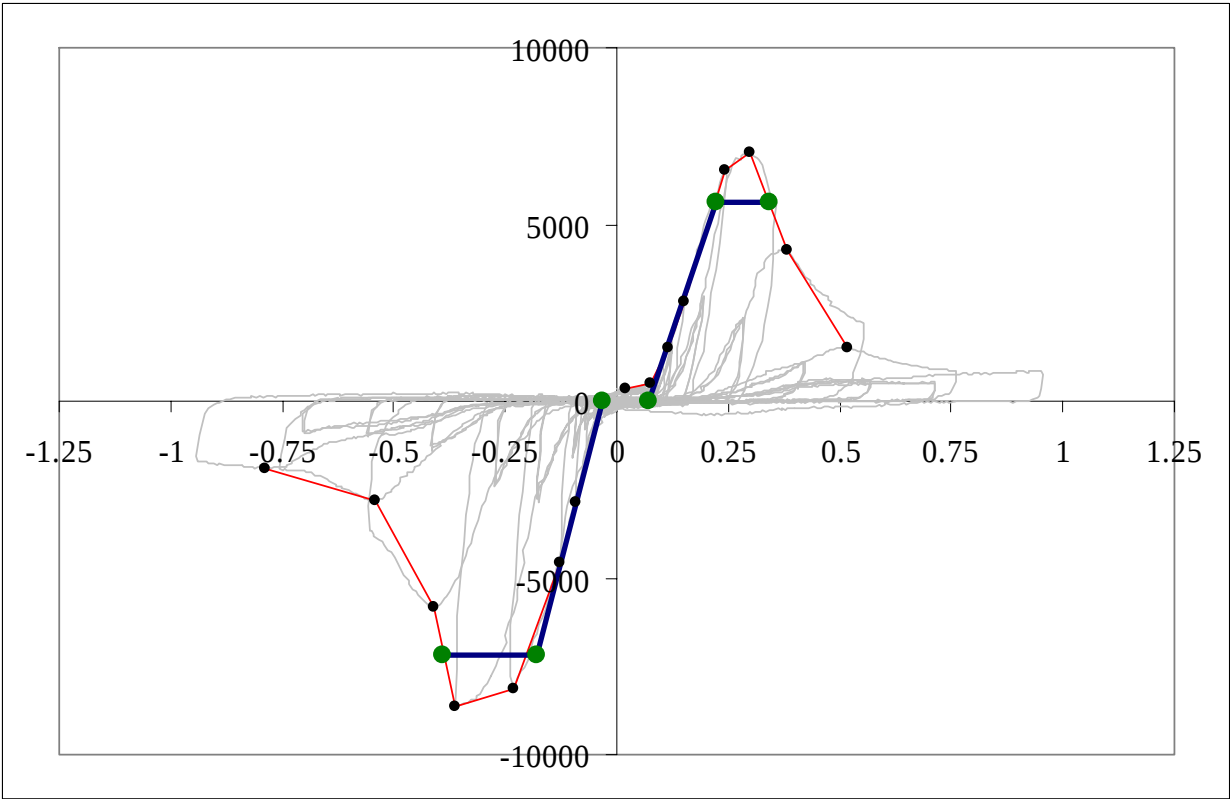


Figure B.127: E6C6 Load (lbs) – Deflection (in) Plot

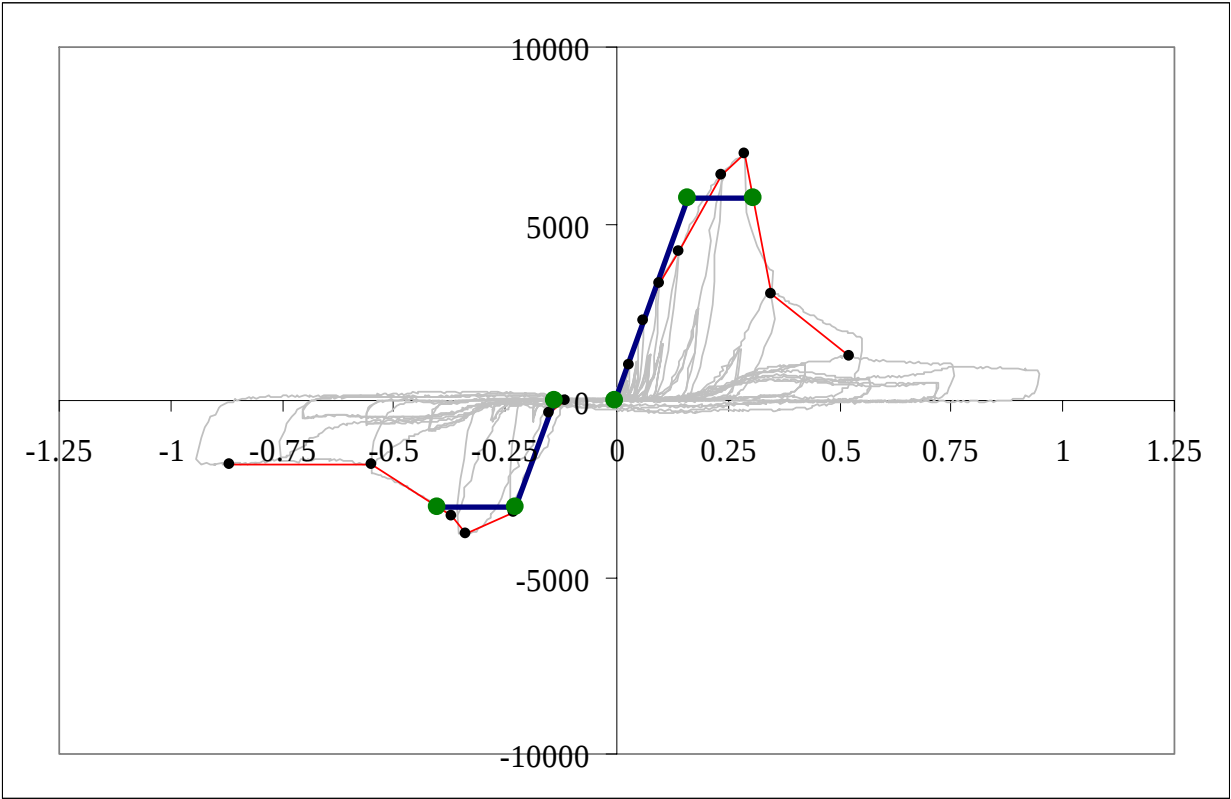


Figure B.128: E6C7 Load (lbs) – Deflection (in) Plot

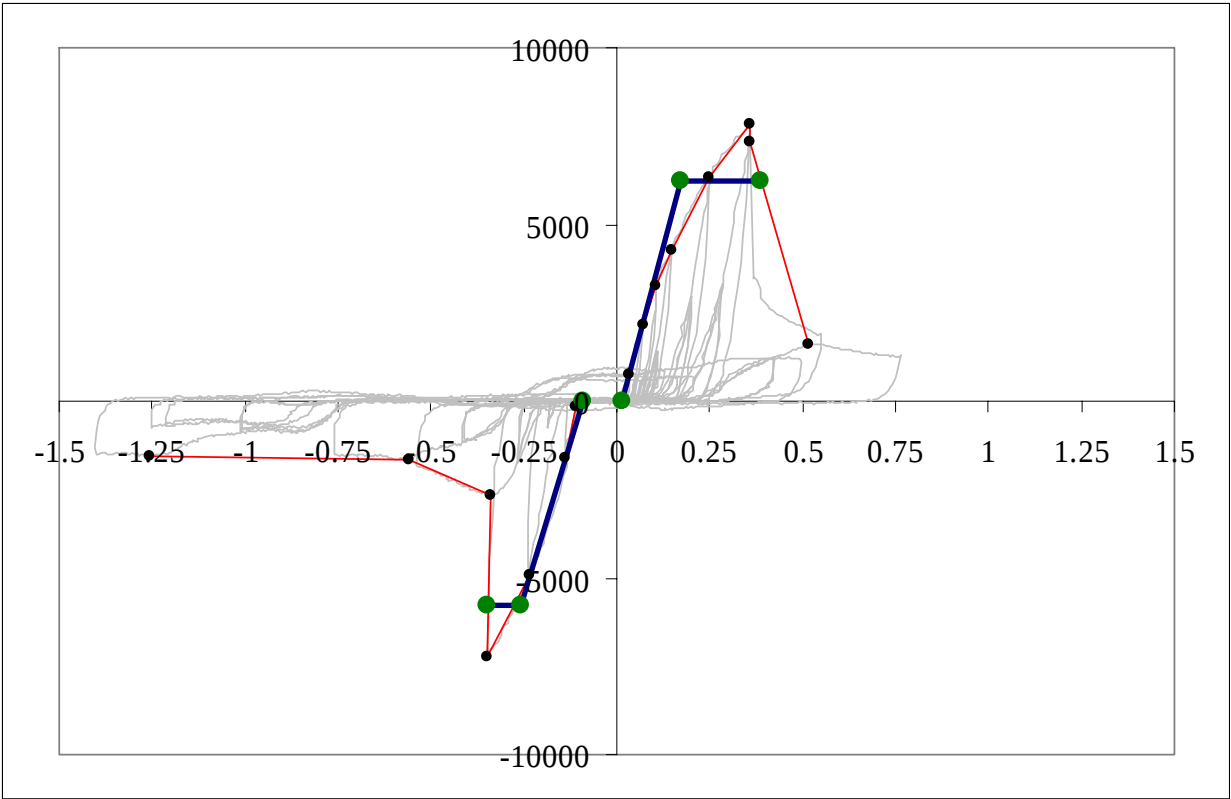


Figure B.129: E6C8 Load (lbs) – Deflection (in) Plot

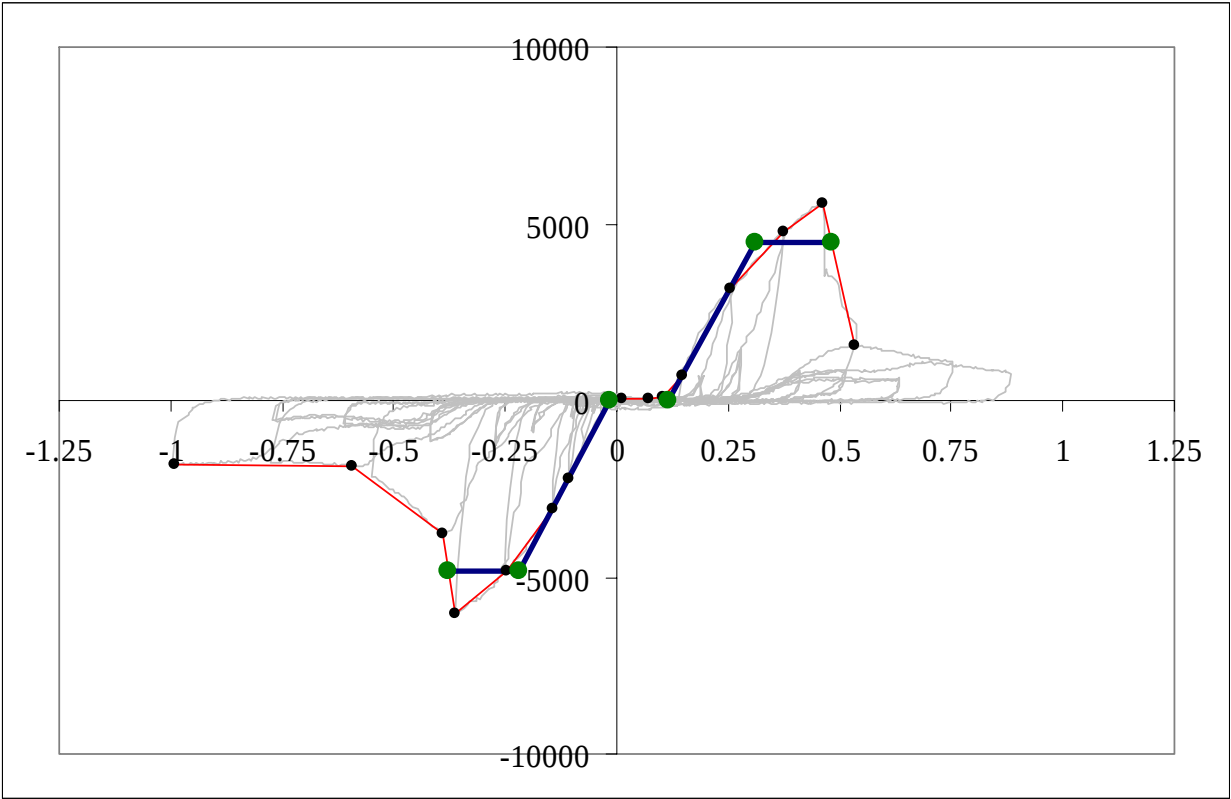


Figure B.130: E6C9 Load (lbs) – Deflection (in) Plot

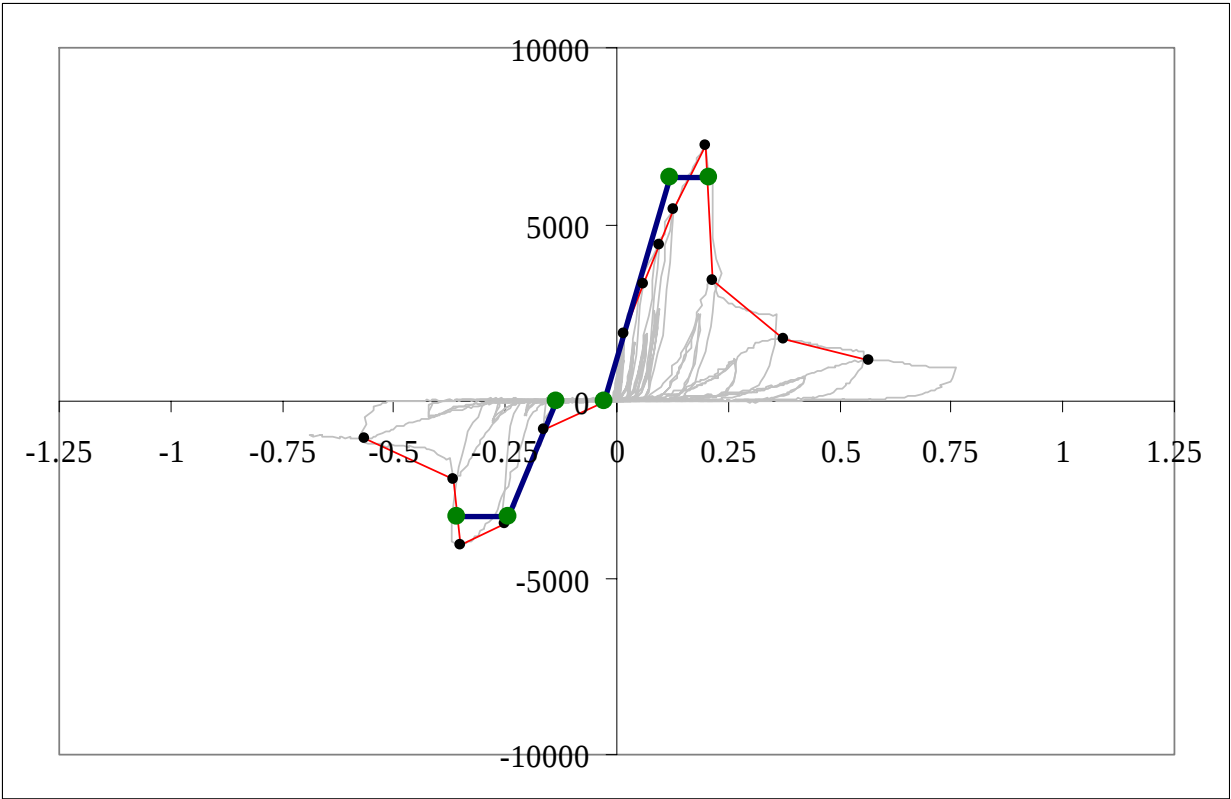


Figure B.131: E6C10 Load (lbs) – Deflection (in) Plot

Table B.14: E5 Connection and Member Properties

	E5 Series										Mean	St. Dev.	COV(%)
	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10			
Max Load (lbs)	4750	5100	5200	7350	4550	4550	5950	6000	6650	5950	5605	937	16.7
@ Displ. (in)	0.27	0.24	0.28	0.31	0.24	0.29	0.33	0.30	0.32	0.29	0.287	0.030	10.4
Failure Load (lbs)	3800	4100	4200	5900	3650	3650	4750	4800	5350	4750	4495	751	16.7
@ Displ. (in)	0.32	0.31	0.30	0.31	0.25	0.32	0.35	0.30	0.33	0.31	0.311	0.026	8.3
40% Max (lbs)	1500	1500	1500	2300	1600	1300	2050	1900	1400	1900	1695	324	19.1
@ Displ. (in)	0.11	0.10	0.12	0.11	0.11	0.09	0.13	0.10	0.09	0.11	0.107	0.011	10.3
E.E.P. Yield (lbs)	3800	4100	4300	5900	3650	4350	4750	4850	5500	4750	4595	711	15.5
@ Displ. (in)	0.18	0.17	0.23	0.20	0.17	0.22	0.21	0.20	0.20	0.19	0.196	0.020	10.15
5% Offset (lbs)	3950	3900	5200	5350	3700	4450	4600	5700	4600	4200	4565	669	14.6
@ Displ. (in)	0.21	0.18	0.29	0.21	0.20	0.24	0.23	0.25	0.19	0.19	0.218	0.032	14.9
Elastic Stiff. (lb/in)	34400	39900	24950	44200	30350	24750	32300	32500	37700	35900	33695	6158	18.3
Slack (in)	0.07	0.07	0.06	0.05	0.05	0.04	0.06	0.05	0.05	0.05	0.054	0.009	16.4
E.E.P. Energy (lb*in)	800	850	700	1100	550	800	1100	900	1150	950	890	191	21.5
Ductility Ratio	1.78	1.89	1.29	1.58	1.46	1.51	1.68	1.63	1.71	1.66	1.62	0.17	10.5
Yield Mode	II	II,III	II	II,III	II	II,III	II	II	II	II			
Failure Mode	split	split	split	split	split	split	split	split	split	split			
Governing Member	T	B	B	B	T	B	B	T	T	T			

	E5 Series										Mean	St. Dev.	COV(%)
Member Top	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10			
M.C. (%)	13	14	12	15	15	15	15	11	12	15	13.8	1.7	12.1
S.G.	0.27	0.56	0.44	0.62	0.59	0.56	0.62	0.48	0.41	0.57	0.513	0.110	21.4
D.E. 5% Yield (psi)	5350	4903	7022	5970	4237	6358	4430	4355	4612	3961	5120	1023	20.0
D.E. Capacity (psi)	5701	4984	6464	5640	3809	6733	4299	4294	4578	4215	5072	1011	19.9

Member Bottom	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	Mean	St. Dev.	COV(%)
M.C. (%)	14	15	14	13	15	14	15	14	14	15	14.3	0.8	5.8
S.G.	0.47	0.58	0.49	0.48	0.58	0.50	0.59	0.48	0.51	0.40	0.509	0.061	12.0
D.E. 5% Yield (psi)	5562	4346	3572	6620	4006	4319	5327	7147	6254	6769	5392	1280	23.7
D.E. Capacity (psi)	5673	4396	3325	5606	4034	4218	5143	7623	6214	6365	5260	1295	24.6

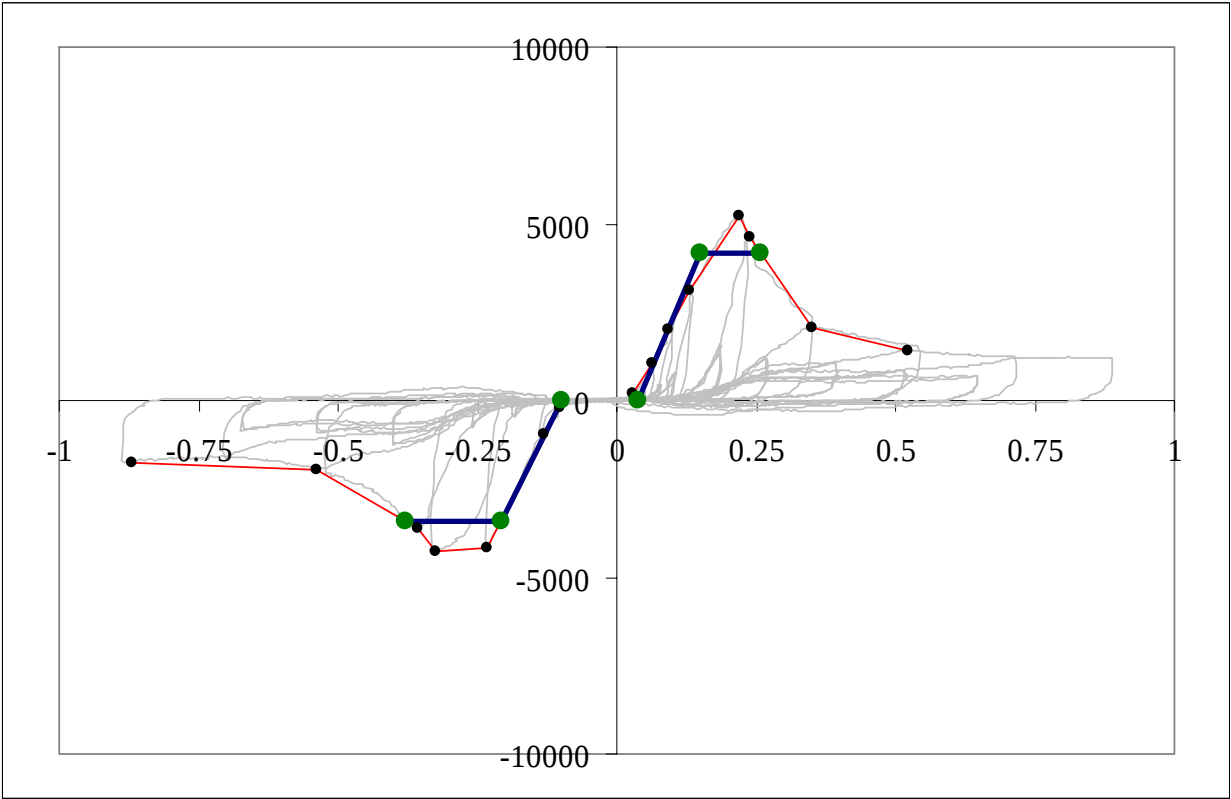


Figure B.132: E5C1 Load (lbs) – Deflection (in) Plot

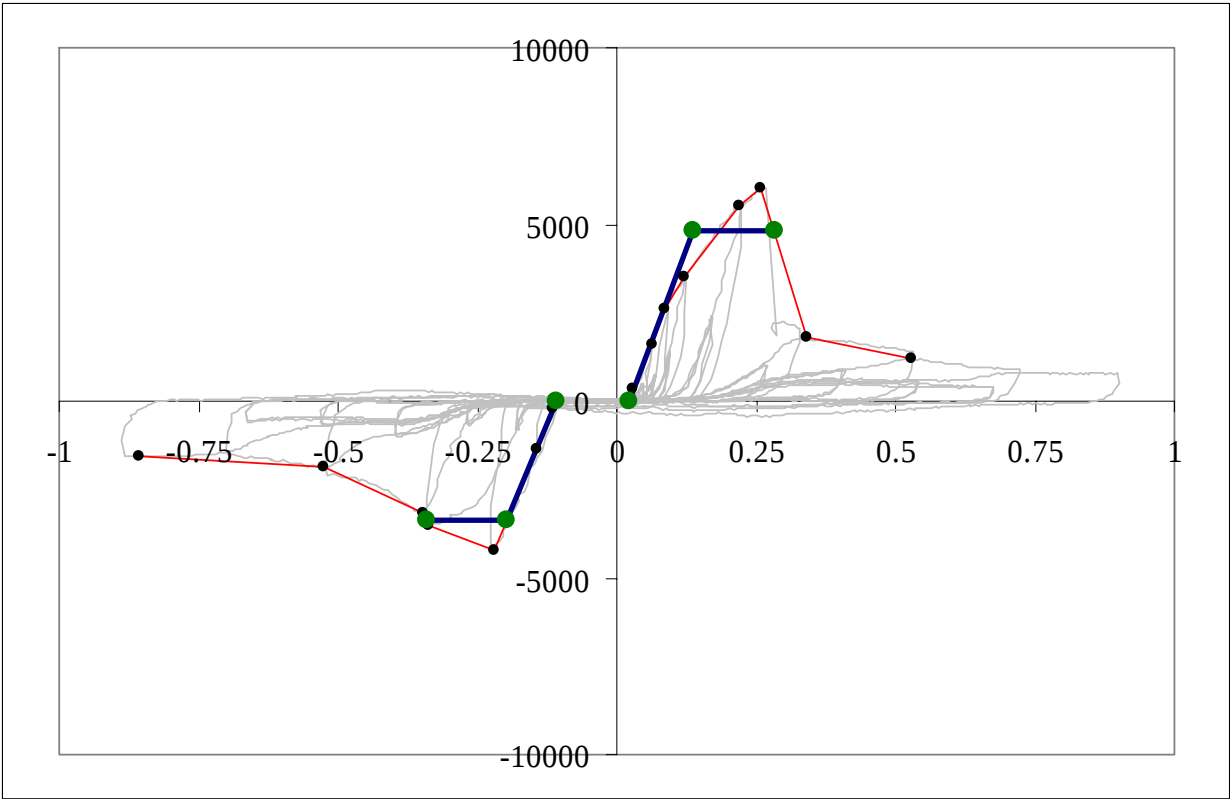


Figure B.133: E5C2 Load (lbs) – Deflection (in) Plot

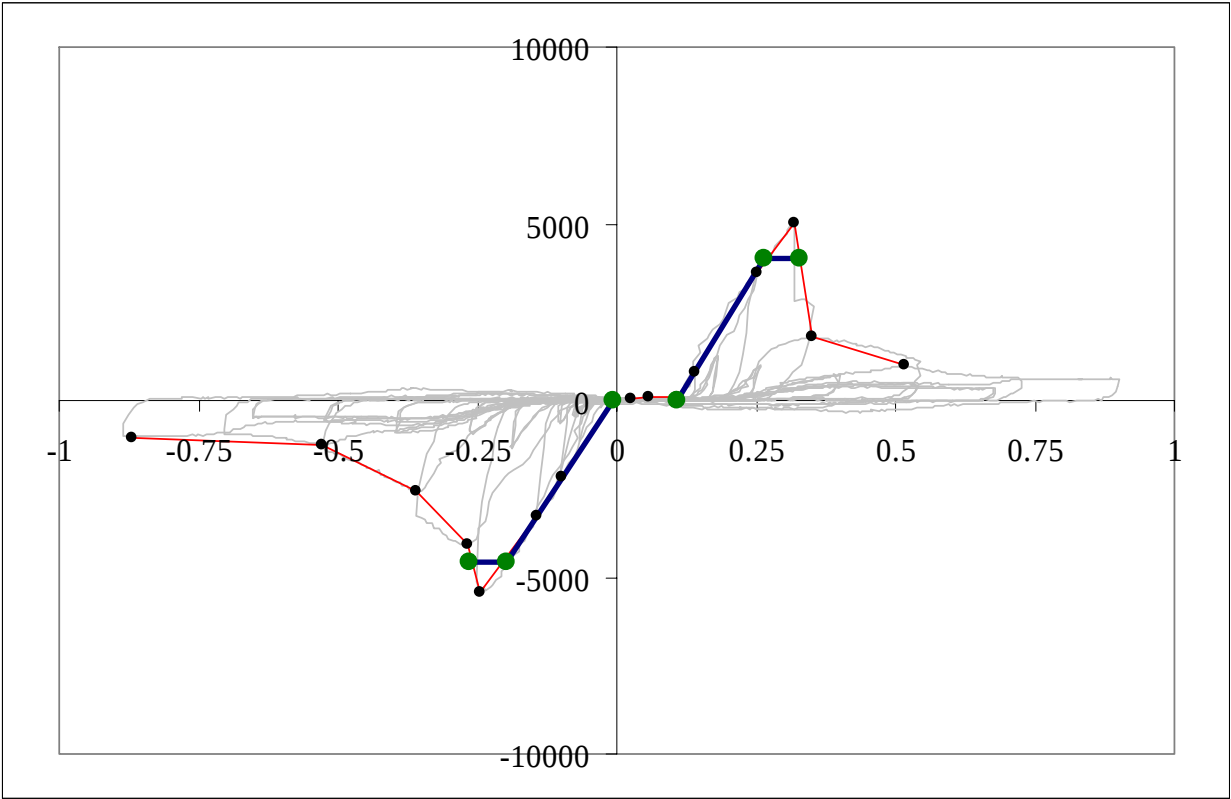


Figure B.134: E5C3 Load (lbs) – Deflection (in) Plot

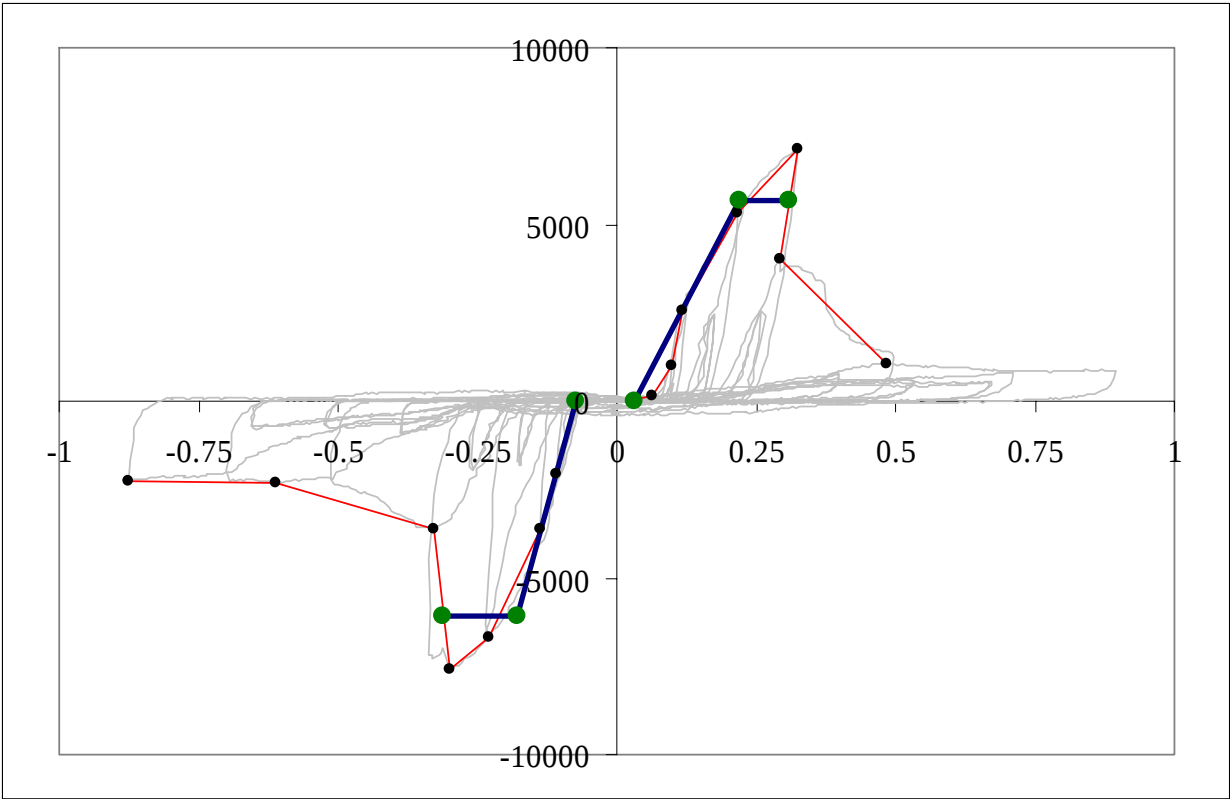


Figure B.135: E5C4 Load (lbs) – Deflection (in) Plot

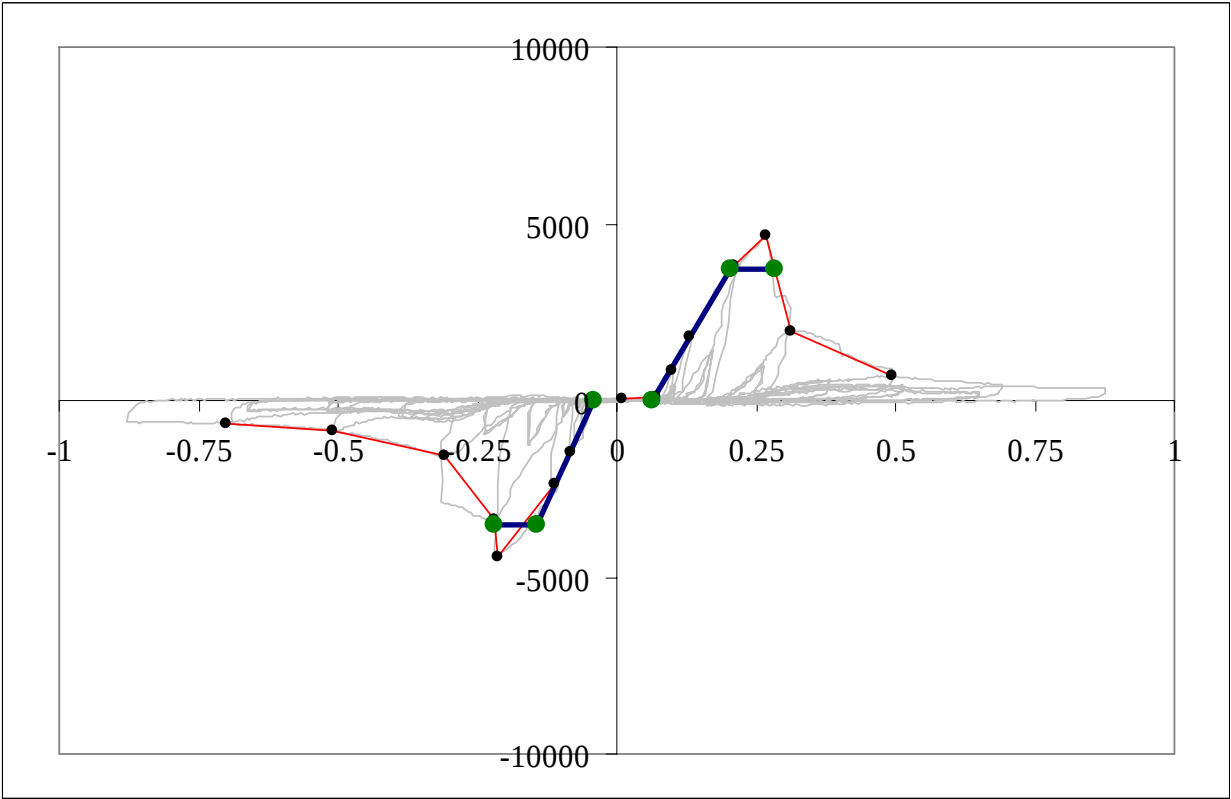


Figure B.136: E5C5 Load (lbs) – Deflection (in) Plot

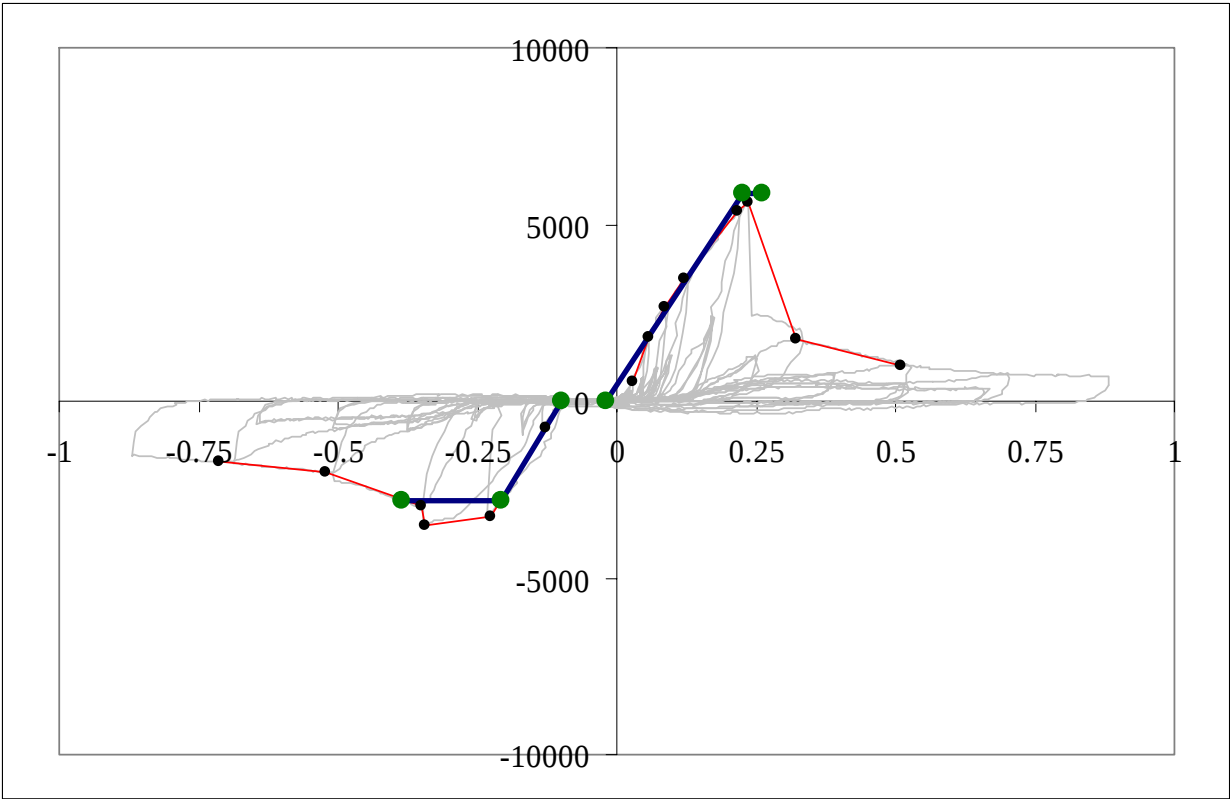


Figure B.137: E5C6 Load (lbs) – Deflection (in) Plot

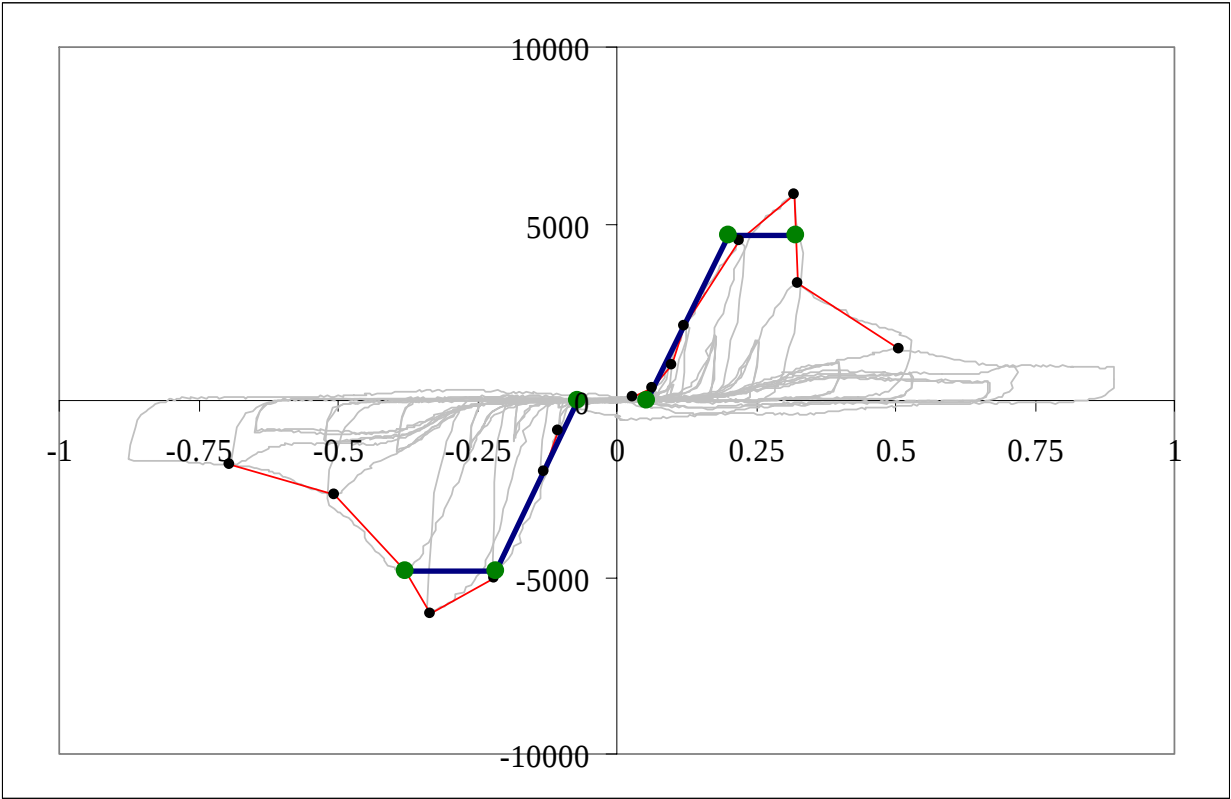


Figure B.138: E5C7 Load (lbs) – Deflection (in) Plot

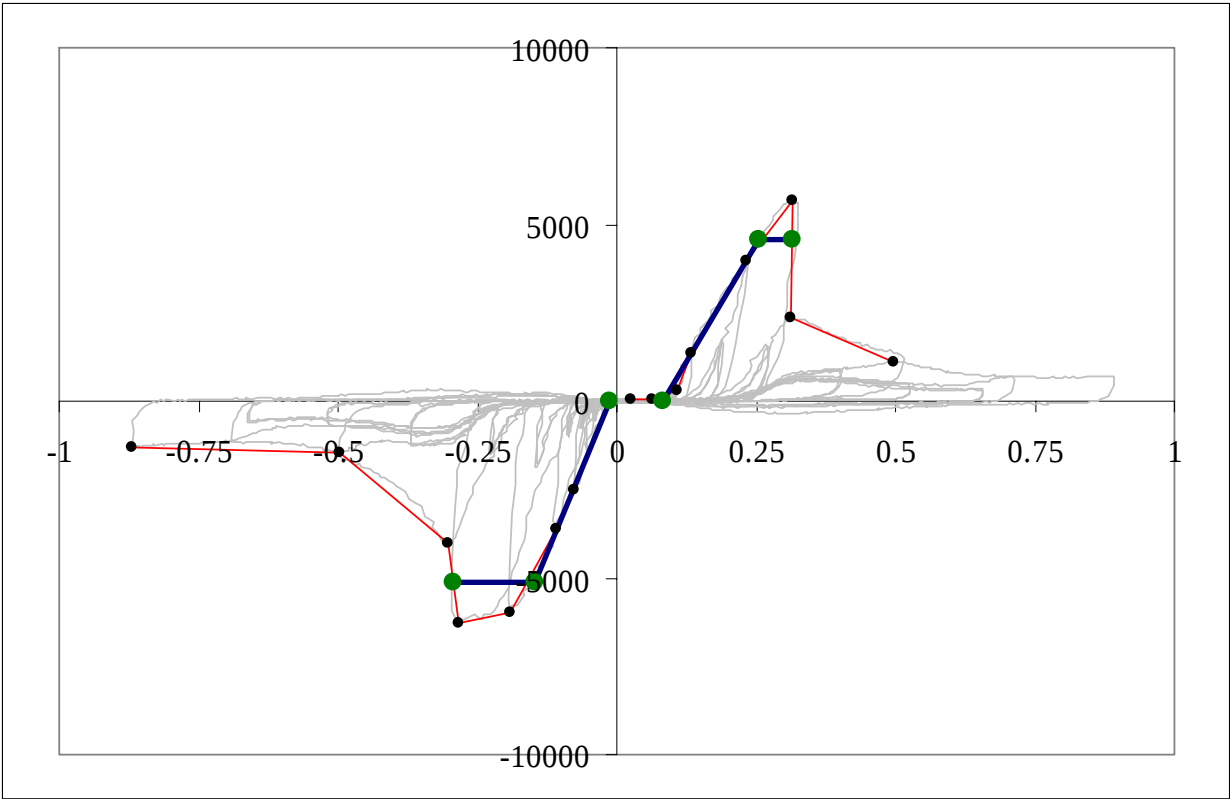


Figure B.139: E5C8 Load (lbs) – Deflection (in) Plot

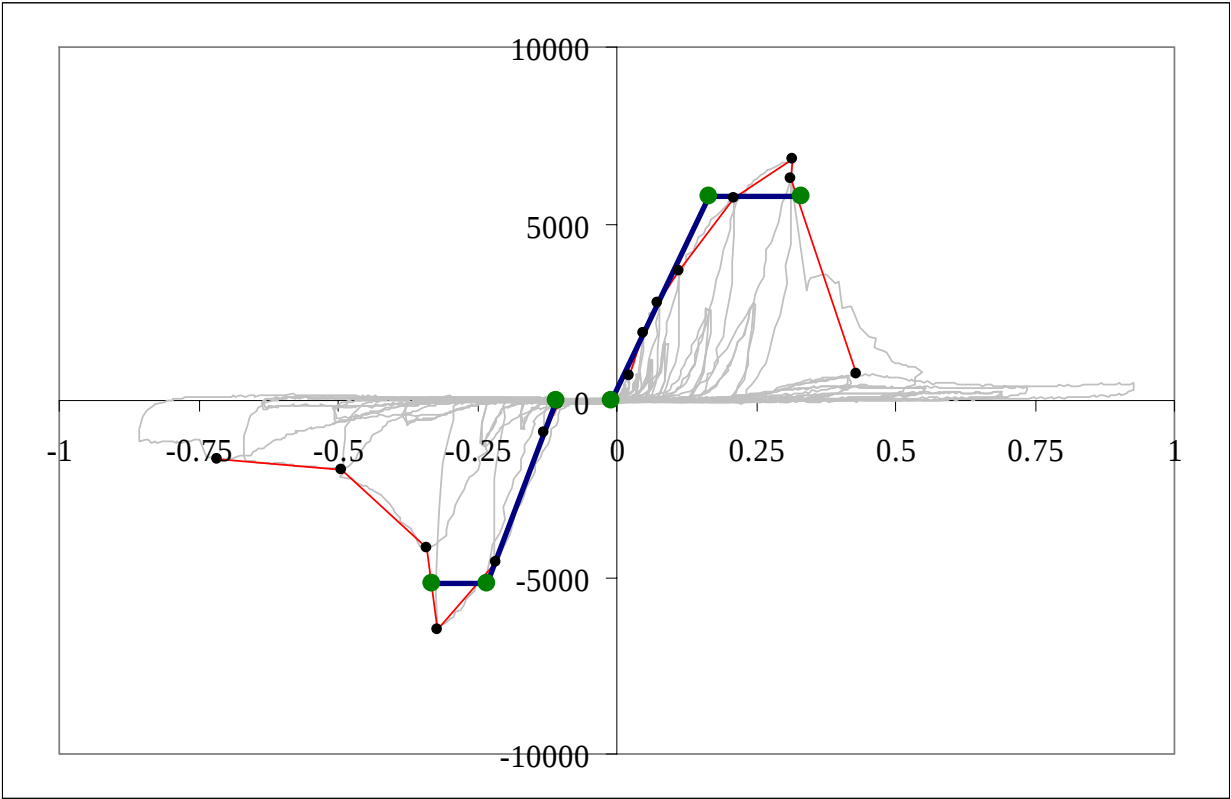


Figure B.140: E5C9 Load (lbs) – Deflection (in) Plot

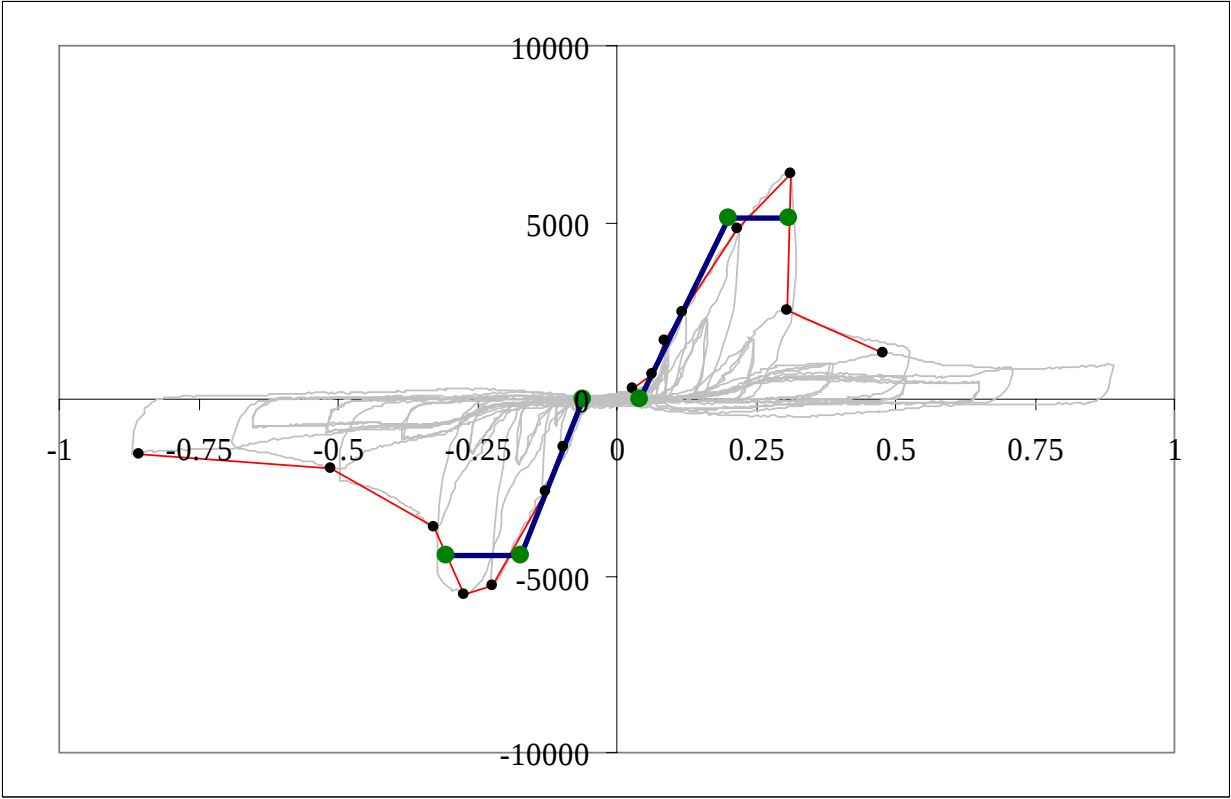


Figure B.141: E5C10 Load (lbs) – Deflection (in) Plot

Table B.15: E3 Connection and Member Properties

	E3 Series										Mean	St. Dev.	COV(%)
	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10			
Max Load (lbs)	4150	3750	5800	4750	6050	4400	4400	4450	3750	4000	4550	792	17.4
@ Displ. (in)	0.20	0.25	0.23	0.18	0.21	0.27	0.22	0.24	0.25	0.30	0.236	0.035	14.7
Failure Load (lbs)	3300	3000	4650	3800	4850	3550	3550	3600	3000	3200	3650	637	17.5
@ Displ. (in)	0.26	0.34	0.33	0.26	0.24	0.31	0.30	0.26	0.30	0.32	0.292	0.035	11.9
40% Max (lbs)	1550	700	1100	1250	2250	750	750	950	700	1150	1115	487	43.7
@ Displ. (in)	0.11	0.08	0.07	0.08	0.10	0.08	0.08	0.08	0.07	0.10	0.086	0.012	14.4
E.E.P. Yield (lbs)	4250	3100	4800	3850	5200	3650	3650	3600	3000	3350	3845	712	18.5
@ Displ. (in)	0.21	0.15	0.17	0.15	0.16	0.17	0.18	0.15	0.14	0.21	0.169	0.025	14.7
5% Offset (lbs)	4050	3150	5300	4700	5800	3950	4350	3750	2600	3650	4130	957	23.2
@ Displ. (in)	0.22	0.18	0.20	0.19	0.20	0.20	0.22	0.17	0.15	0.25	0.196	0.028	14.3
Elastic Stiff. (lb/in)	30150	32300	38650	40250	46900	33500	32950	37500	37550	19500	34925	7247	20.8
Slack (in)	0.06	0.06	0.05	0.05	0.05	0.06	0.06	0.05	0.06	0.04	0.053	0.006	10.7
E.E.P. Energy (lb*in)	600	800	1150	700	700	800	750	600	650	700	745	159	21.3
Ductility Ratio	1.25	2.15	2.00	1.79	1.49	1.86	1.70	1.77	2.16	1.56	1.77	0.29	16.4
Yield Mode	II	II	II	II	II	II	II	II	II	II			
Failure Mode	split	split	split	split	split	split	split	split	split	split			
Governing Member	B	B	B	B	B	T	T	B	B	T			

	E3 Series										Mean	St. Dev.	COV(%)
Member Top	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10			
M.C. (%)	16	13	20	16	15	14	12	13	14	15	14.9	2.3	15.7
S.G.	0.60	0.37	0.85	0.62	0.62	0.55	0.48	0.49	0.45	0.65	0.568	0.132	23.3
D.E. 5% Yield (psi)	7035	4405	5644	5191	7287	4440	6096	6033	5117	3922	5517	1119	20.3
D.E. Capacity (psi)	7322	4115	6578	5252	7532	4616	5682	6299	4802	3585	5578	1339	24.0

Member Bottom	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	Mean	St. Dev.	COV(%)
M.C. (%)	15	13	13	14	13	15	13	14	15	14	13.9	0.8	5.8
S.G.	0.47	0.51	0.39	0.51	0.50	0.57	0.48	0.47	0.60	0.52	0.501	0.058	11.6
D.E. 5% Yield (psi)	4338	4531	4832	4629	6856	3969	3900	4976	5378	3897	4731	893	18.9
D.E. Capacity (psi)	4122	4251	5098	4919	7162	4713	1493	5156	5379	3625	4592	1445	31.5

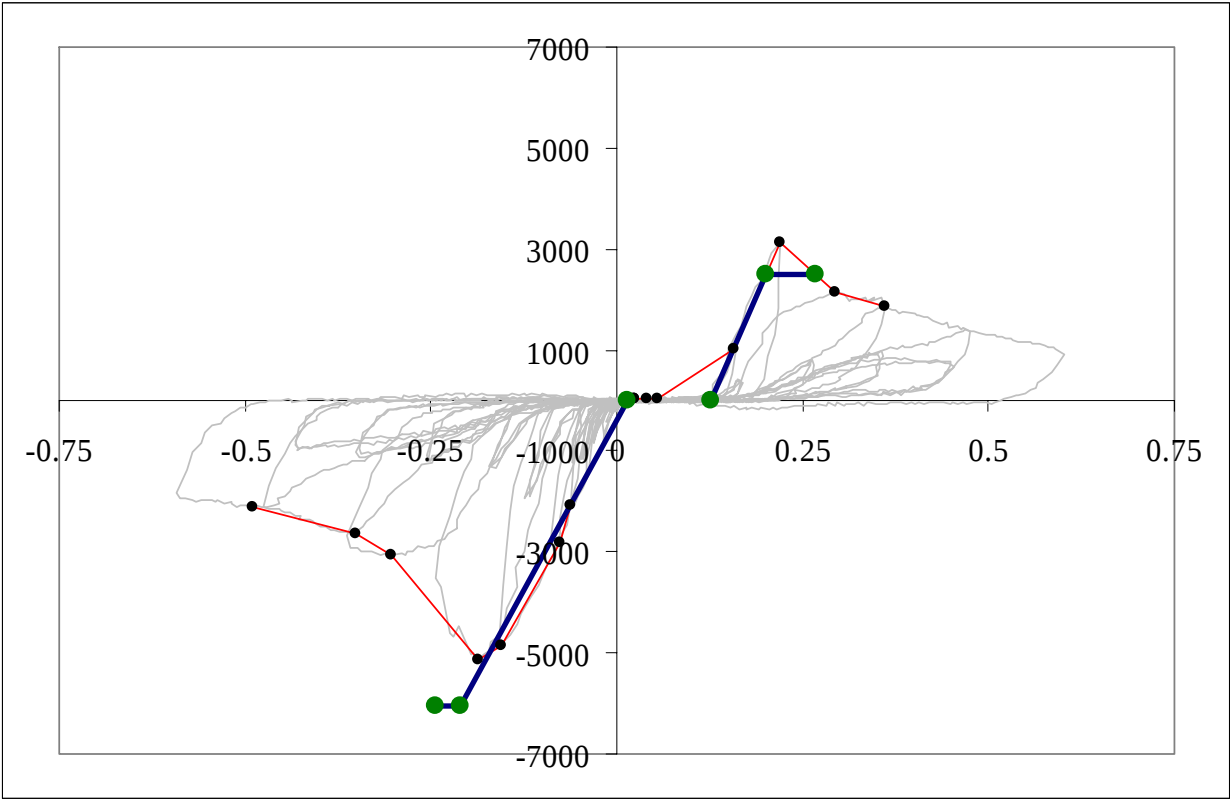


Figure B.142: E3C1 Load (lbs) – Deflection (in) Plot

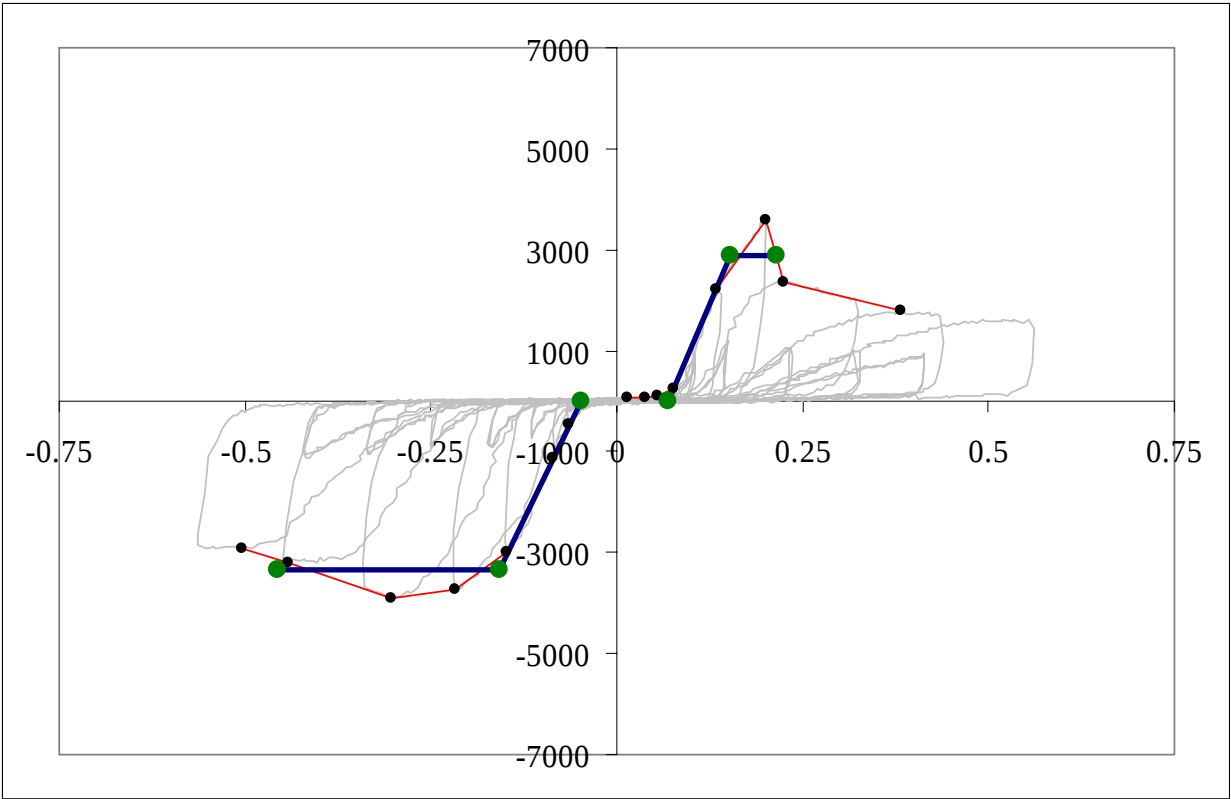


Figure B.143: E3C2 Load (lbs) – Deflection (in) Plot

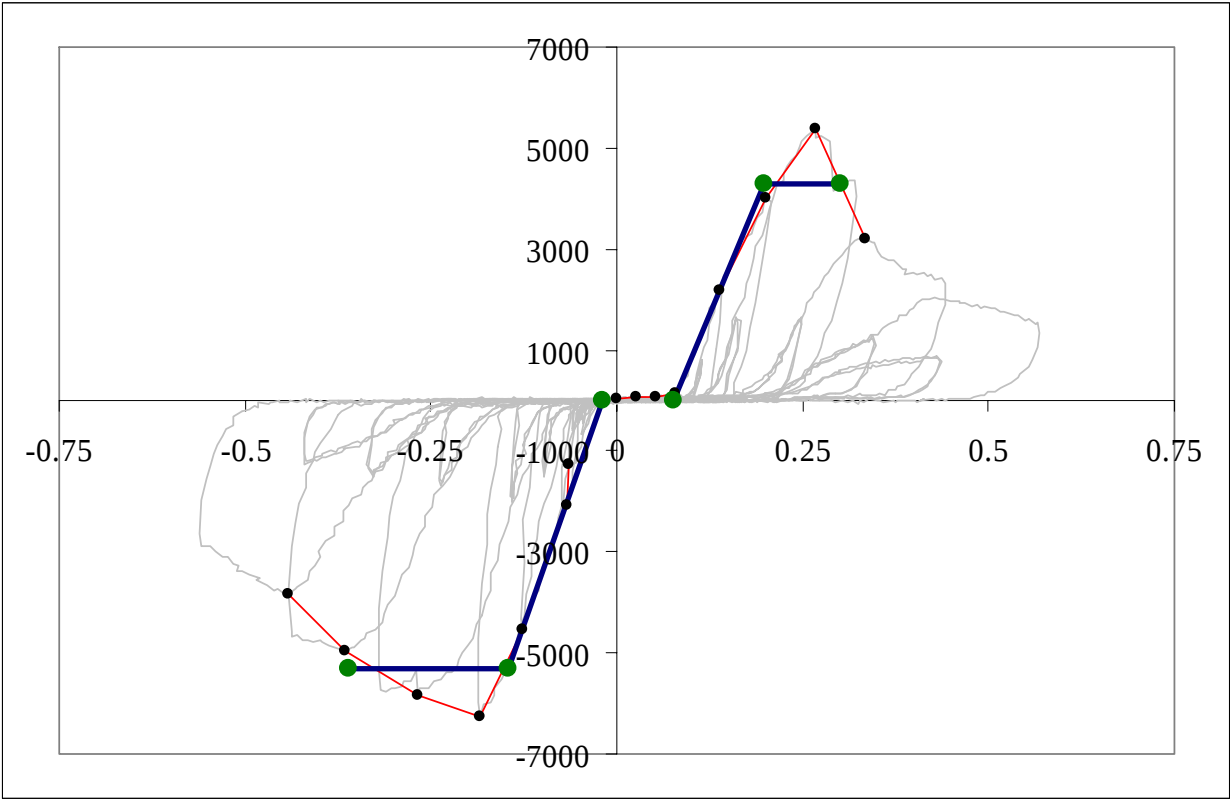


Figure B.144: E3C3 Load (lbs) – Deflection (in) Plot

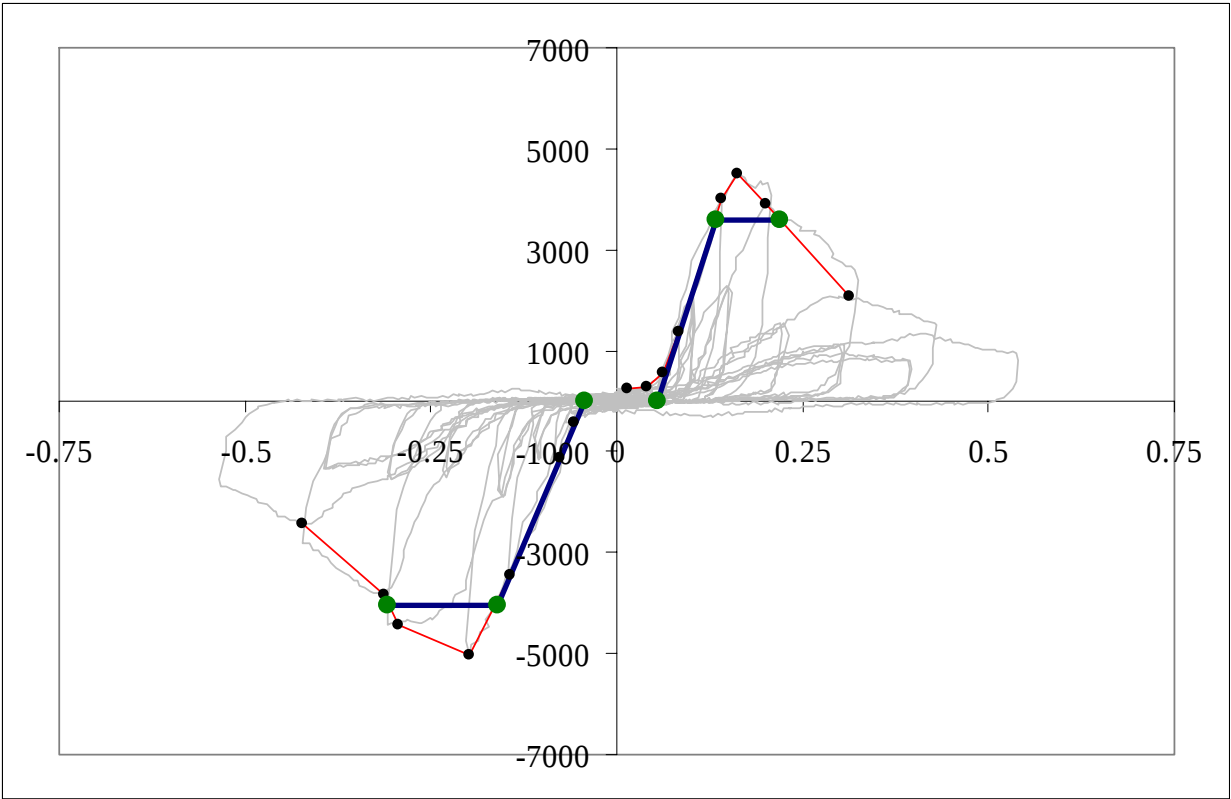


Figure B.145: E3C4 Load (lbs) – Deflection (in) Plot

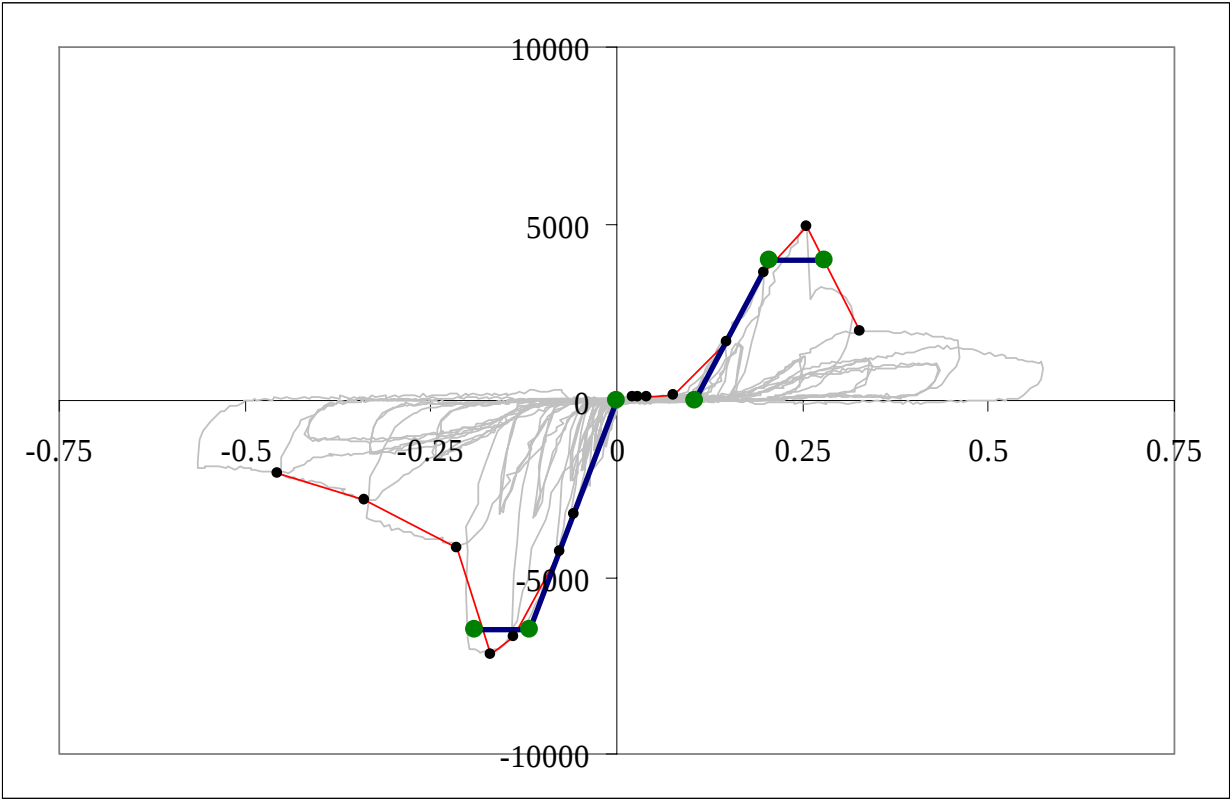


Figure B.146: E3C5 Load (lbs) – Deflection (in) Plot

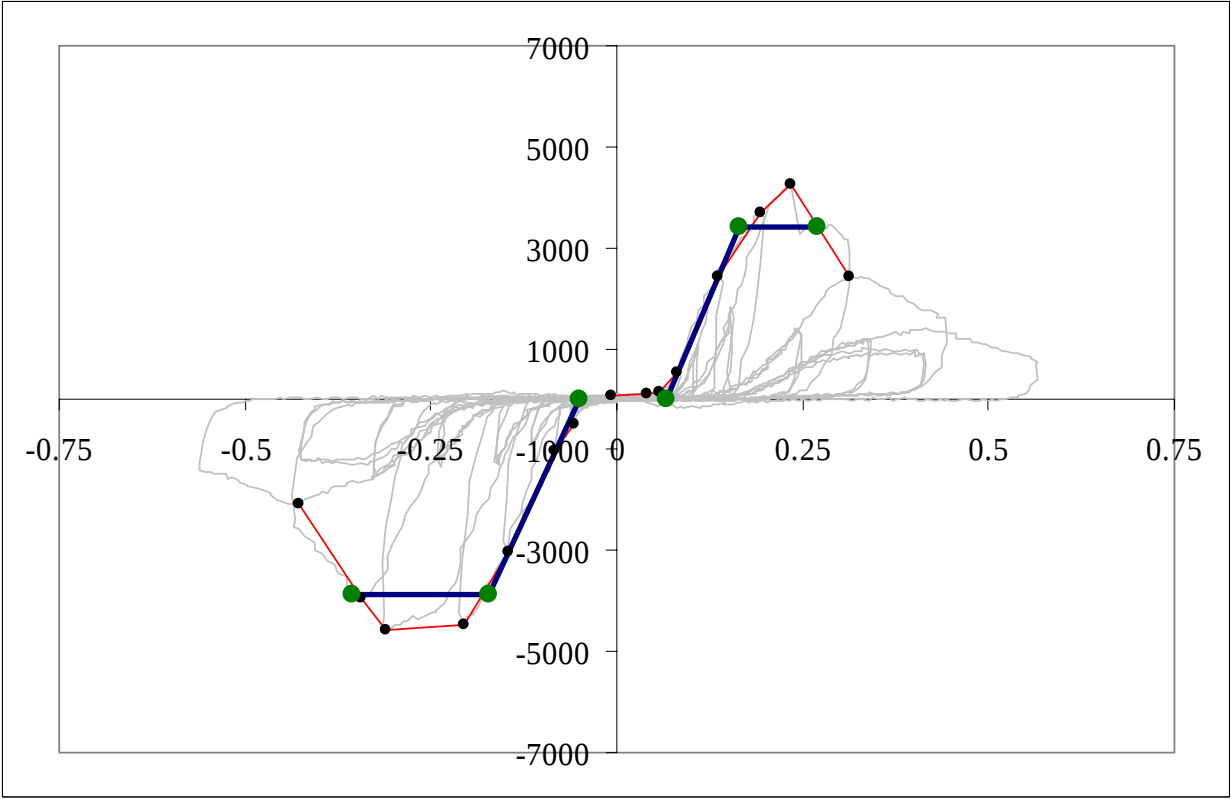


Figure B.147: E3C6 Load (lbs) – Deflection (in) Plot

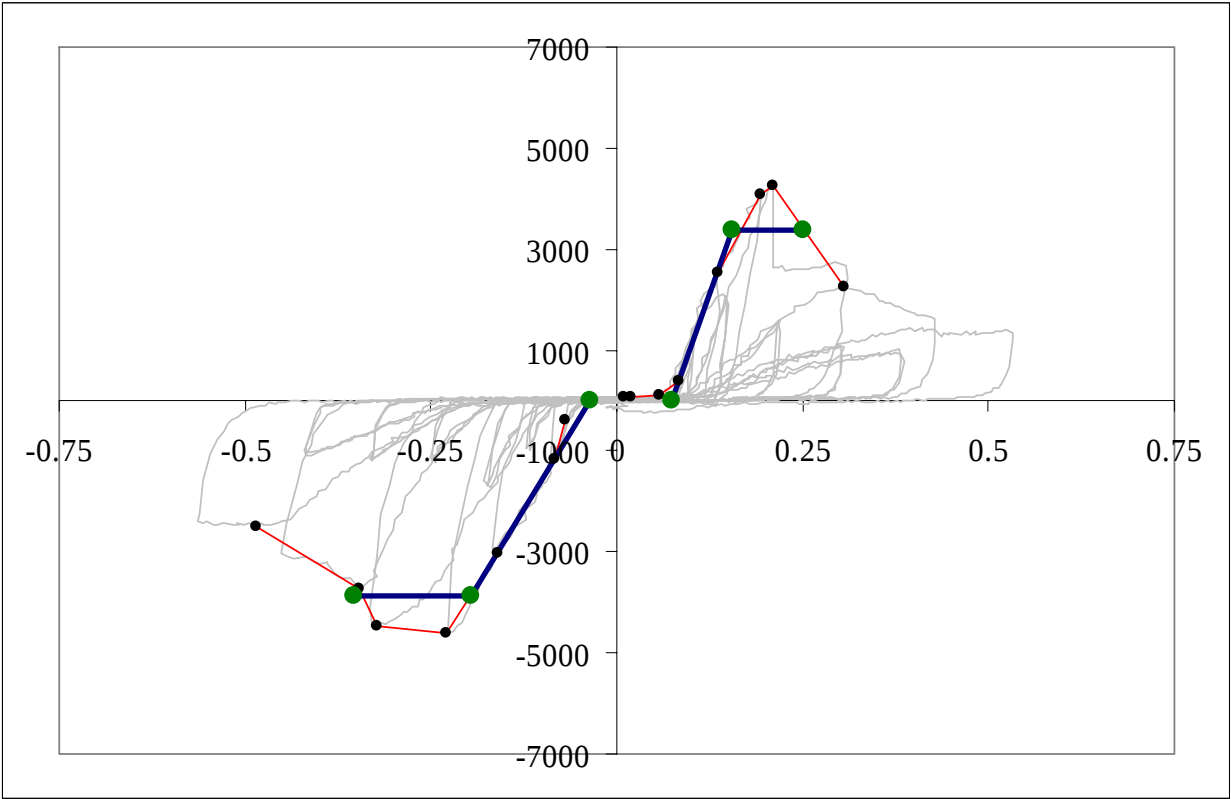


Figure B.148: E3C7 Load (lbs) – Deflection (in) Plot

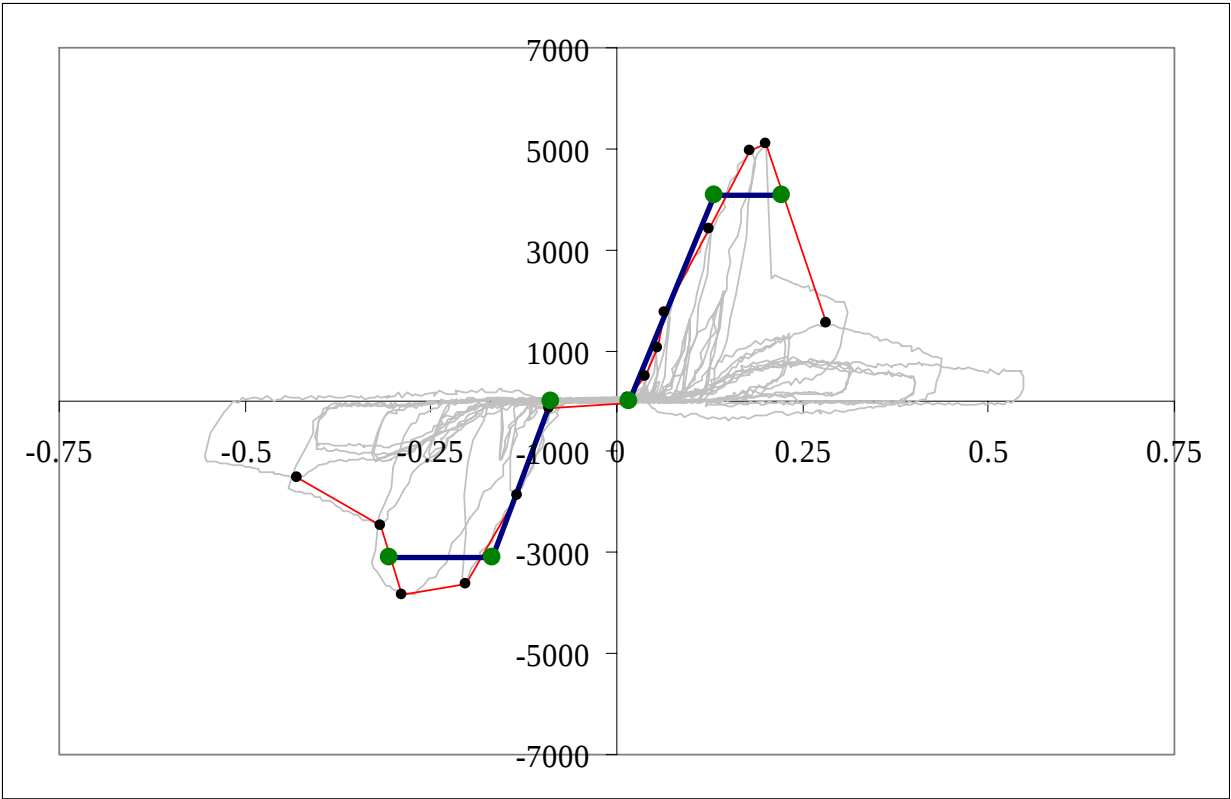


Figure B.149: E3C8 Load (lbs) – Deflection (in) Plot

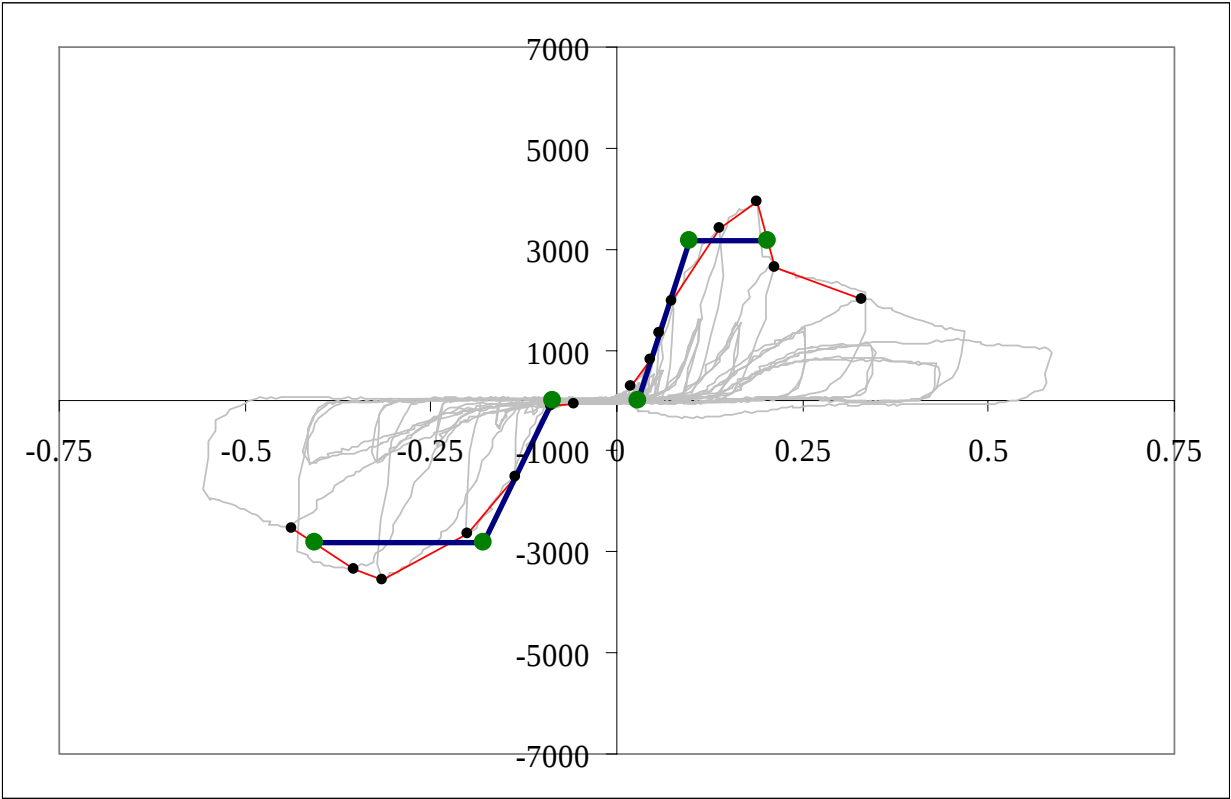


Figure B.150: E3C9 Load (lbs) – Deflection (in) Plot

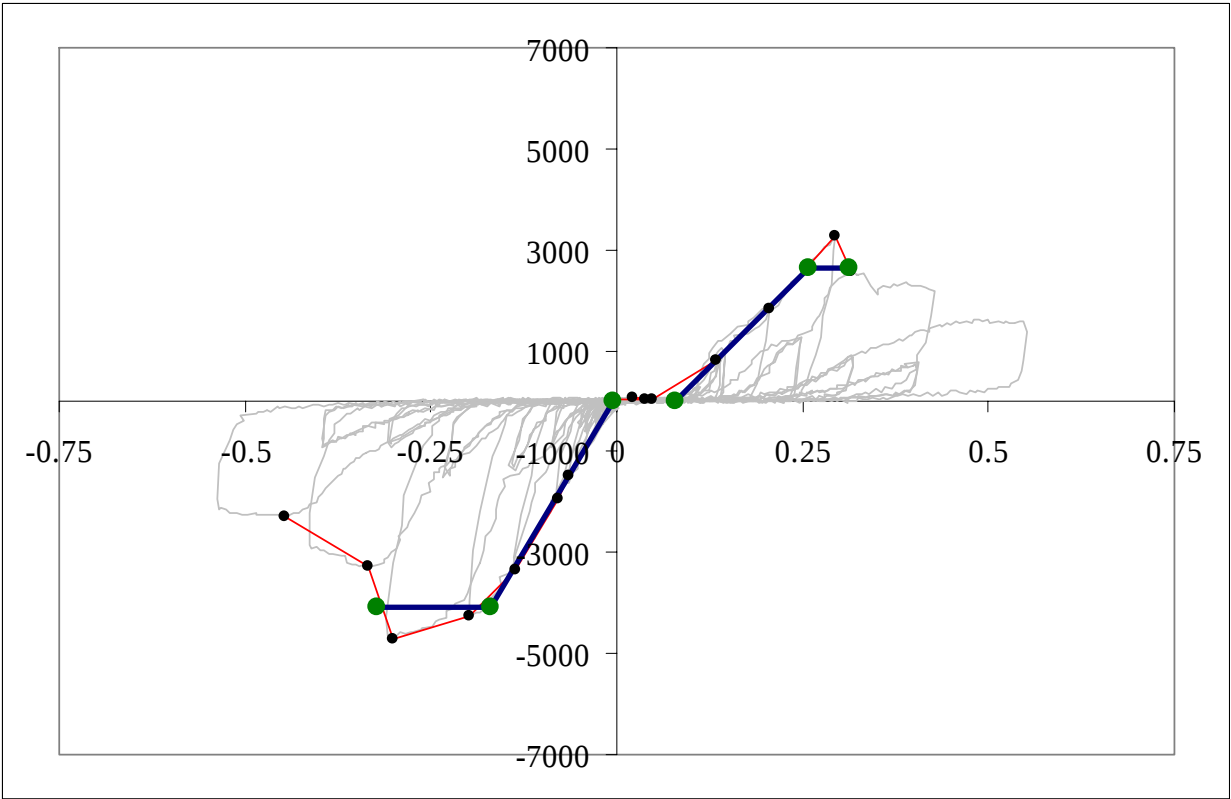


Figure B.151: E3C10 Load (lbs) – Deflection (in) Plot