

A. Appendix A: Experimental Graphs for the Mono-tube MR Damper

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Impact velocity of 7 ft/s Test 1

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Mono-tube MR Damper Subject to a 22 ft/s Impact

Test 1: Mono-tube MR Damper Subject to 22 ft/s Impact

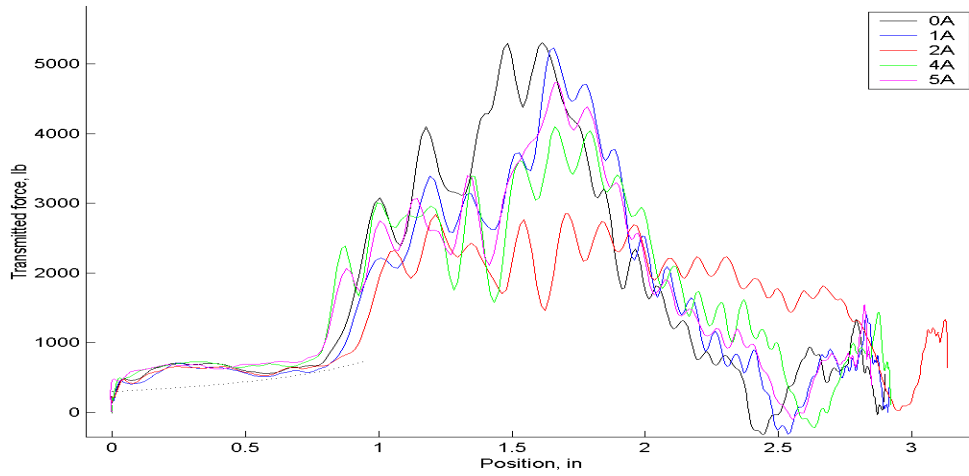


Figure A-1. Force transmitted to the base versus the piston displacement

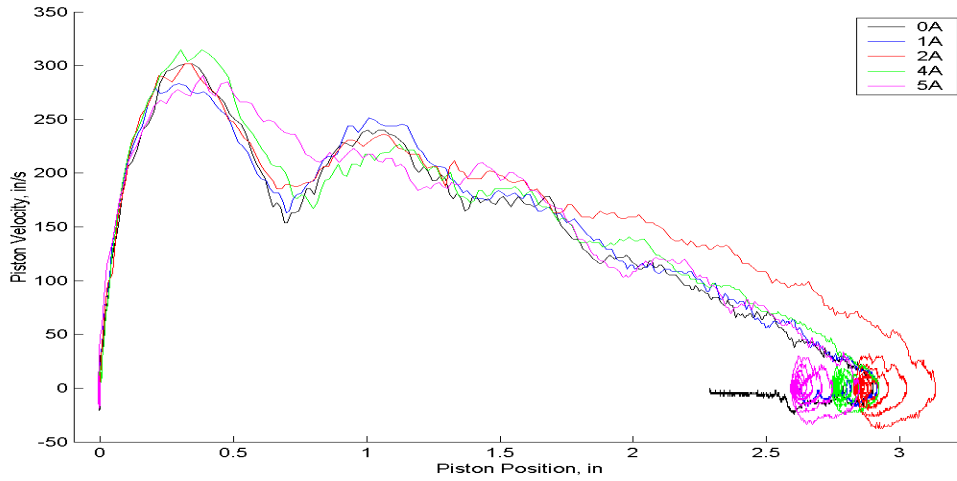


Figure A-2. Piston velocity versus the piston displacement

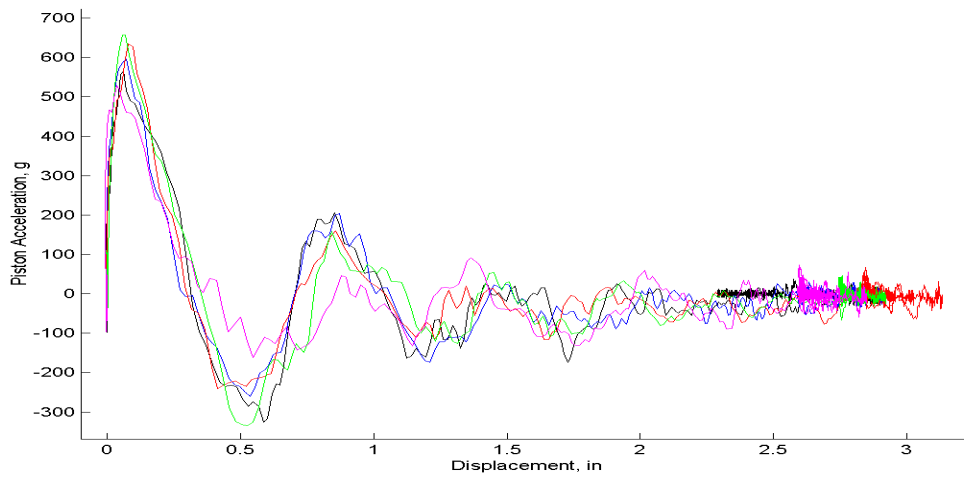


Figure A-3. Piston acceleration versus the piston displacement

Test 1: Mono-tube MR Damper Subject to 22 ft/s Impact

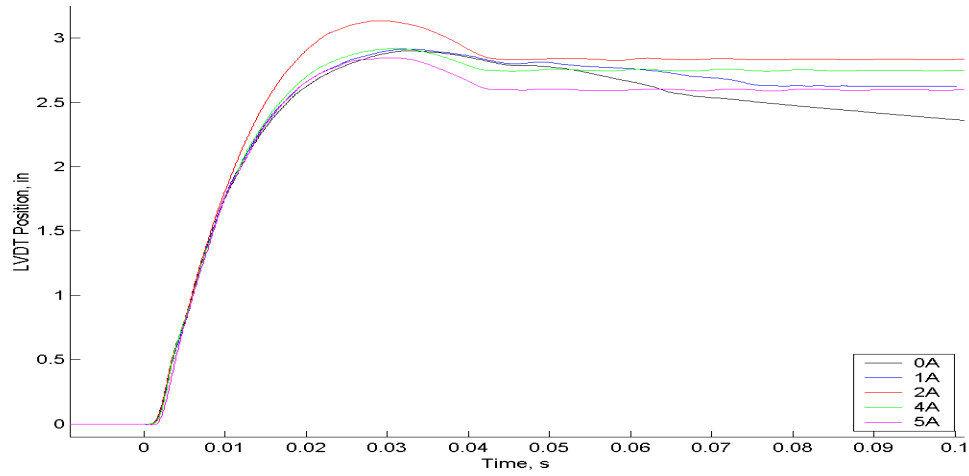


Figure A-4. Piston displacement versus the time from the initial contact

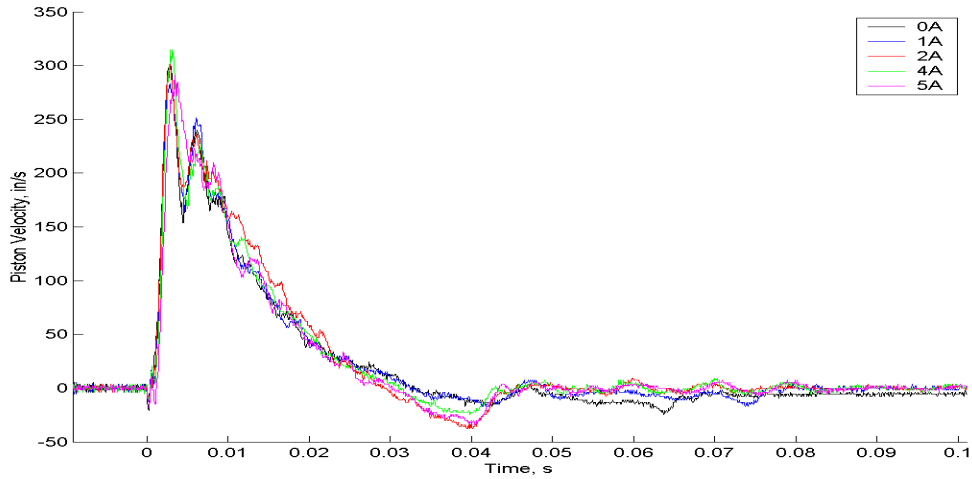


Figure A-5. Piston velocity versus the time from the initial contact

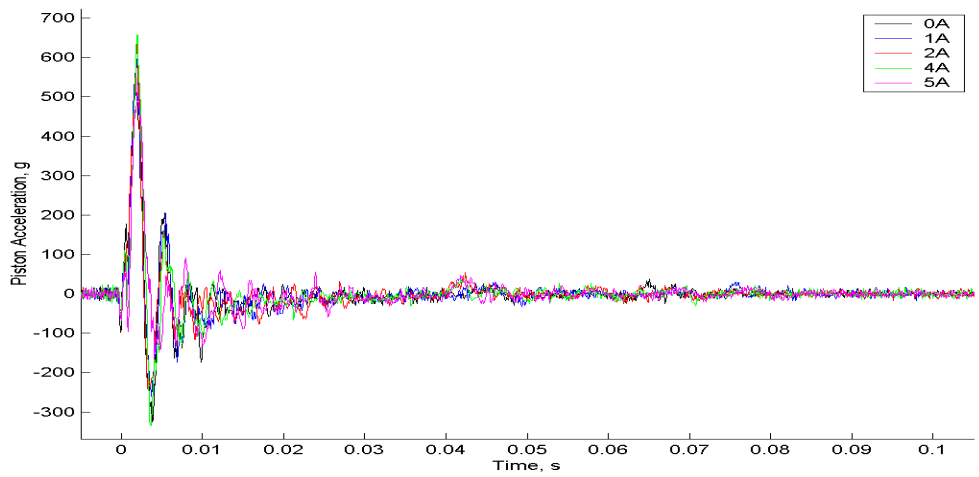


Figure A-6. Piston acceleration versus the time from the initial contact

Test 1: Mono-tube MR Damper Subject to 22 ft/s Impact

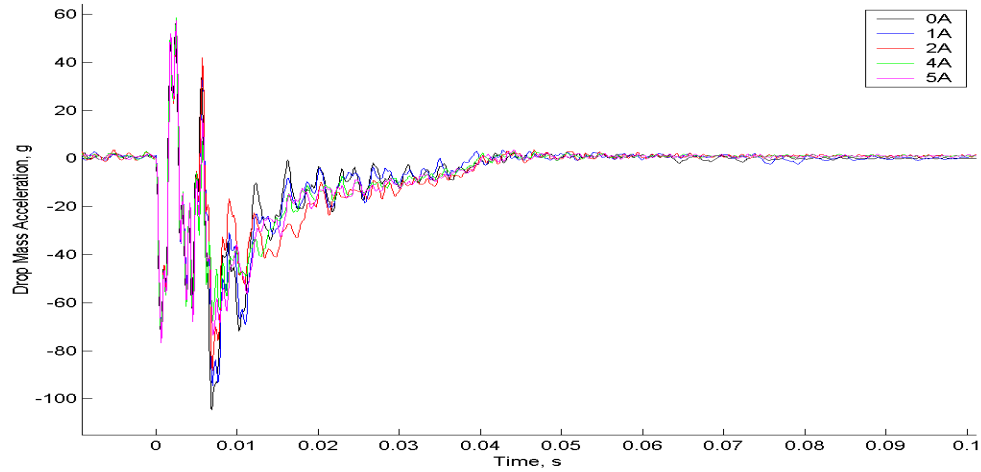


Figure A-7. Acceleration of the drop mass versus the time from the initial contact

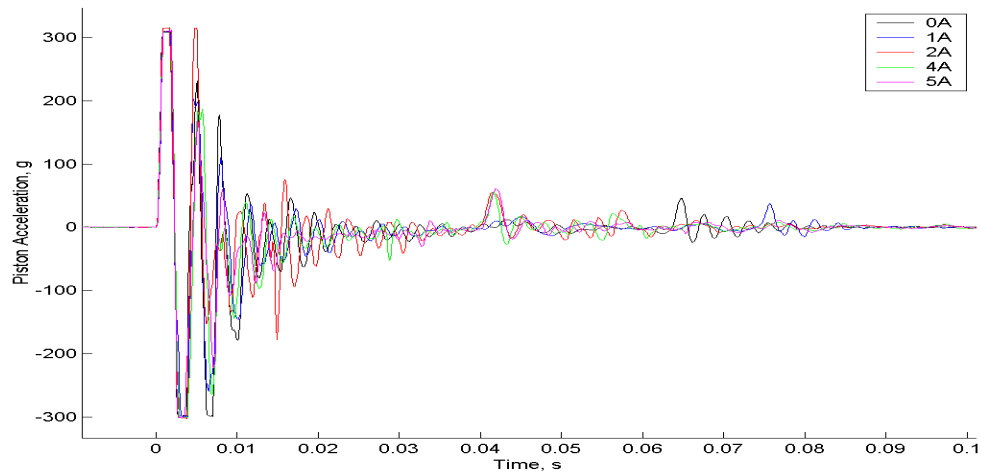


Figure A-8. Piston acceleration versus the time from the initial contact*

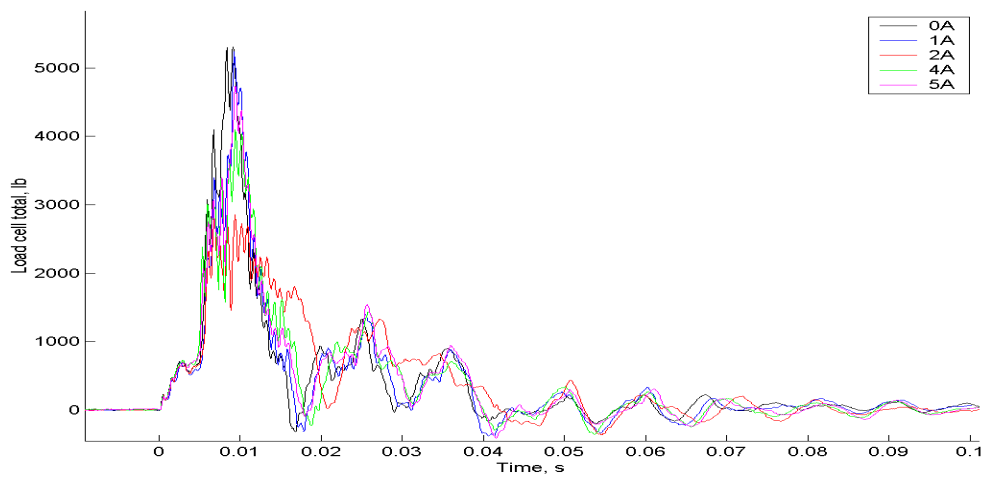


Figure A-9. Force transmitted to the base plate versus the time from the initial contact

Test 1: Mono-tube MR Damper Subject to 22 ft/s Impact

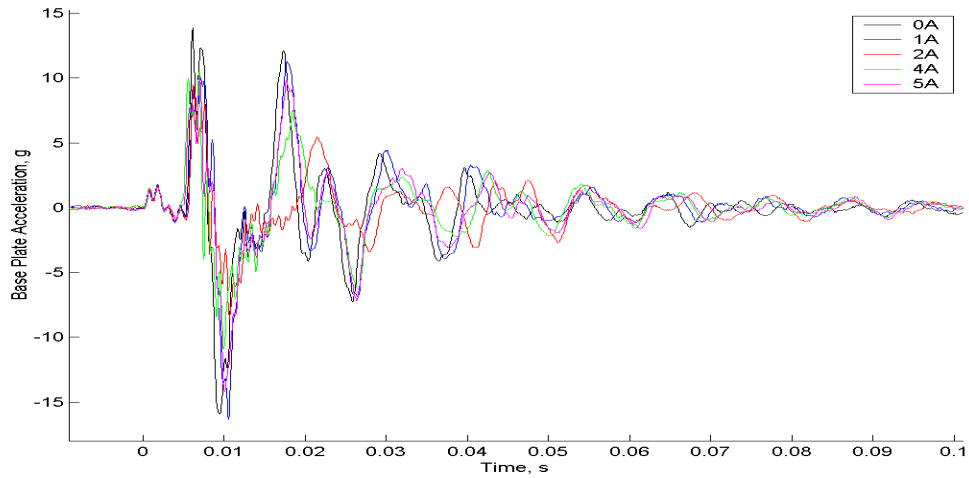


Figure A-10. Acceleration of the base plate versus the time from the initial contact

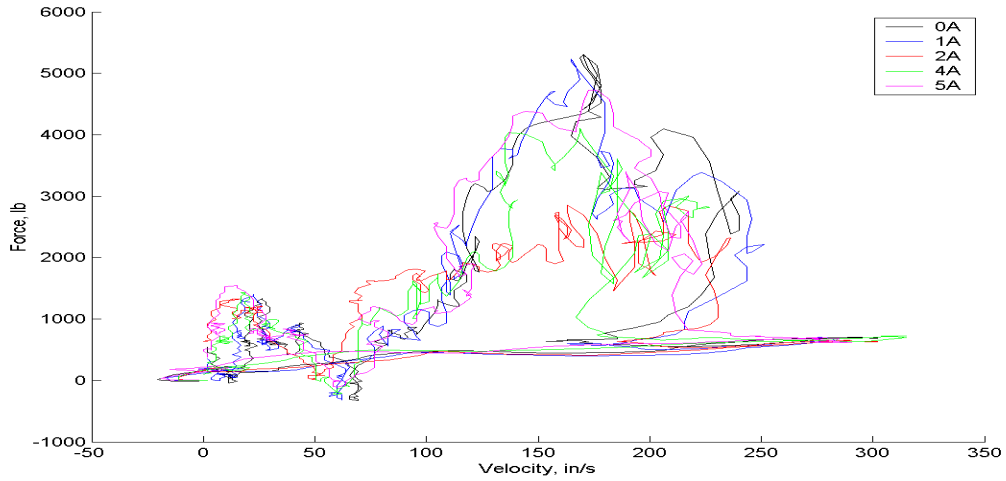


Figure A-11. Force transmitted to the base versus the piston velocity

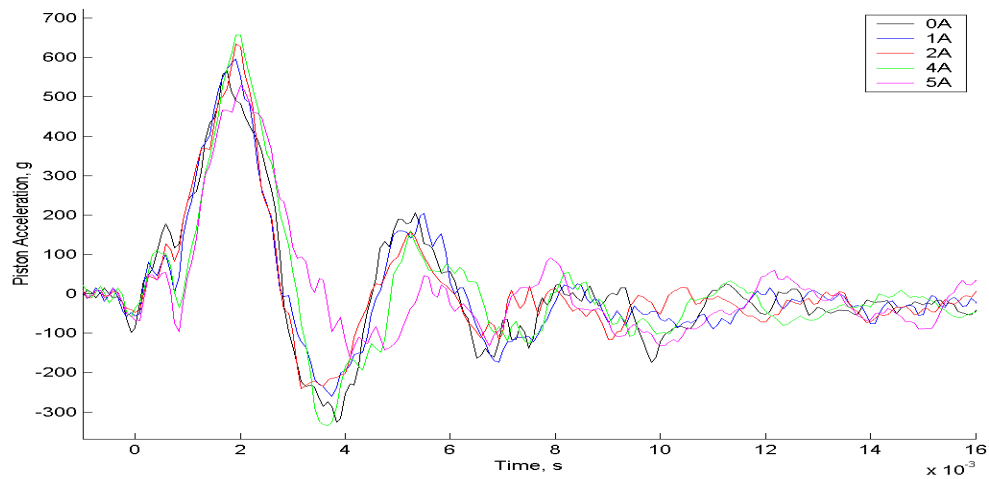


Figure A-12. Piston acceleration versus the time from the initial contact**

Test 2: Mono-tube MR Damper Subject to 22 ft/s Impact

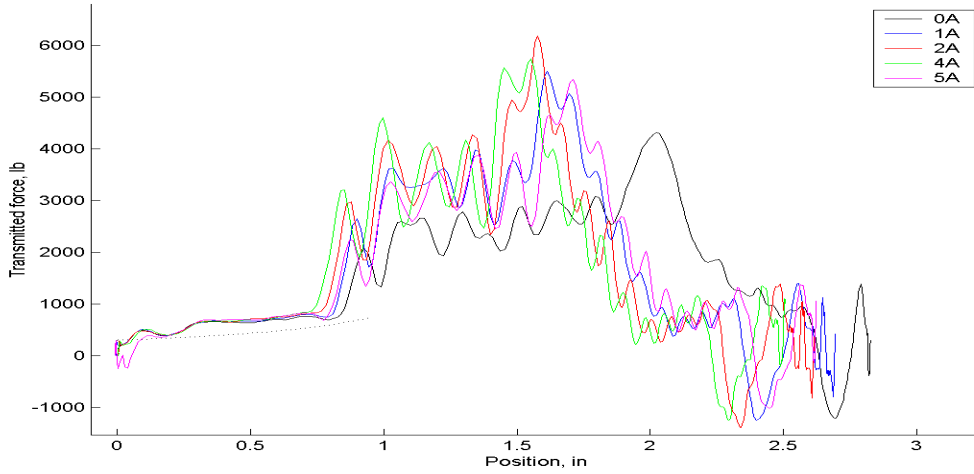


Figure A-13. Force transmitted to the base versus the piston displacement

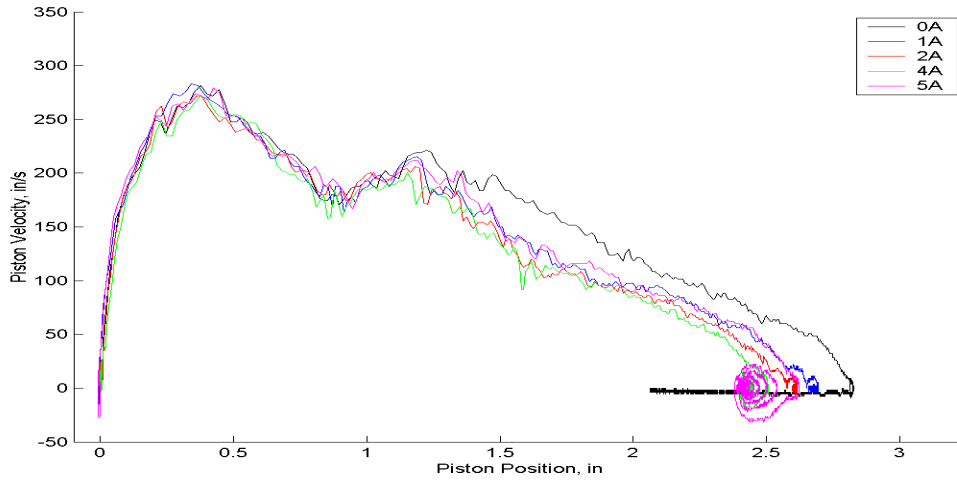


Figure A-14. Piston velocity versus the piston displacement

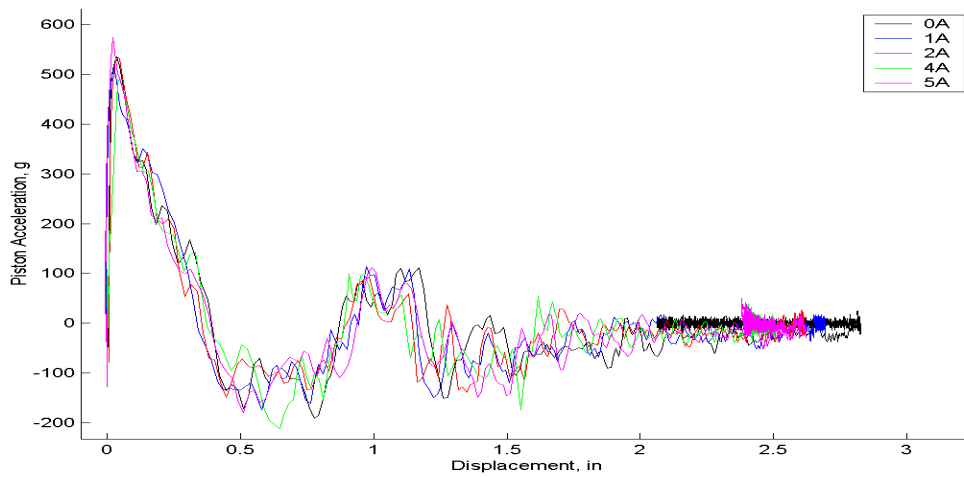


Figure A-15. Piston acceleration versus the piston displacement

Test 2: Mono-tube MR Damper Subject to 22 ft/s Impact

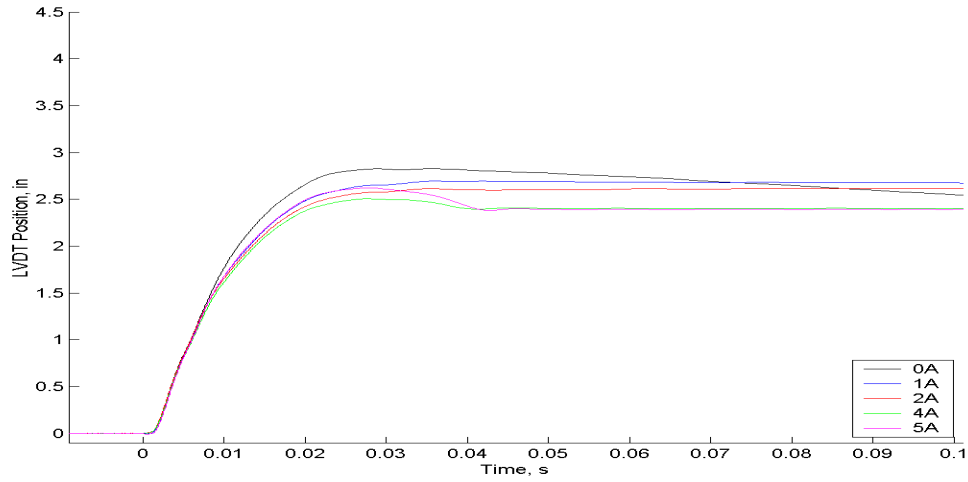


Figure A-16. Piston displacement versus the time from the initial contact

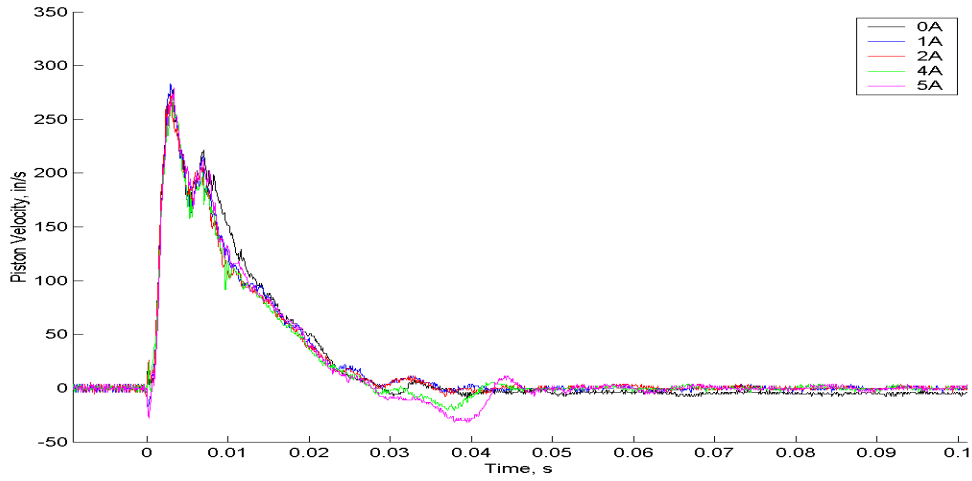


Figure A-17. Piston velocity versus the time from the initial contact

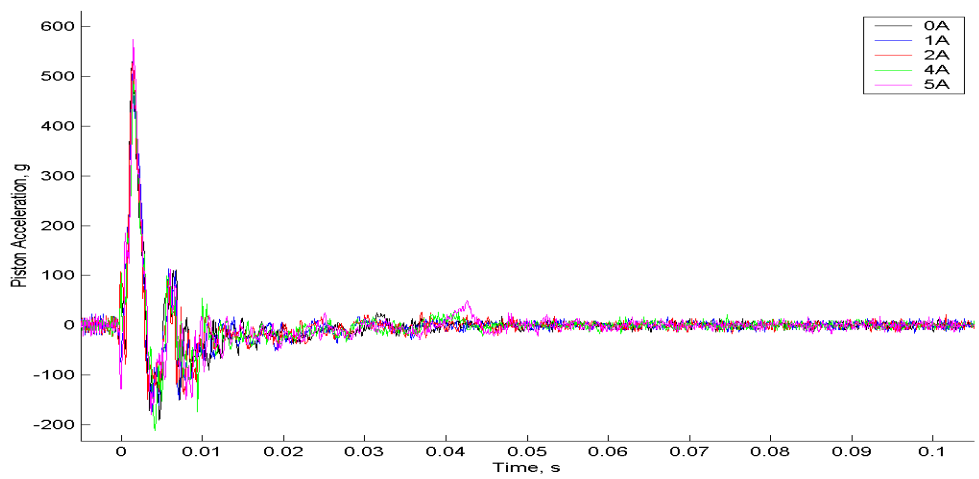


Figure A-18. Piston acceleration versus the time from the initial contact

Test 2: Mono-tube MR Damper Subject to 22 ft/s Impact

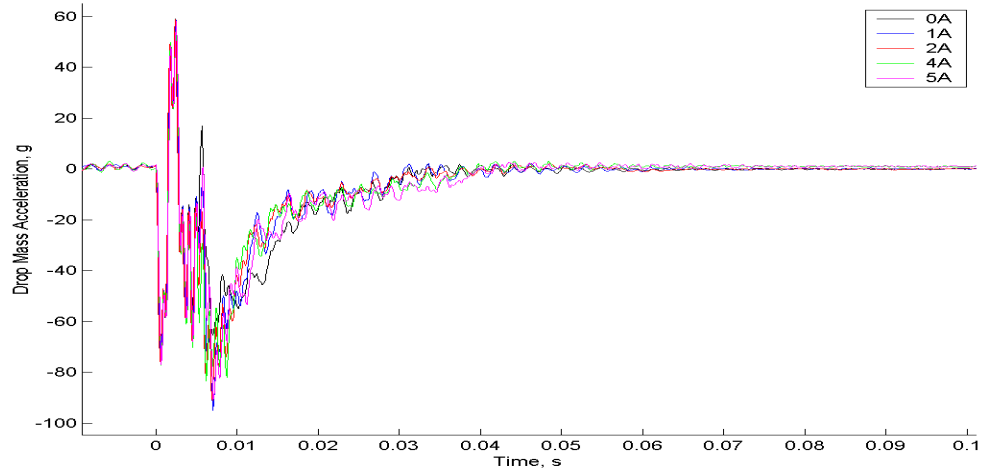


Figure A-19. Acceleration of the drop mass versus the time from the initial contact

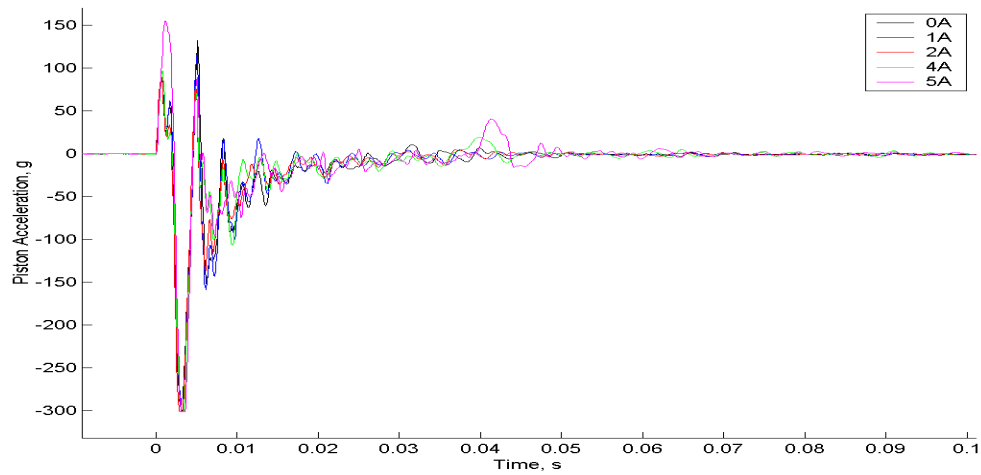


Figure A-20. Piston acceleration versus the time from the initial contact*

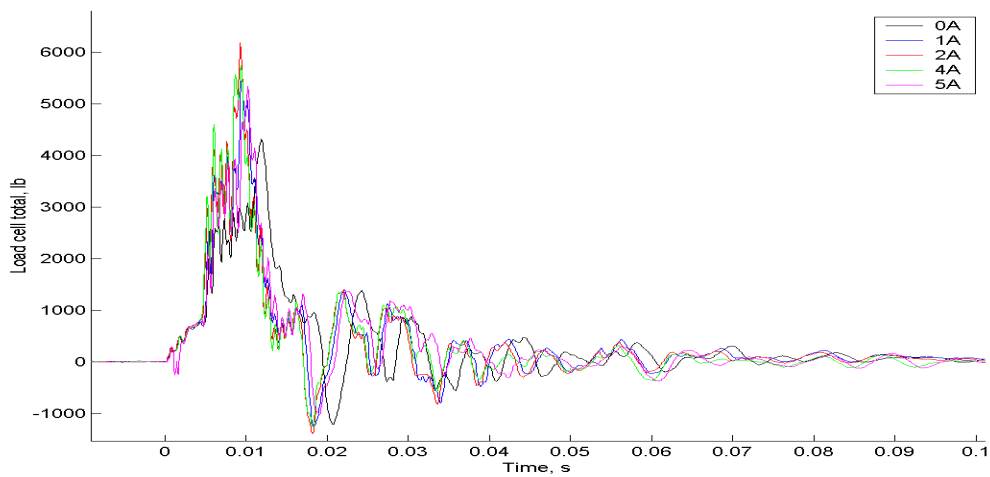


Figure A-21. Force transmitted to the base plate versus the time from the initial contact

Test 2: Mono-tube MR Damper Subject to 22 ft/s Impact

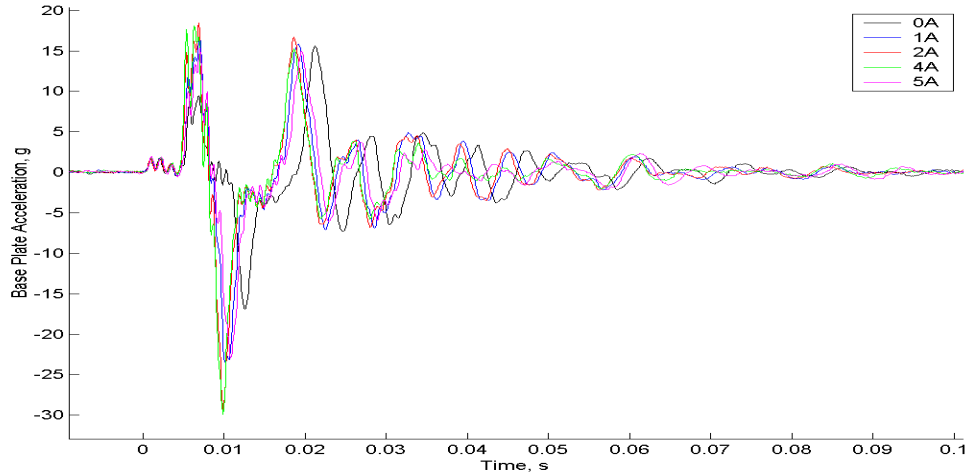


Figure A-22. Acceleration of the base plate versus the time from the initial contact

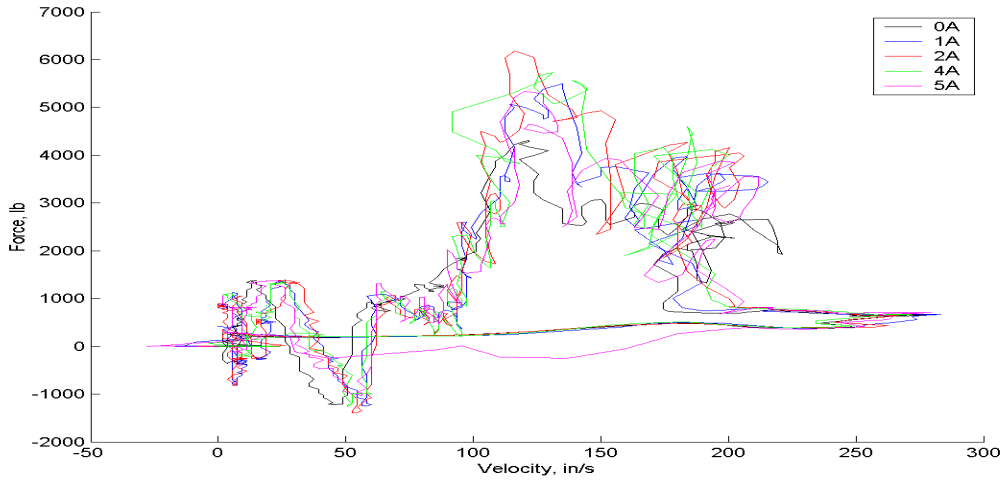


Figure A-23. Force transmitted to the base versus the piston velocity

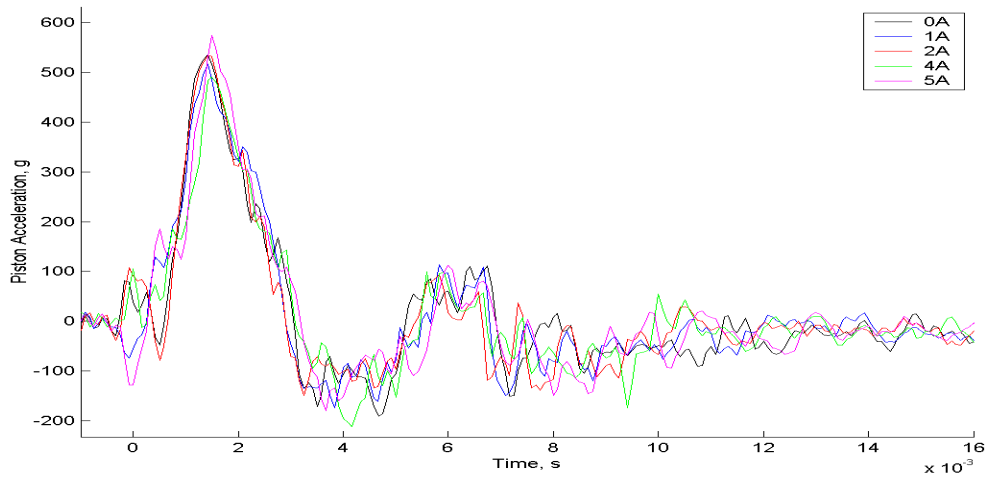


Figure A-24. Piston acceleration versus the time from the initial contact**

Test 3: Mono-tube MR Damper Subject to 22 ft/s Impact

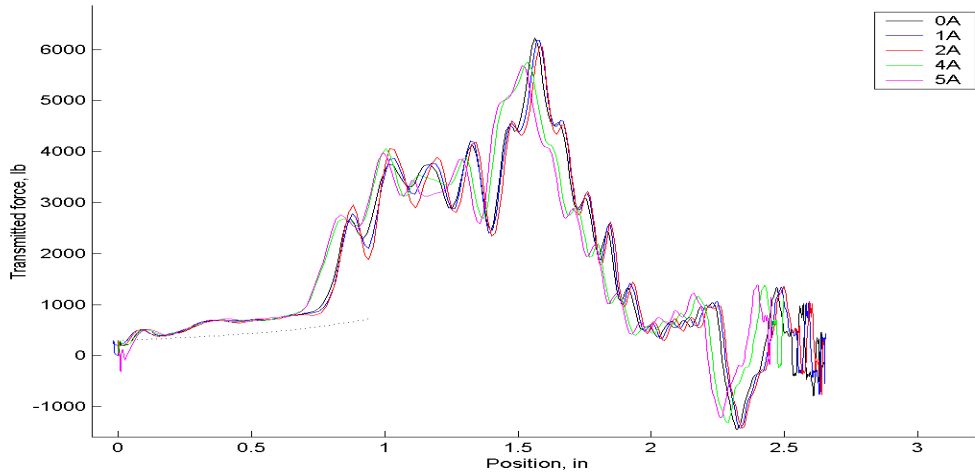


Figure A-25. Force transmitted to the base versus the piston displacement

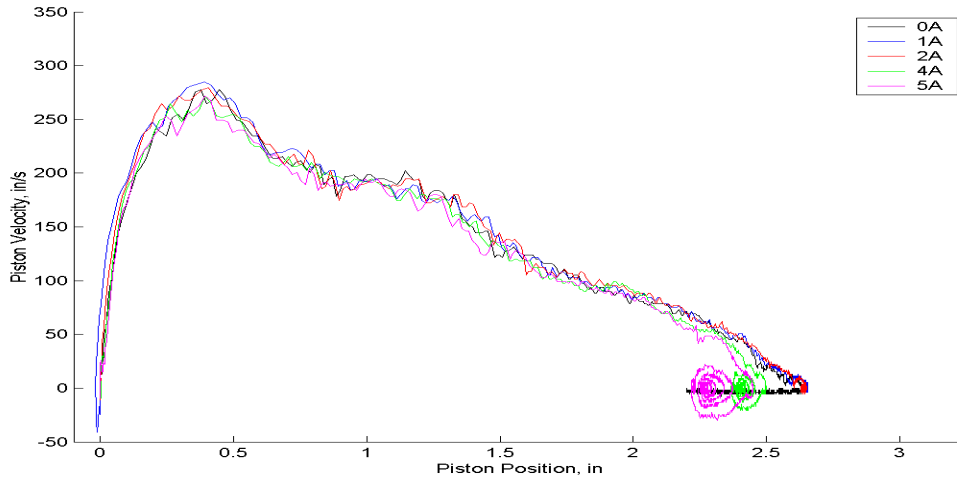


Figure A-26. Piston velocity versus the piston displacement

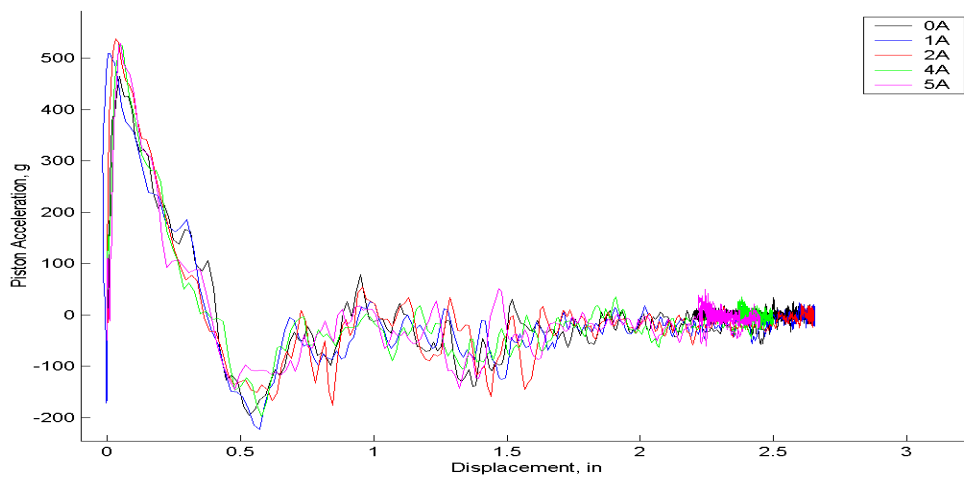


Figure A-27. Piston acceleration versus the piston displacement

Test 3: Mono-tube MR Damper Subject to 22 ft/s Impact

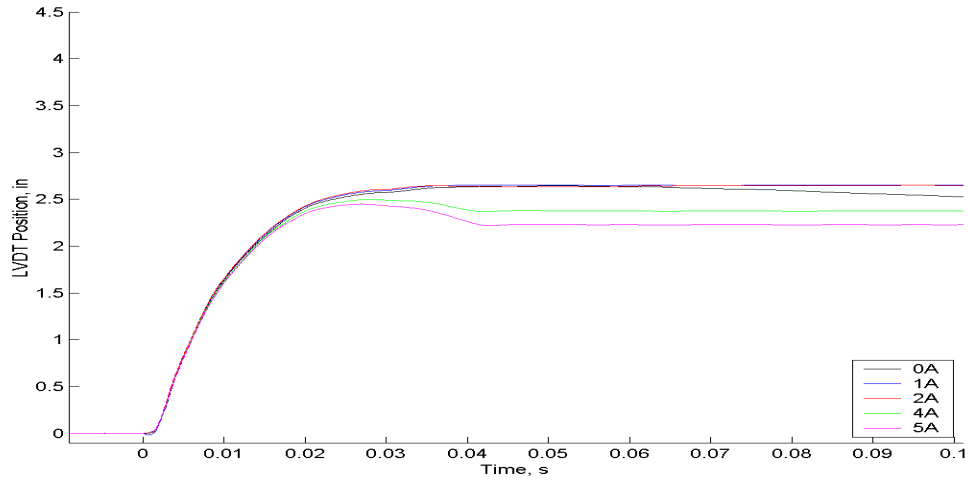


Figure A-28. Piston displacement versus the time from the initial contact

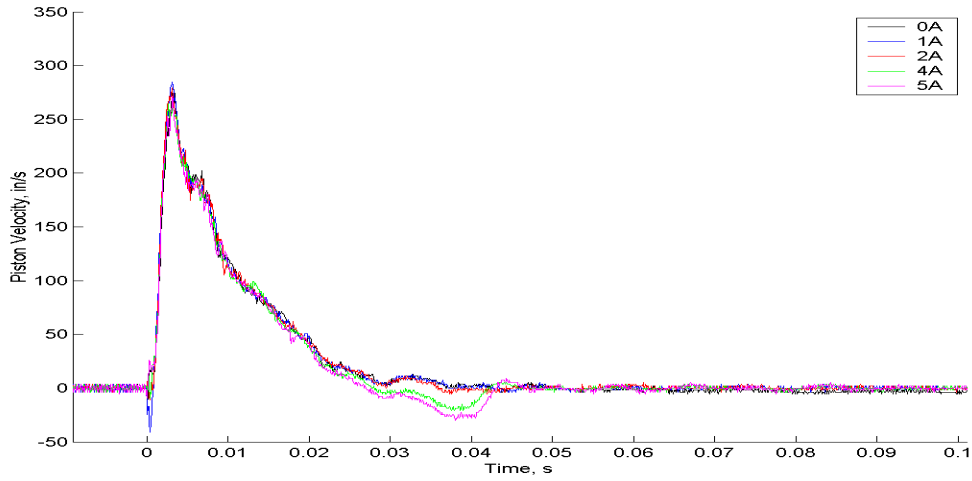


Figure A-29. Piston velocity versus the time from the initial contact

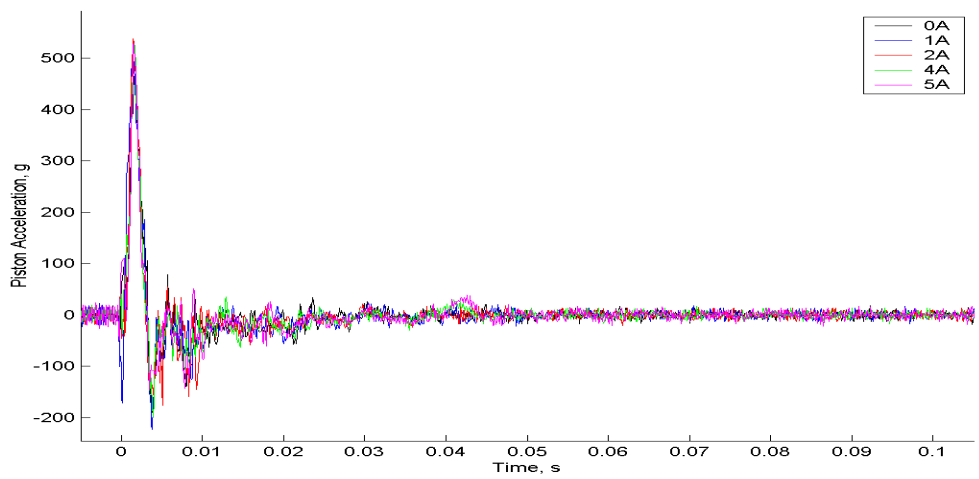


Figure A-30. Piston acceleration versus the time from the initial contact

Test 3: Mono-tube MR Damper Subject to 22 ft/s Impact

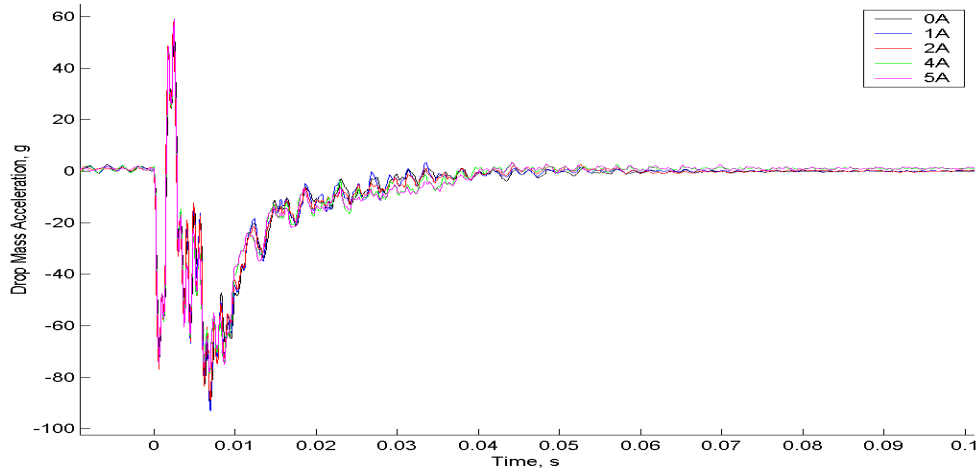


Figure A-31. Acceleration of the drop mass versus the time from the initial contact

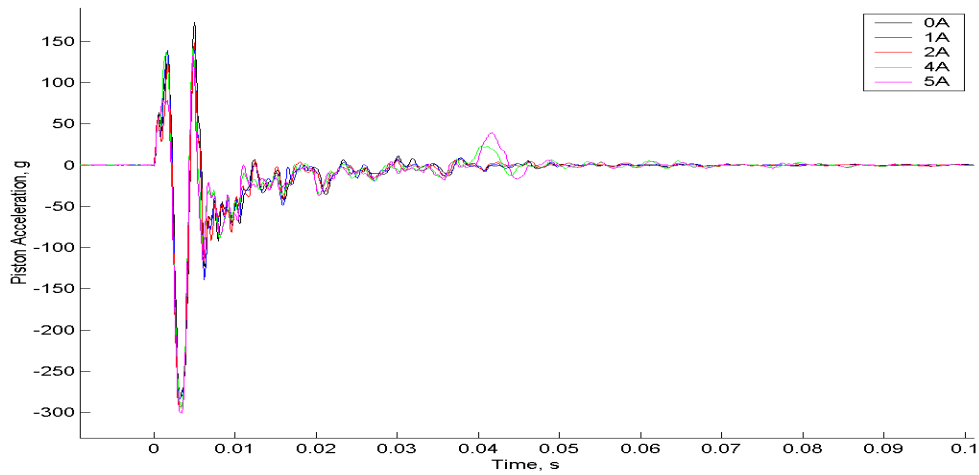


Figure A-32. Piston acceleration versus the time from the initial contact*

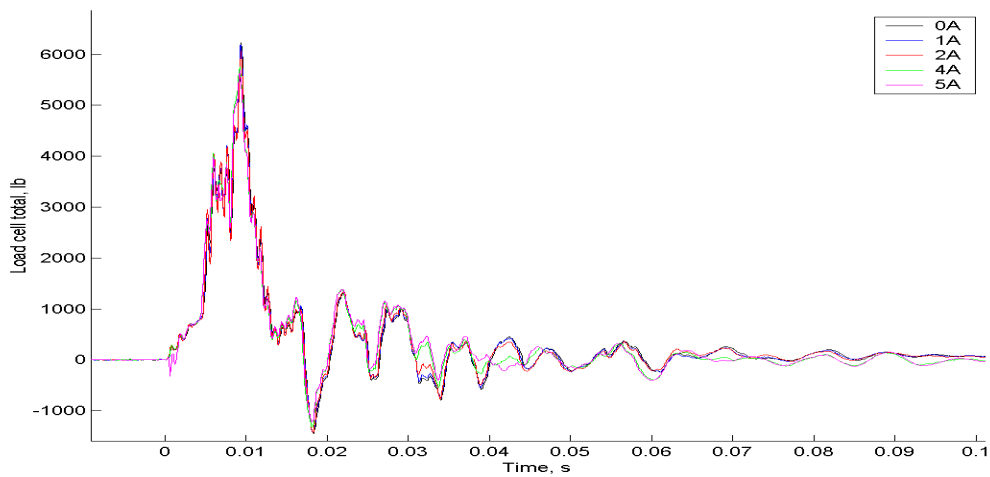


Figure A-33. Force transmitted to the base plate versus the time from the initial contact

Test 3: Mono-tube MR Damper Subject to 22 ft/s Impact

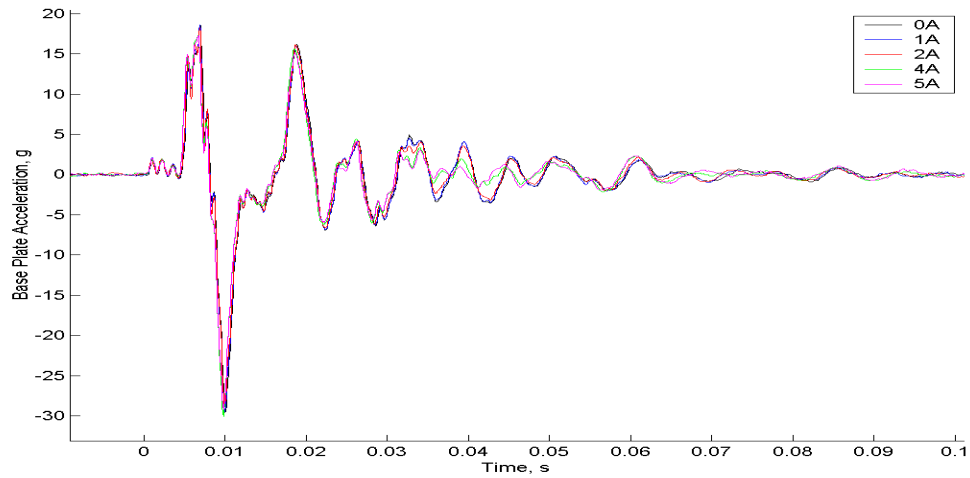


Figure A-34. Acceleration of the base plate versus the time from the initial contact

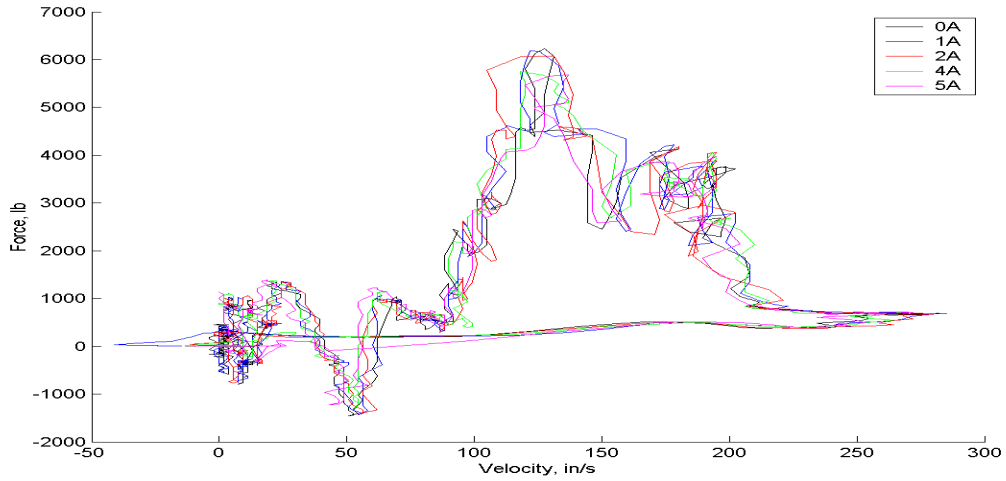


Figure A-35. Force transmitted to the base versus the piston velocity

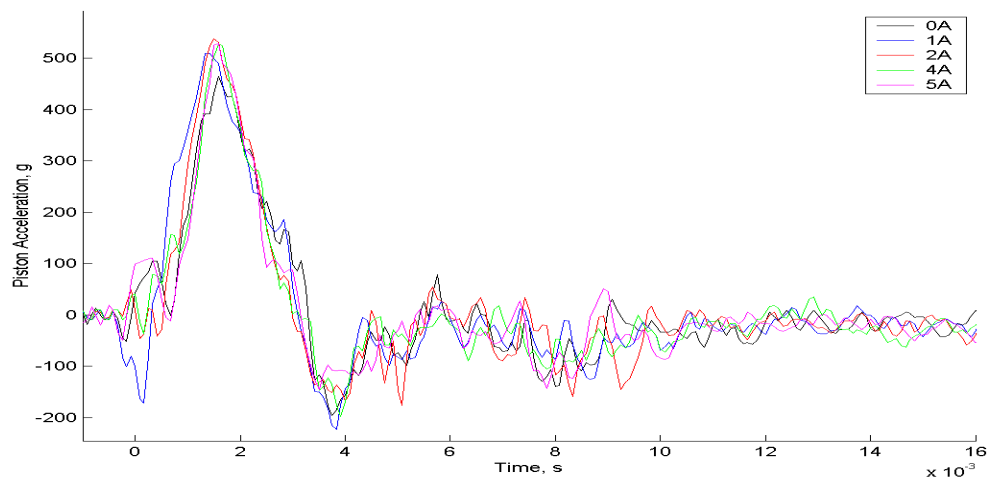


Figure A-36. Piston acceleration versus the time from the initial contact**

Mono-tube MR Damper Subject to a 19 ft/s Impact

Test 1: Mono-tube MR Damper Subject to 19 ft/s Impact

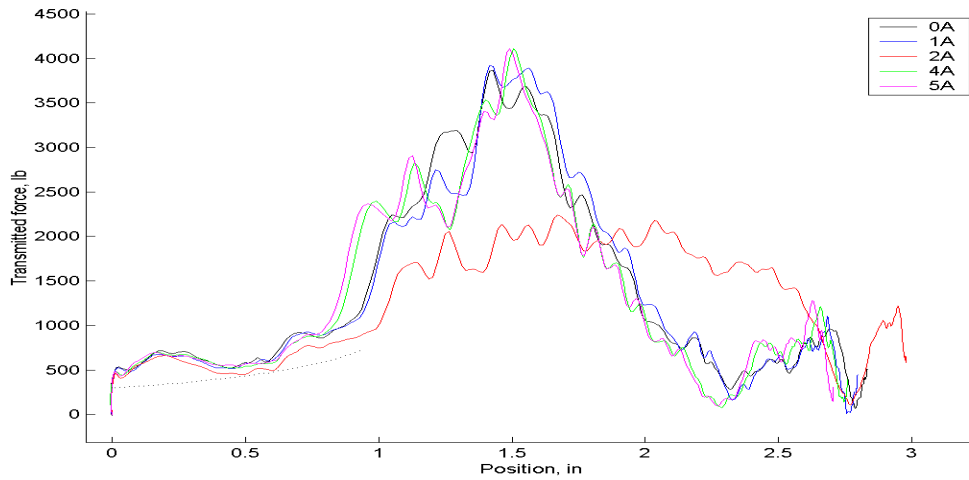


Figure A-37. Force transmitted to the base versus the piston displacement

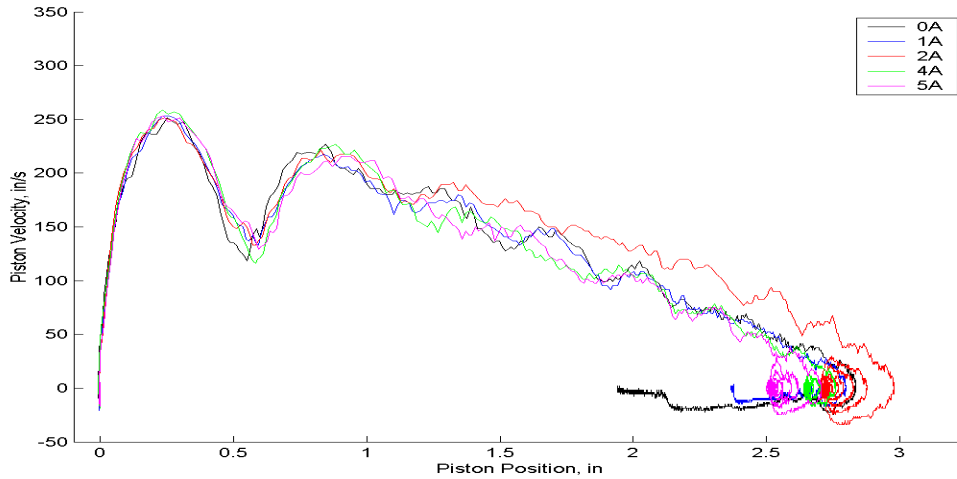


Figure A-38. Piston velocity versus the piston displacement

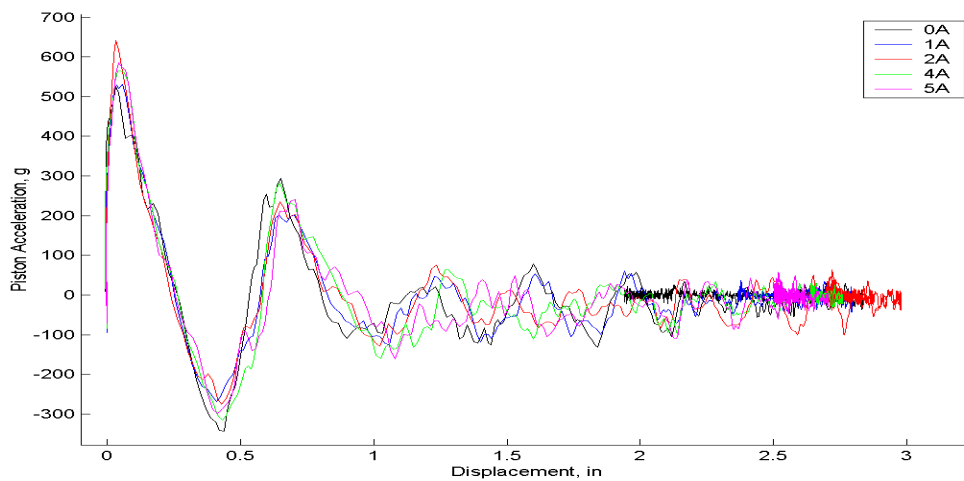


Figure A-39. Piston acceleration versus the piston displacement

Test 1: Mono-tube MR Damper Subject to 19 ft/s Impact

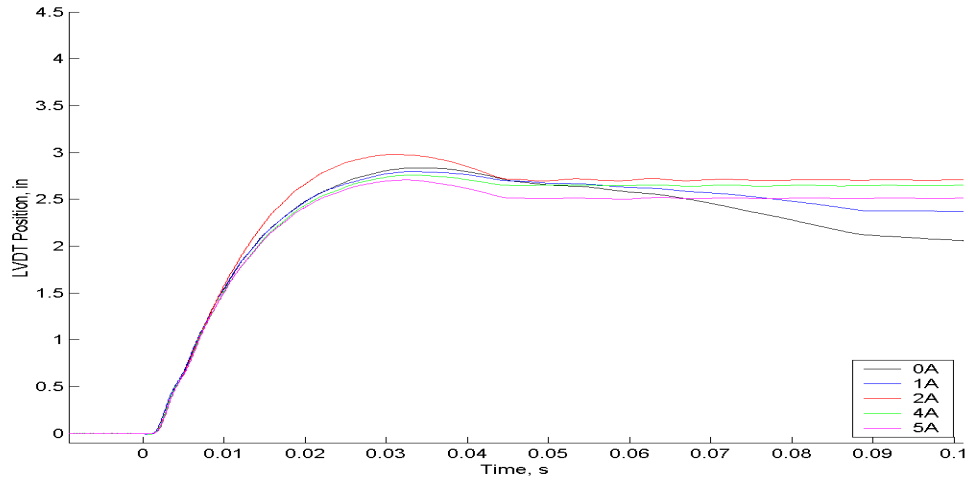


Figure A-40. Piston displacement versus the time from the initial contact

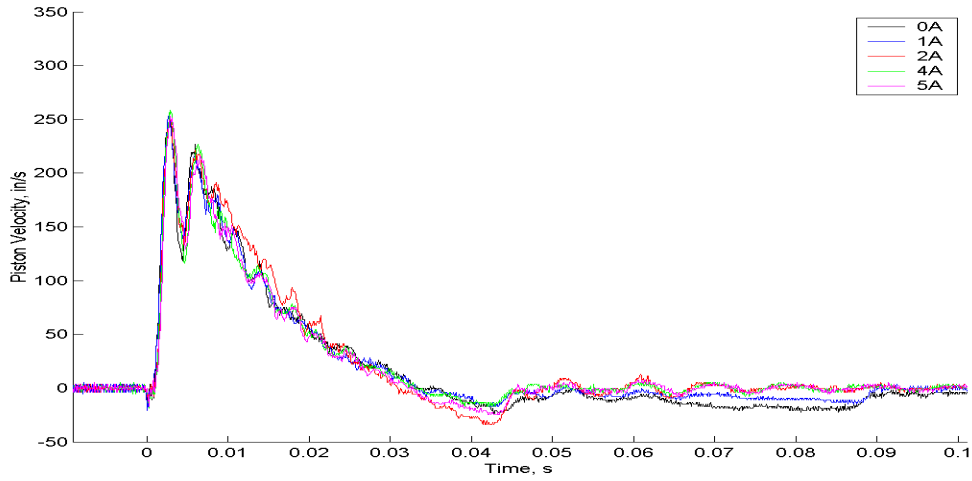


Figure A-41. Piston velocity versus the time from the initial contact

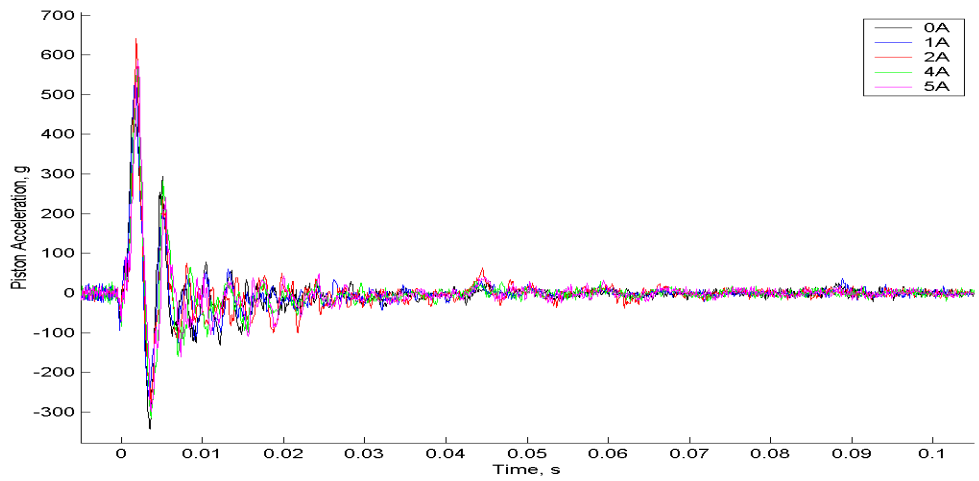


Figure A-42. Piston acceleration versus the time from the initial contact

Test 1: Mono-tube MR Damper Subject to 19 ft/s Impact

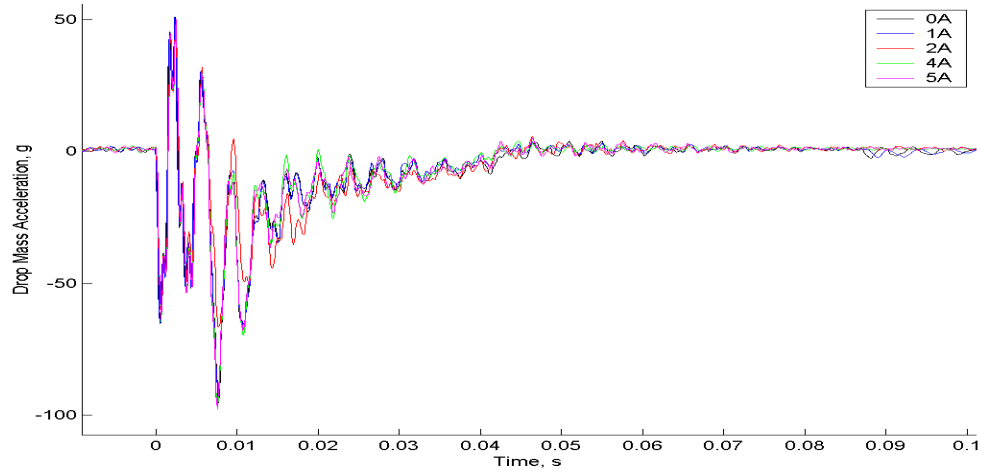


Figure A-43. Acceleration of the drop mass versus the time from the initial contact

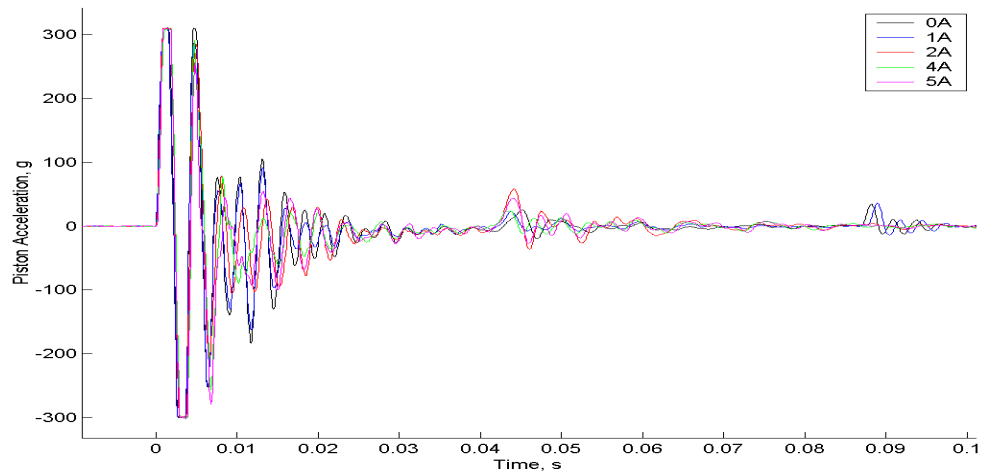


Figure A-44. Piston acceleration versus the time from the initial contact*

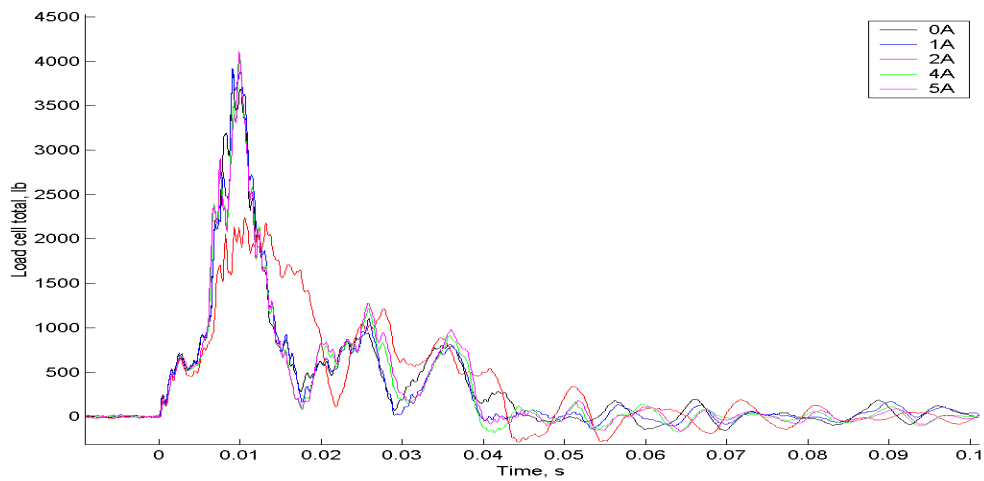


Figure A-45. Force transmitted to the base plate versus the time from the initial contact

Test 1: Mono-tube MR Damper Subject to 19 ft/s Impact

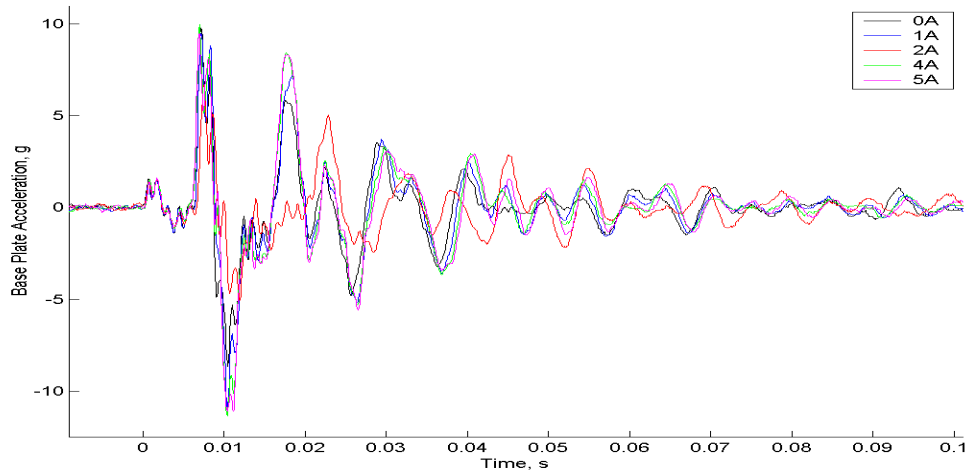


Figure A-46. Acceleration of the base plate versus the time from the initial contact

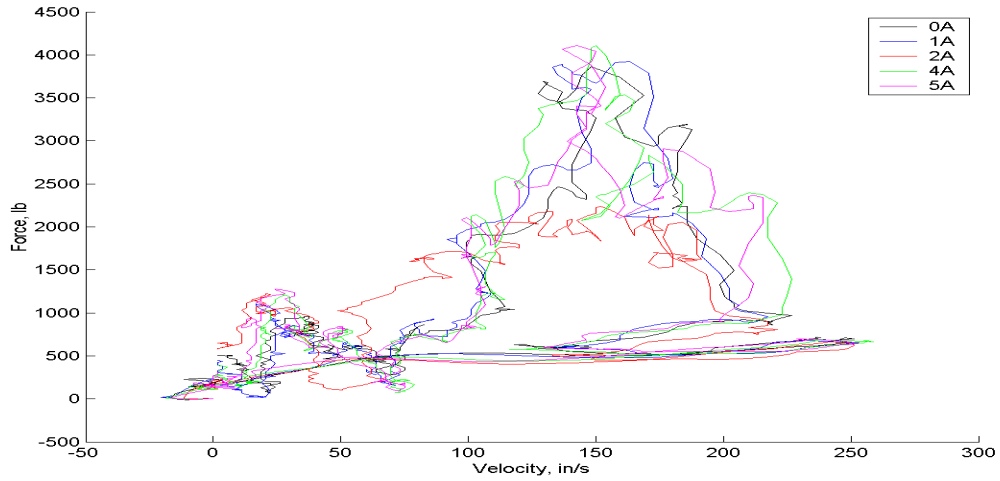


Figure A-47. Force transmitted to the base versus the piston velocity

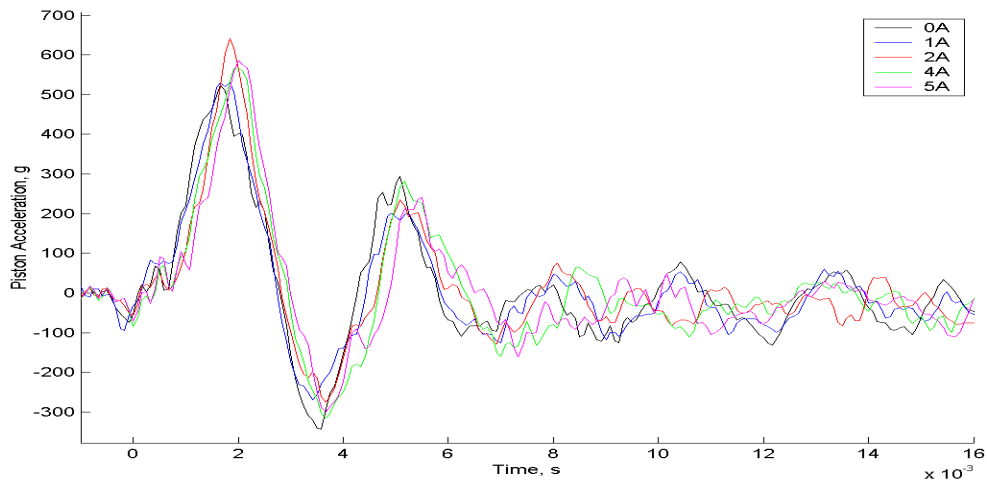


Figure A-48. Piston acceleration versus the time from the initial contact**

Test 2: Mono-tube MR Damper Subject to 19 ft/s Impact

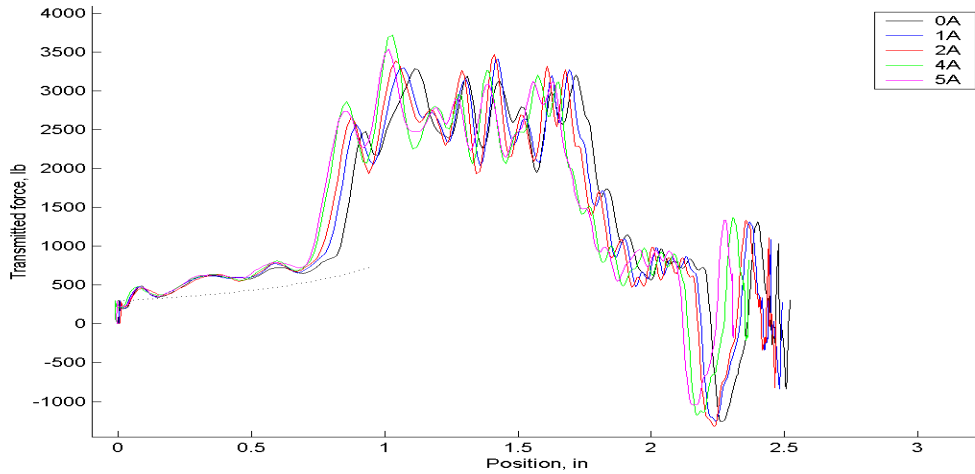


Figure A-49. Force transmitted to the base versus the piston displacement

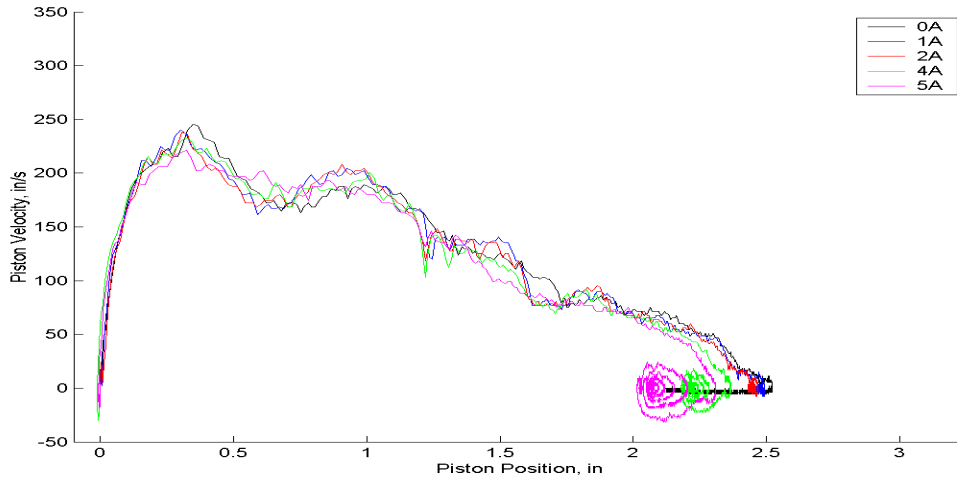


Figure A-50. Piston velocity versus the piston displacement

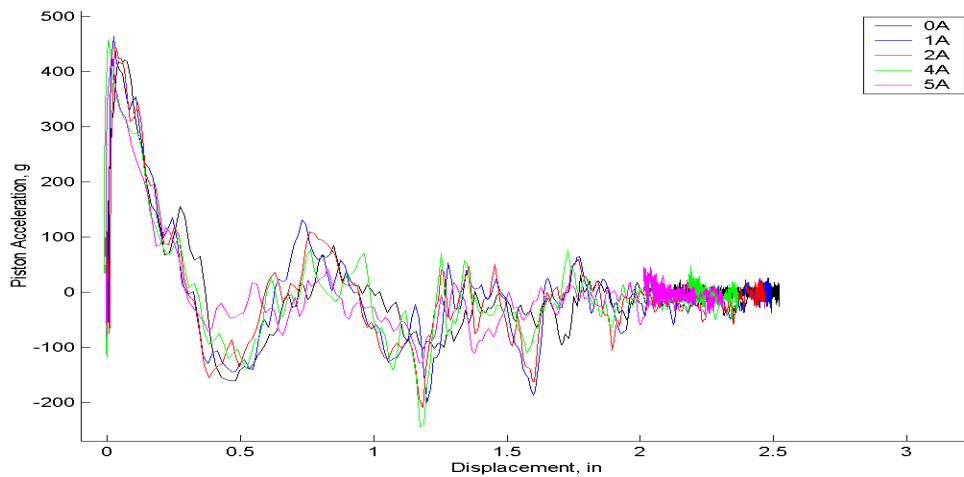


Figure A-51. Piston acceleration versus the piston displacement

Test 2: Mono-tube MR Damper Subject to 19 ft/s Impact

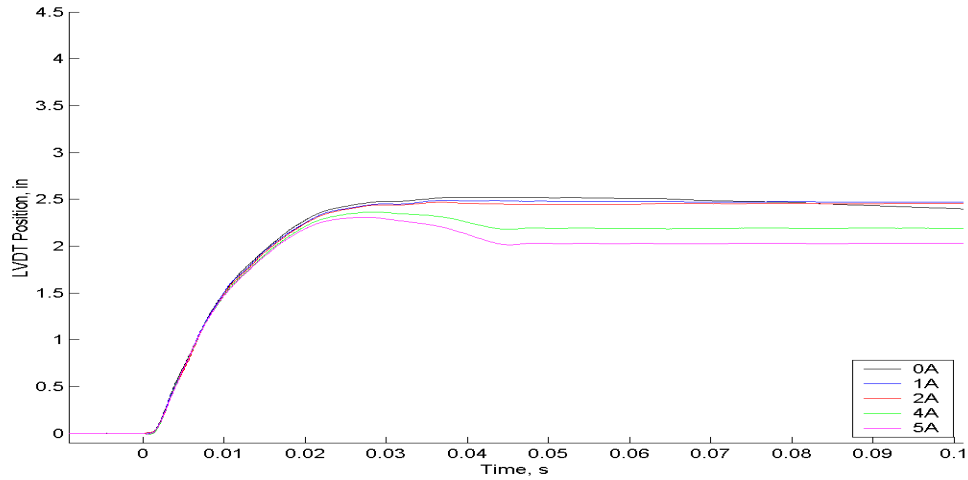


Figure A-52. Piston displacement versus the time from the initial contact

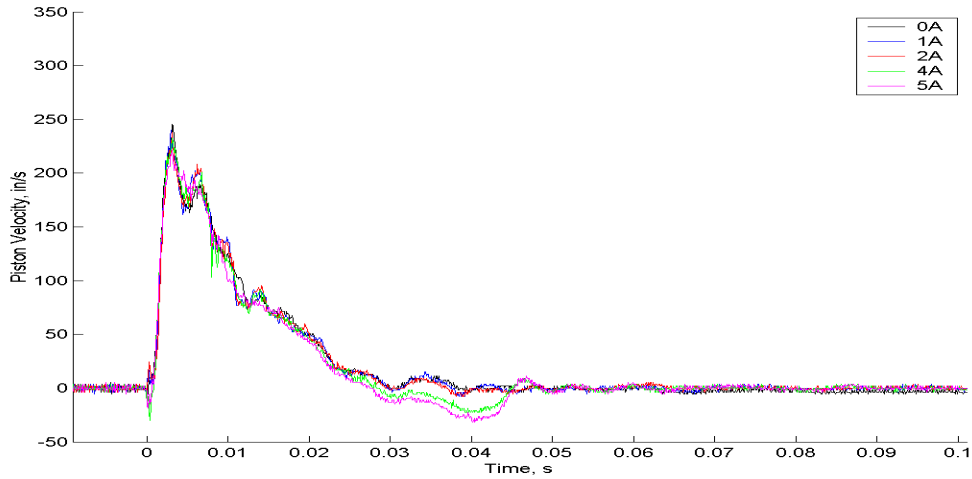


Figure A-53. Piston velocity versus the time from the initial contact

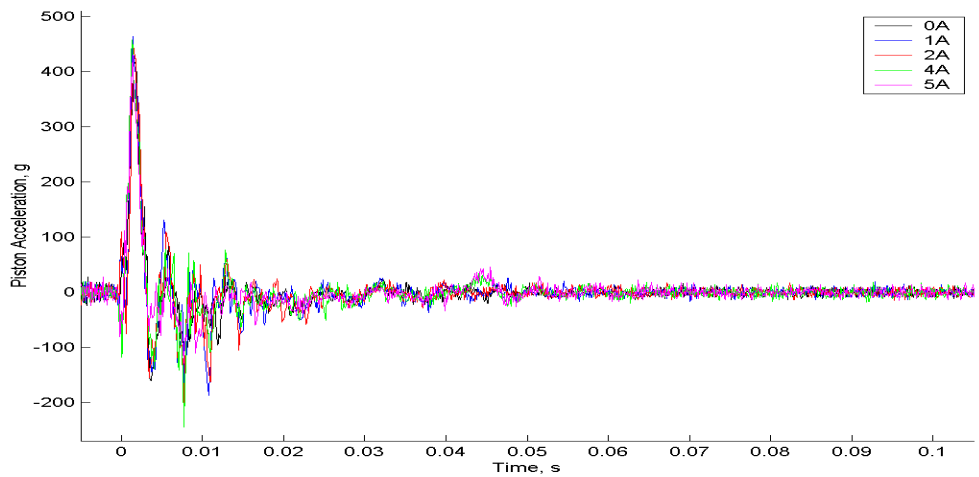


Figure A-54. Piston acceleration versus the time from the initial contact

Test 2: Mono-tube MR Damper Subject to 19 ft/s Impact

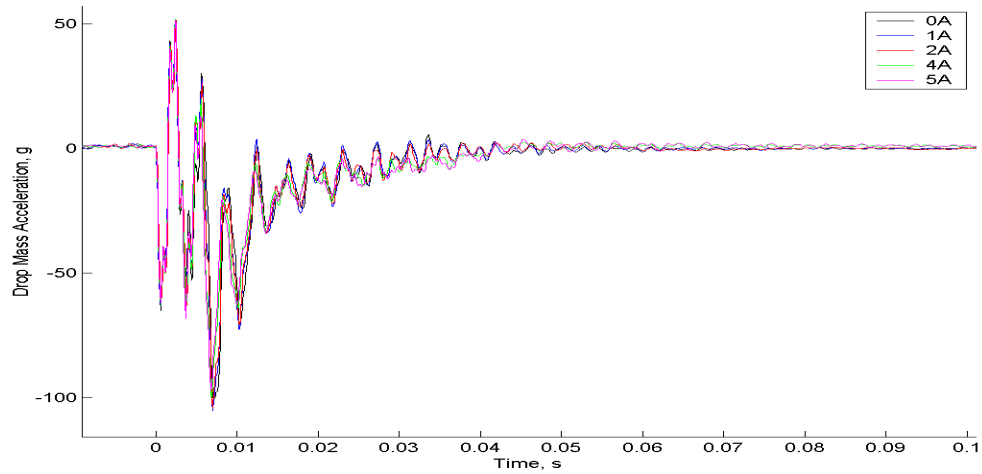


Figure A-55. Acceleration of the drop mass versus the time from the initial contact

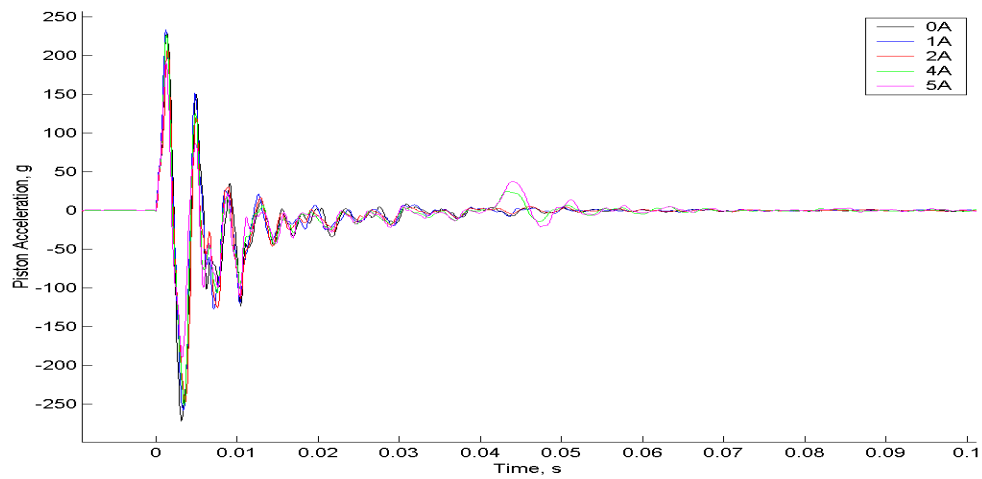


Figure A-56. Piston acceleration versus the time from the initial contact*

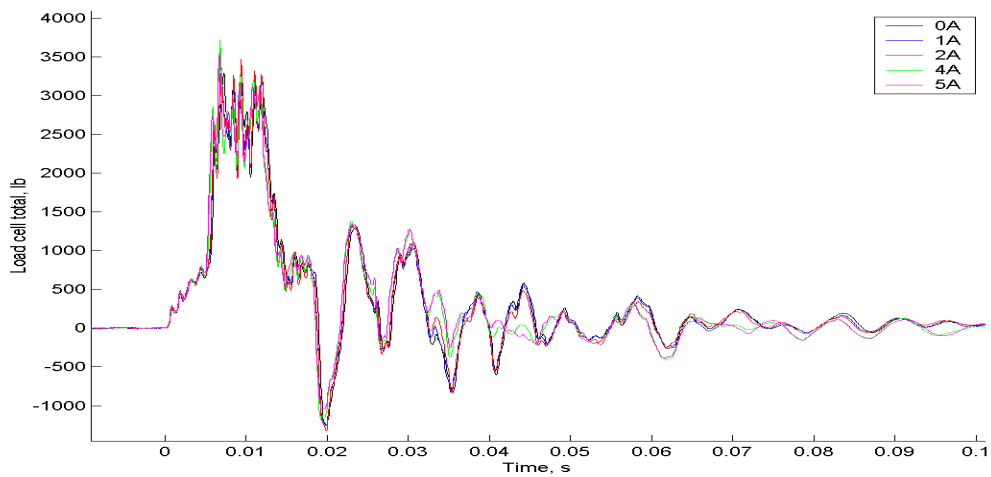


Figure A-57. Force transmitted to the base plate versus the time from the initial contact

Test 2: Mono-tube MR Damper Subject to 19 ft/s Impact

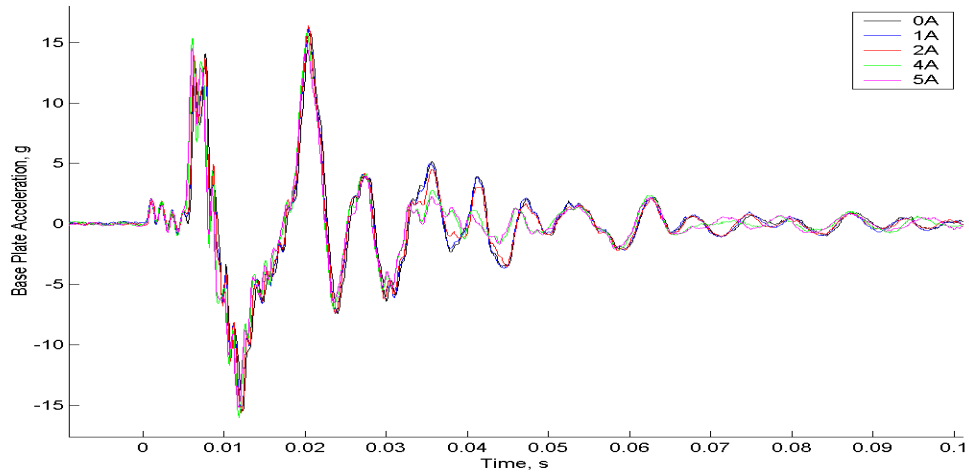


Figure A-58. Acceleration of the base plate versus the time from the initial contact

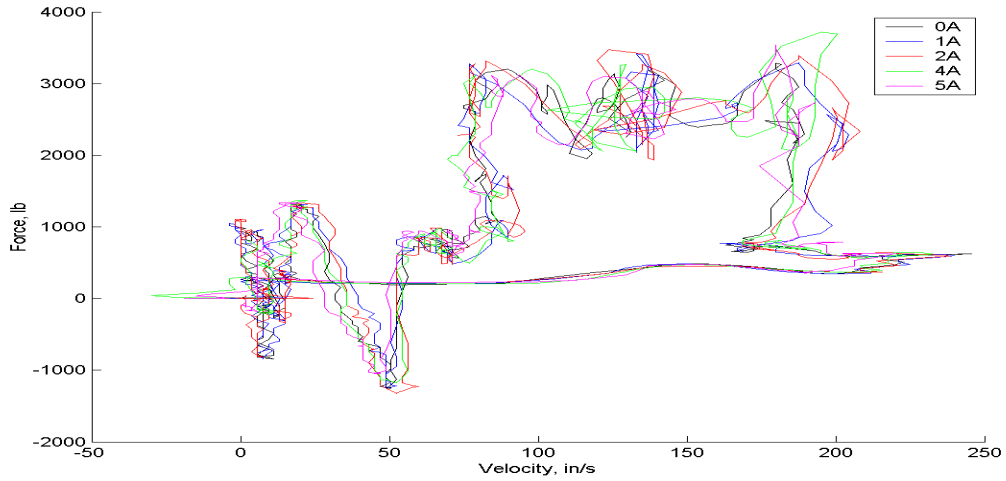


Figure A-59. Force transmitted to the base versus the piston velocity

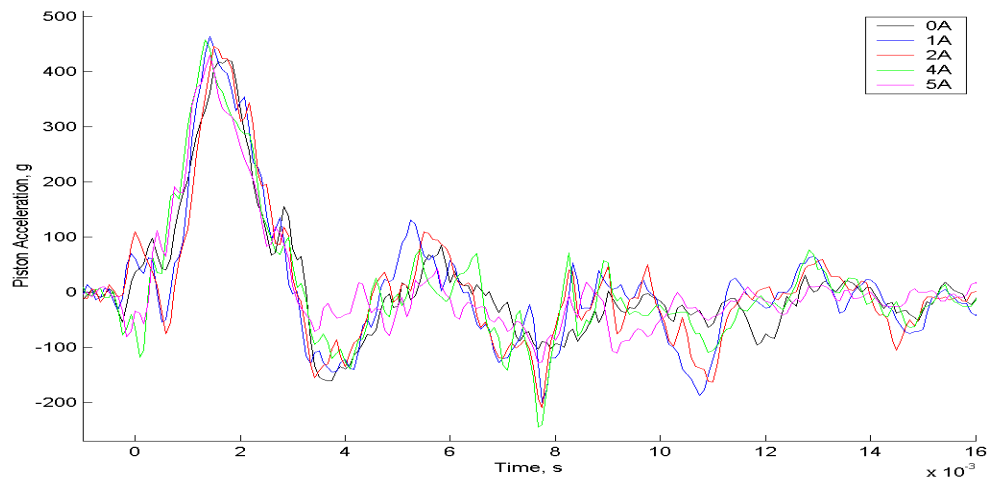


Figure A-60. Piston acceleration versus the time from the initial contact**

Test 3: Mono-tube MR Damper Subject to 19 ft/s Impact

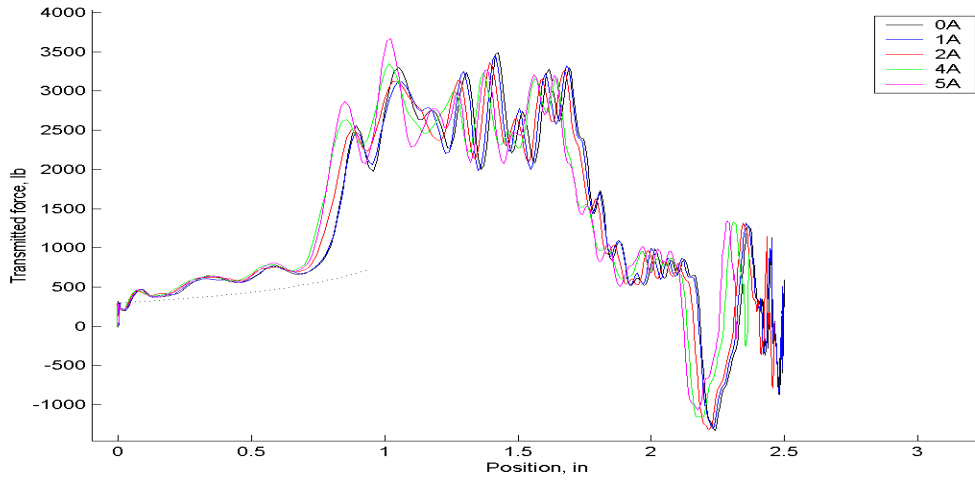


Figure A-61. Force transmitted to the base versus the piston displacement

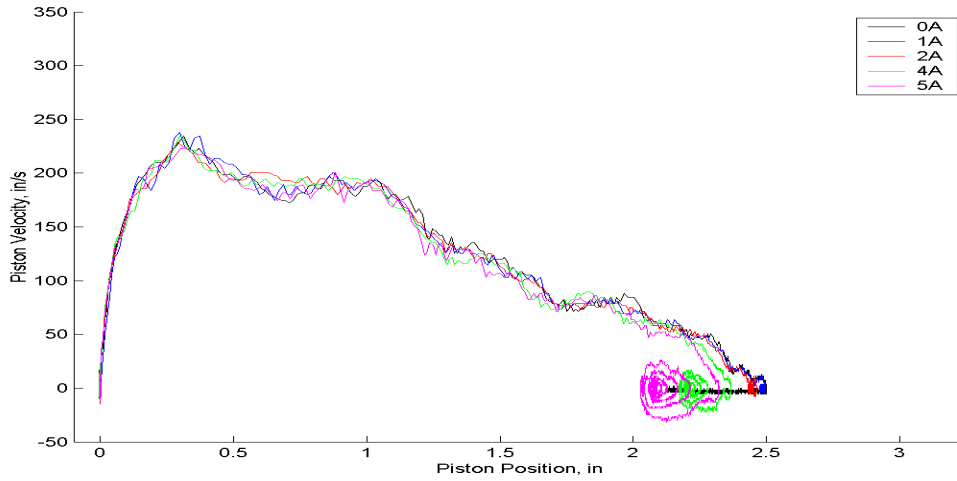


Figure A-62. Piston velocity versus the piston displacement

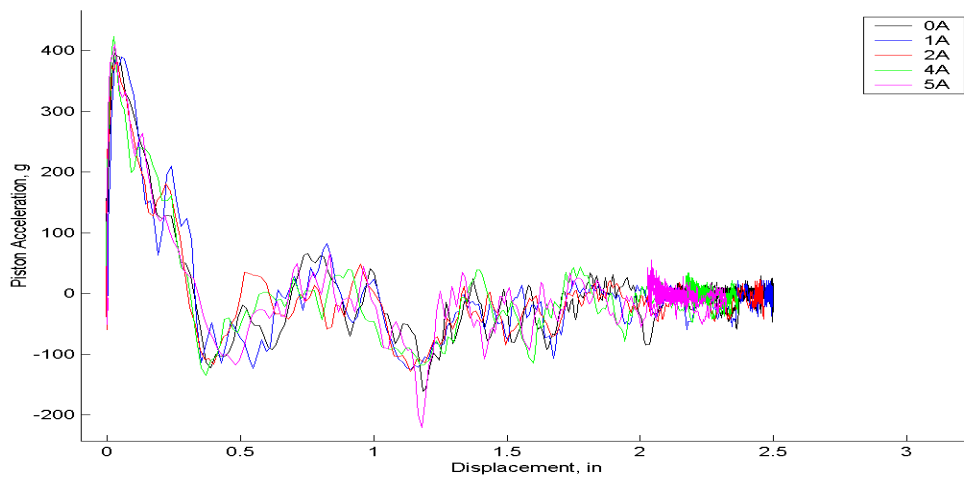


Figure A-63. Piston acceleration versus the piston displacement

Test 3: Mono-tube MR Damper Subject to 19 ft/s Impact

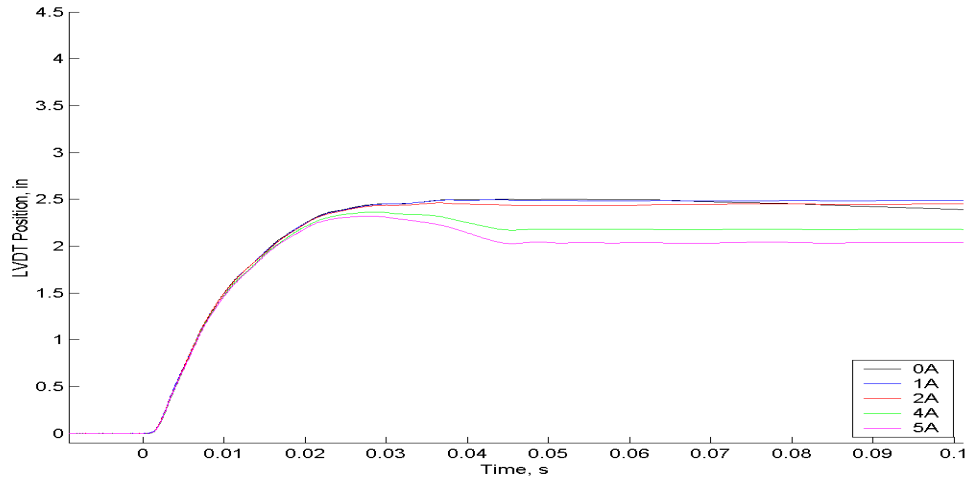


Figure A-64. Piston displacement versus the time from the initial contact

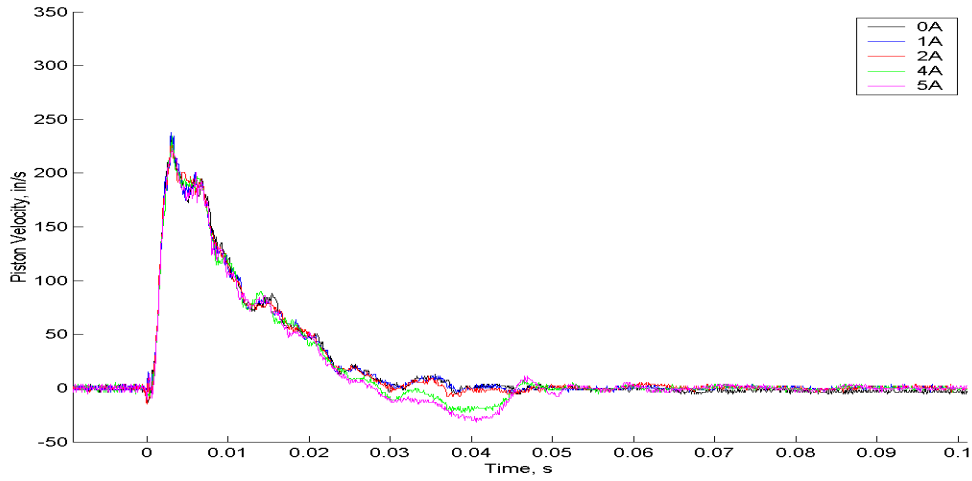


Figure A-65. Piston velocity versus the time from the initial contact

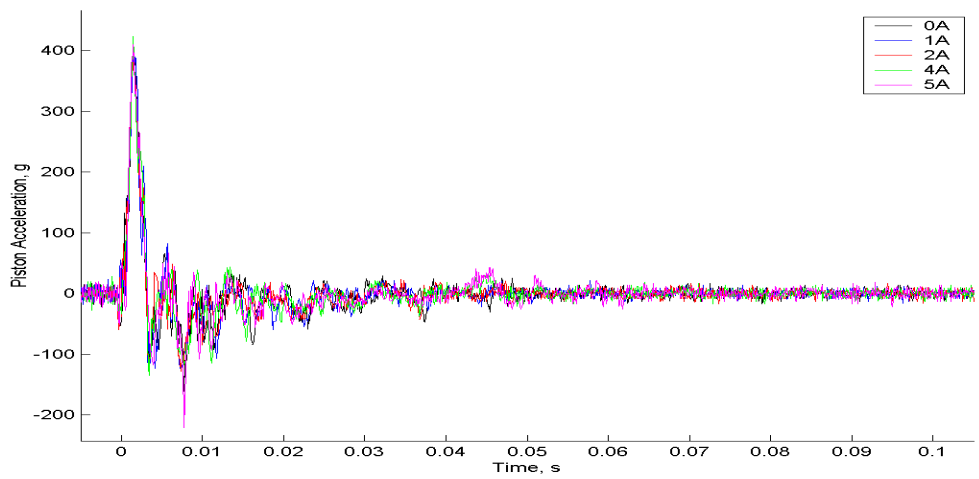


Figure A-66. Piston acceleration versus the time from the initial contact

Test 3: Mono-tube MR Damper Subject to 19 ft/s Impact

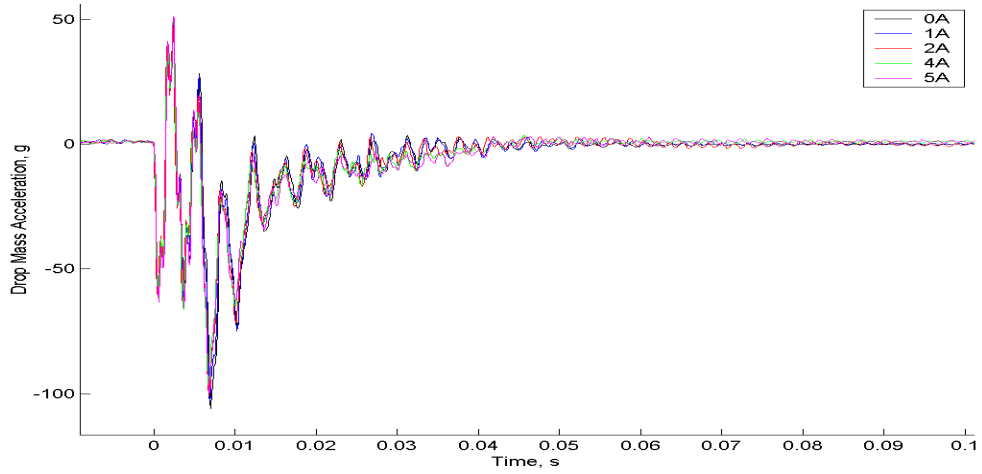


Figure A-67. Acceleration of the drop mass versus the time from the initial contact

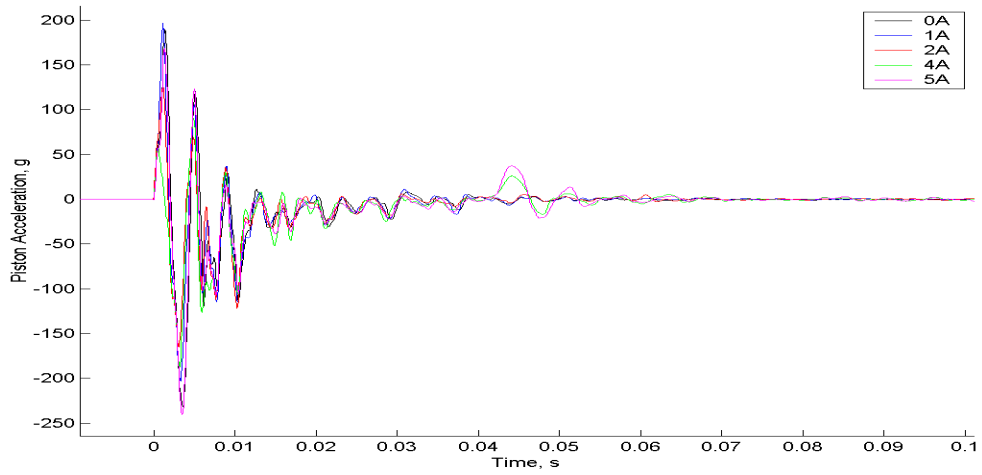


Figure A-68. Piston acceleration versus the time from the initial contact*

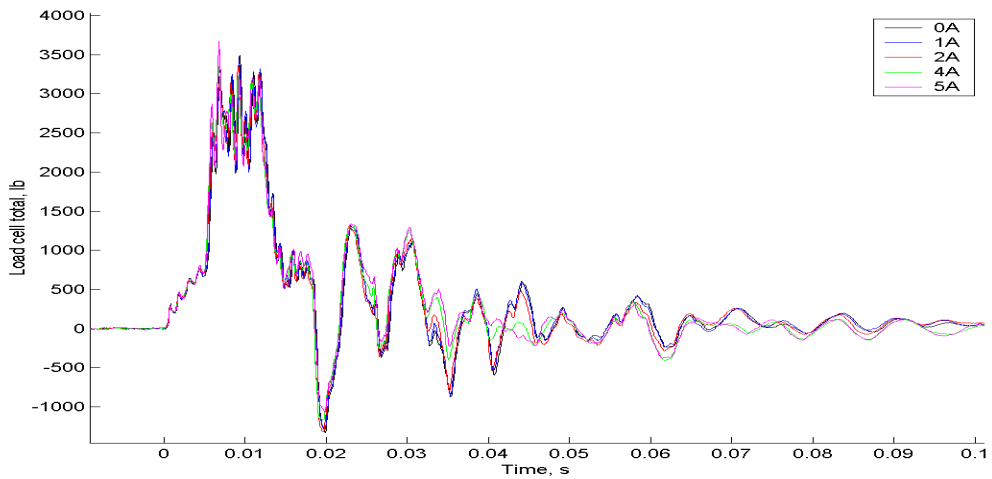


Figure A-69. Force transmitted to the base plate versus the time from the initial contact

Test 3: Mono-tube MR Damper Subject to 19 ft/s Impact

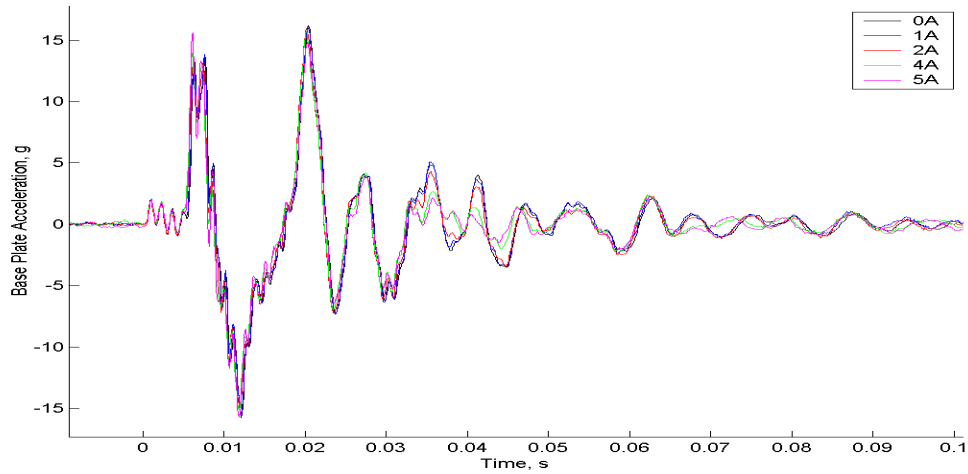


Figure A-70. Acceleration of the base plate versus the time from the initial contact

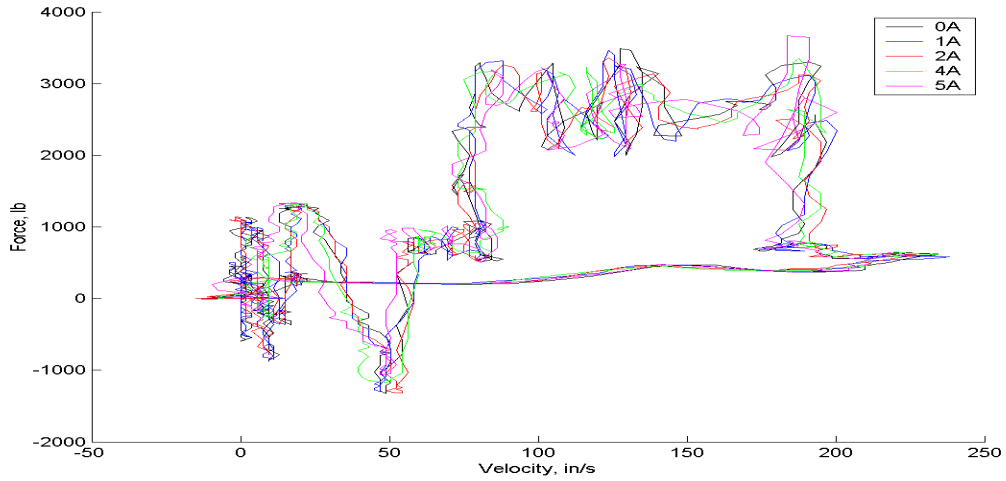


Figure A-71. Force transmitted to the base versus the piston velocity

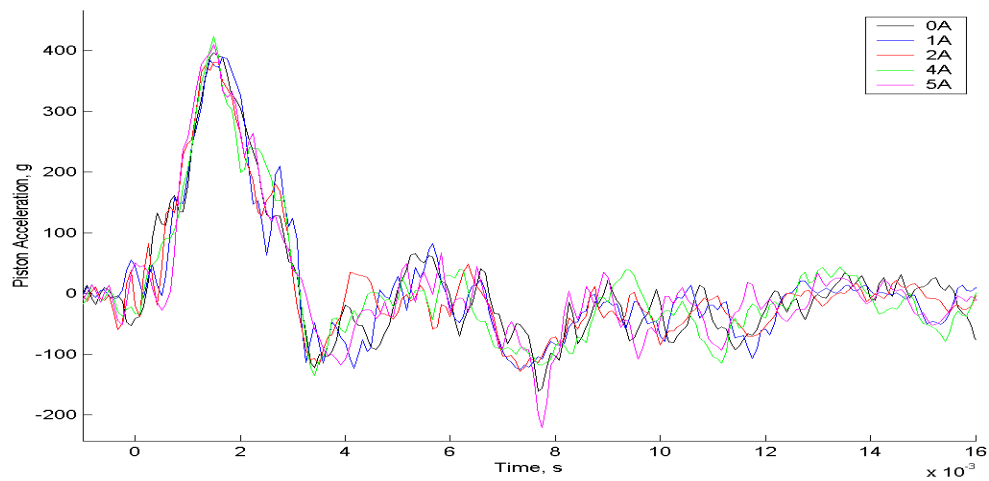


Figure A-72. Piston acceleration versus the time from the initial contact**

Mono-tube MR Damper Subject to a 15 ft/s Impact

Test 1: Mono-tube MR Damper Subject to 15 ft/s Impact

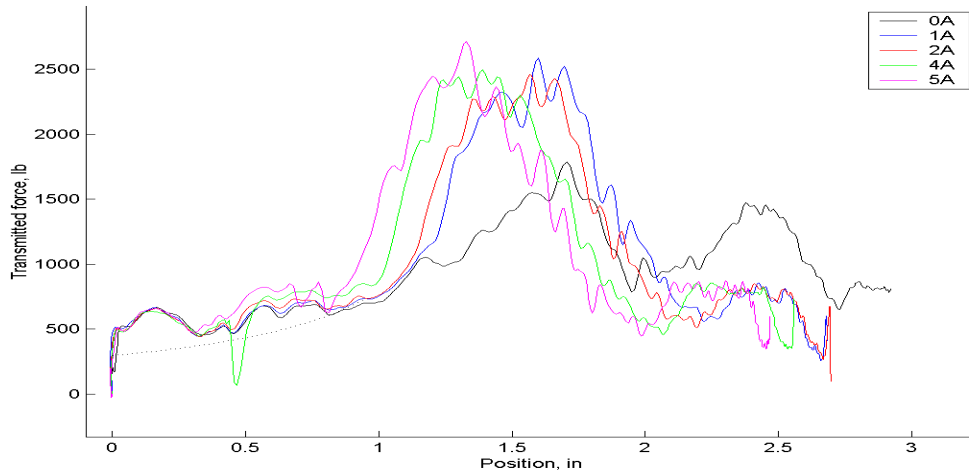


Figure A-73. Force transmitted to the base versus the piston displacement

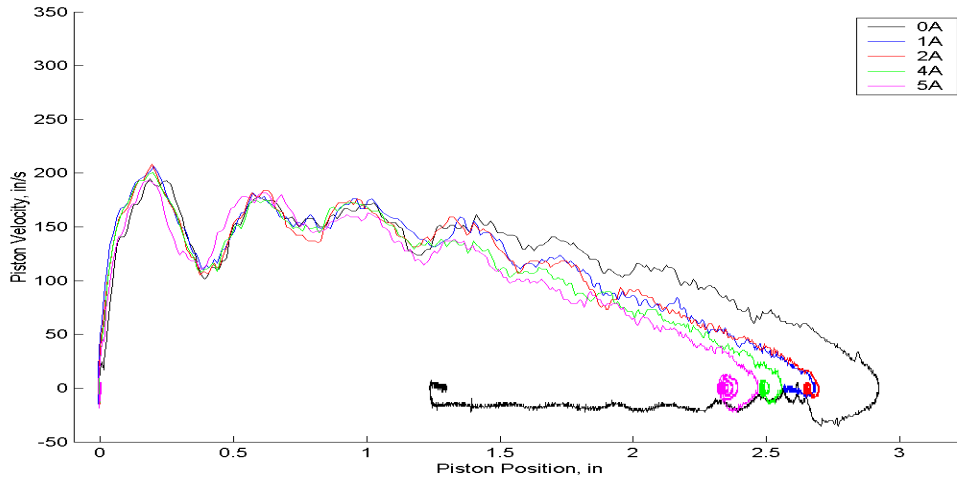


Figure A-74. Piston velocity versus the piston displacement

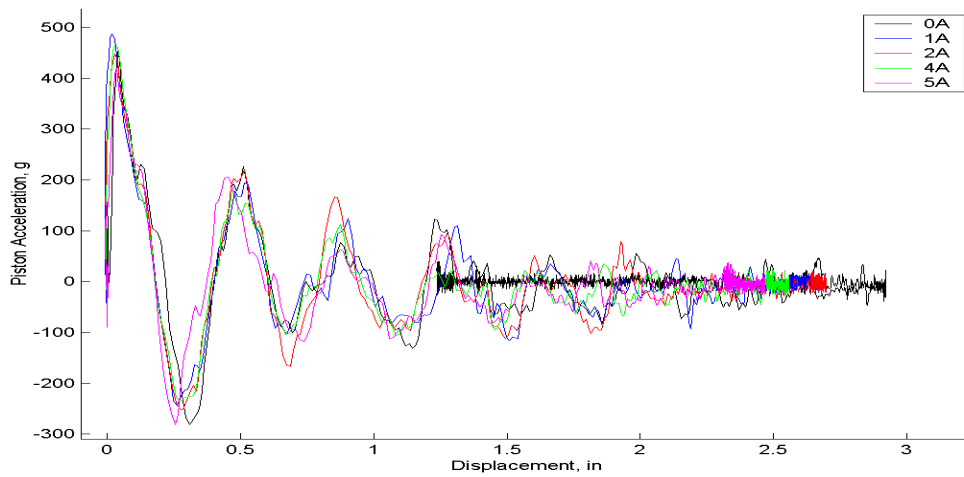


Figure A-75. Piston acceleration versus the piston displacement

Test 1: Mono-tube MR Damper Subject to 15 ft/s Impact

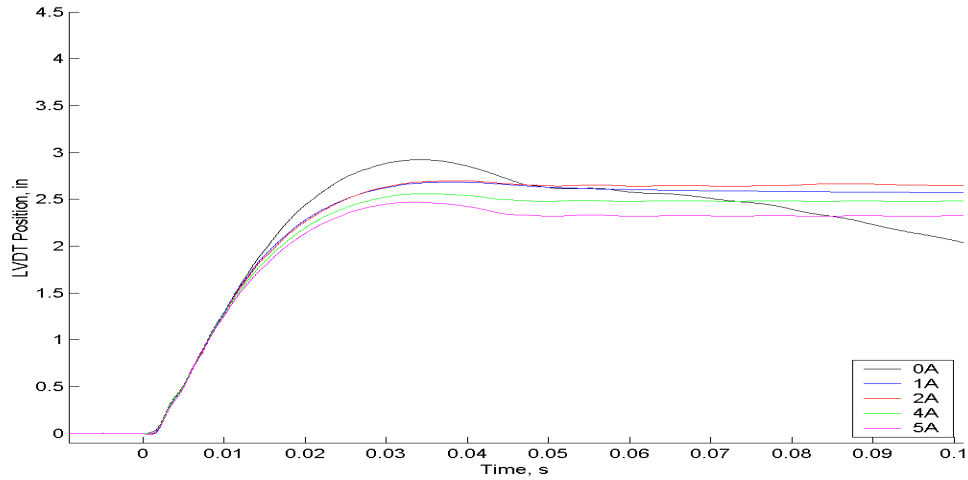


Figure A-76. Piston displacement versus the time from the initial contact

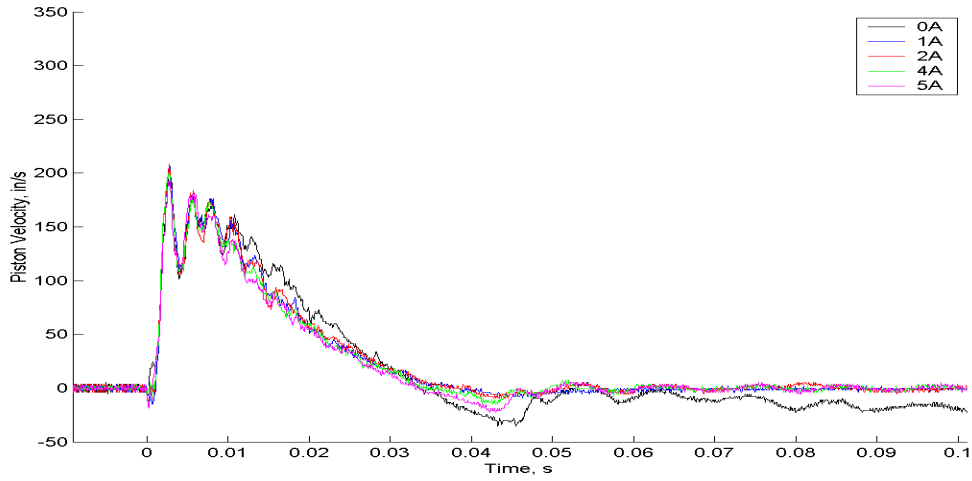


Figure A-77. Piston velocity versus the time from the initial contact

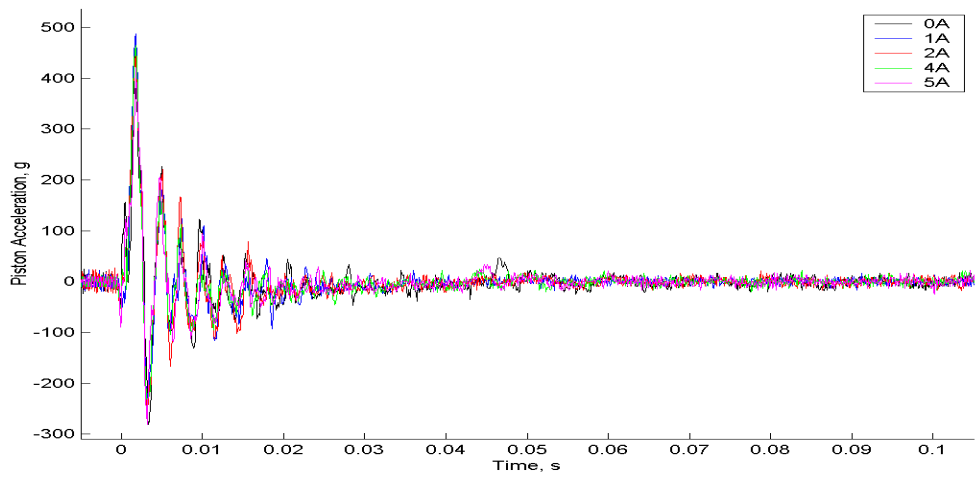


Figure A-78. Piston acceleration versus the time from the initial contact

Test 1: Mono-tube MR Damper Subject to 15 ft/s Impact

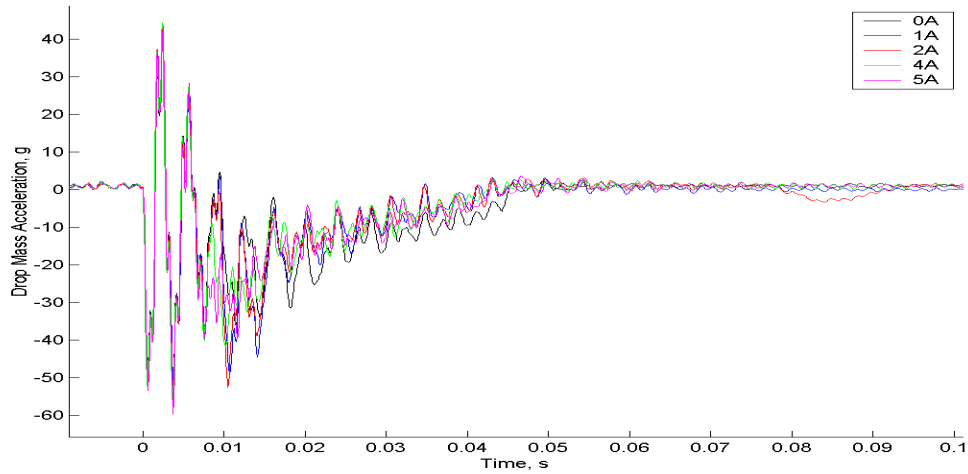


Figure A-79. Acceleration of the drop mass versus the time from the initial contact

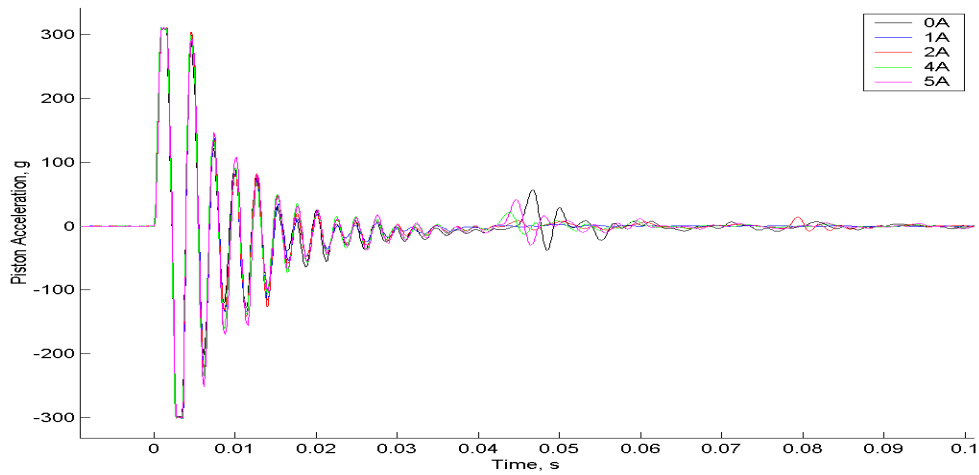


Figure A-80. Piston acceleration versus the time from the initial contact*

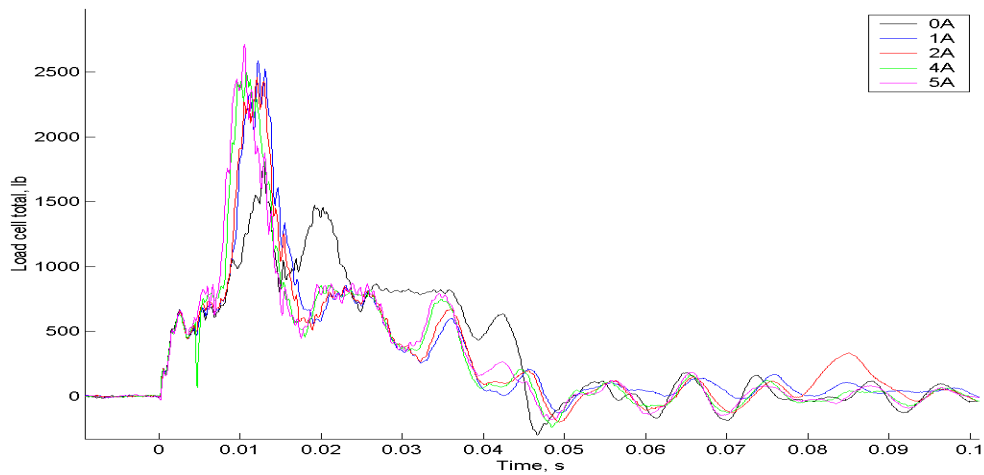


Figure A-81. Force transmitted to the base plate versus the time from the initial contact

Test 1: Mono-tube MR Damper Subject to 15 ft/s Impact

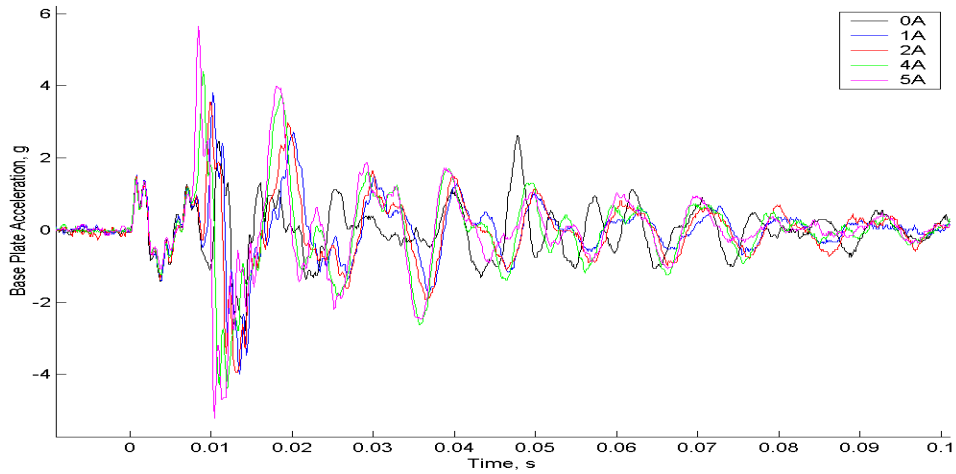


Figure A-82. Acceleration of the base plate versus the time from the initial contact

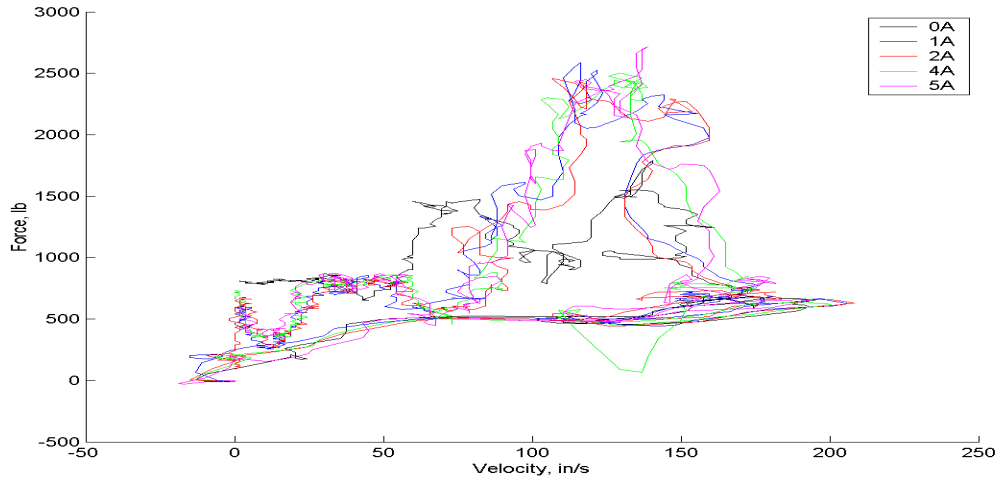


Figure A-83. Force transmitted to the base versus the piston velocity

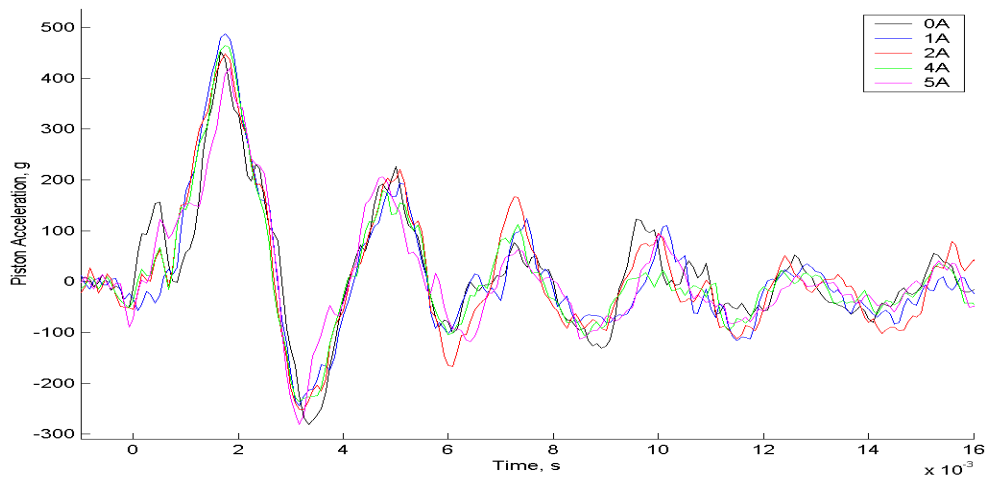


Figure A-84. Piston acceleration versus the time from the initial contact**

Test 2: Mono-tube MR Damper Subject to 15 ft/s Impact

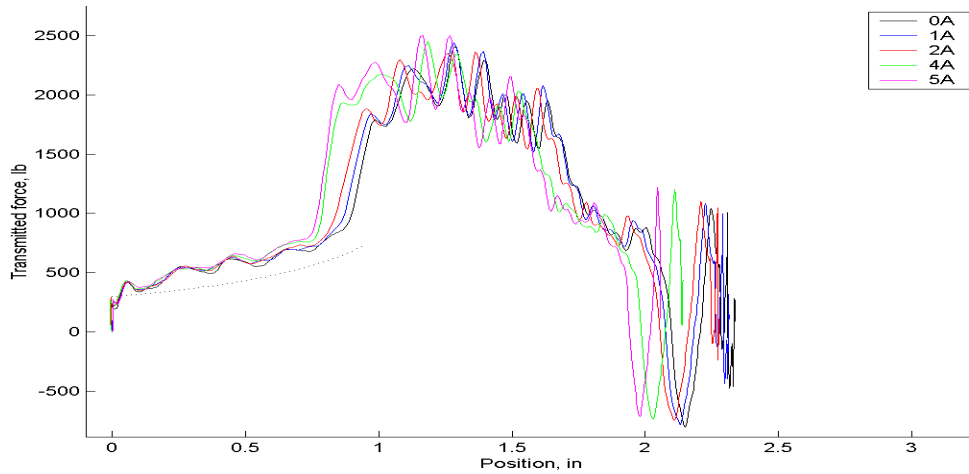


Figure A-85. Force transmitted to the base versus the piston displacement

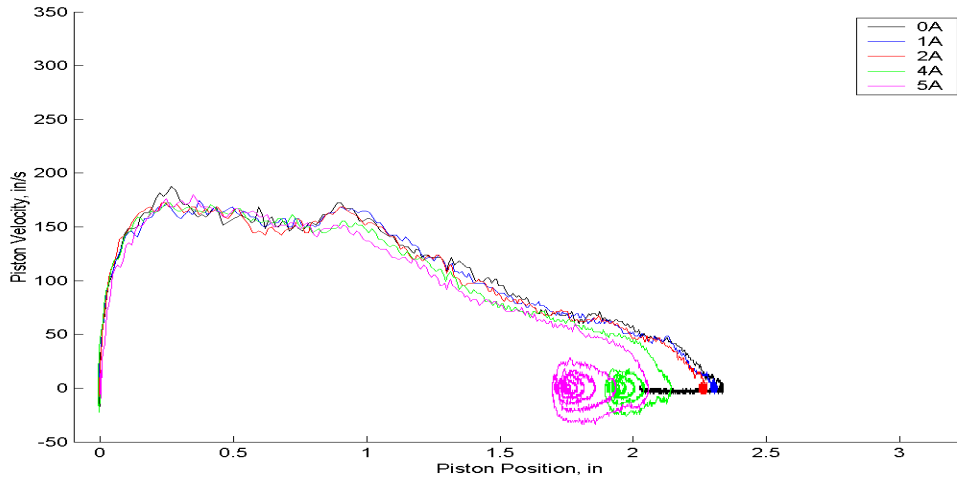


Figure A-86. Piston velocity versus the piston displacement

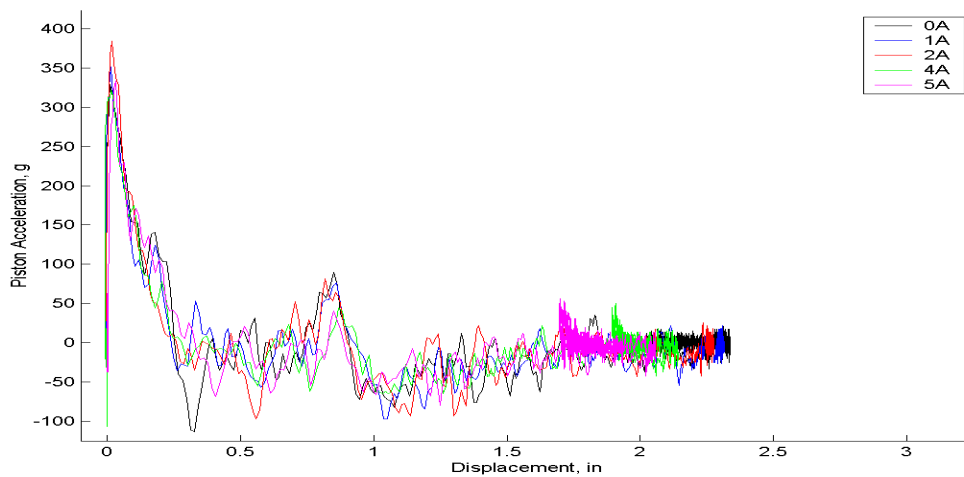


Figure A-87. Piston acceleration versus the piston displacement

Test 2: Mono-tube MR Damper Subject to 15 ft/s Impact

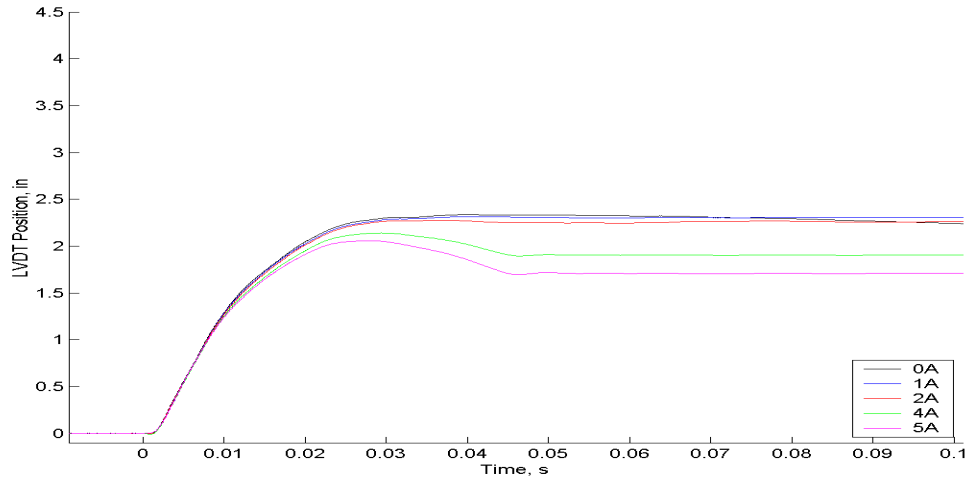


Figure A-88. Piston displacement versus the time from the initial contact

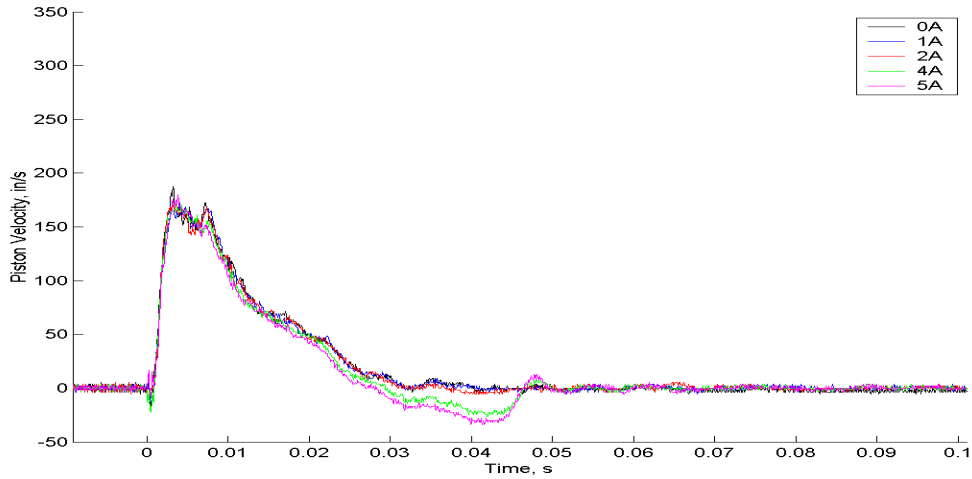


Figure A-89. Piston velocity versus the time from the initial contact

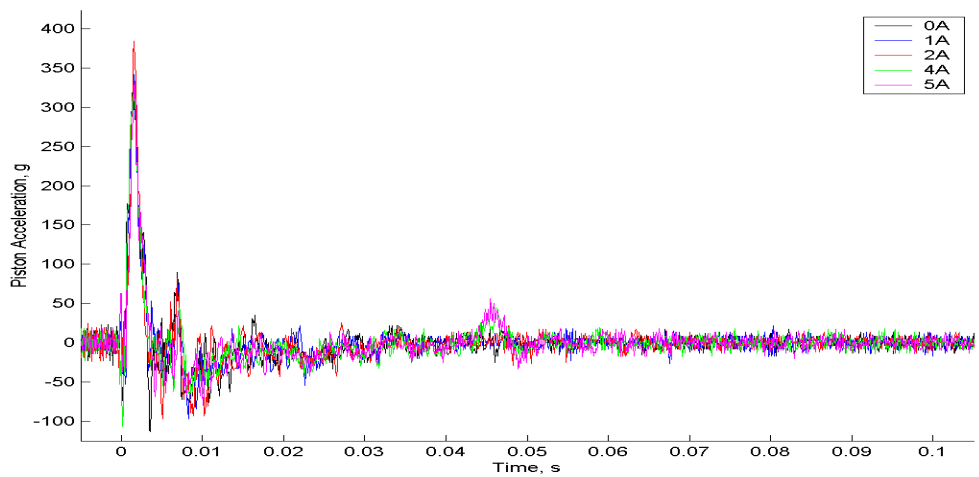


Figure A-90. Piston acceleration versus the time from the initial contact

Test 2: Mono-tube MR Damper Subject to 15 ft/s Impact

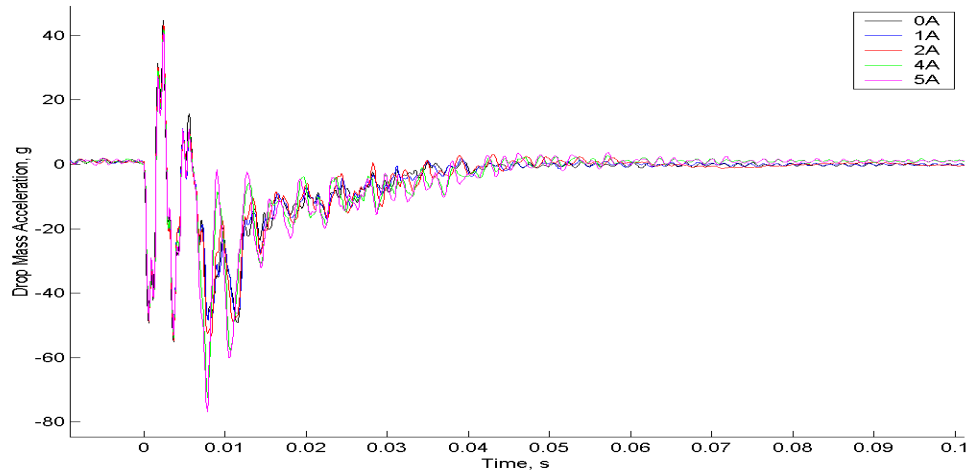


Figure A-91. Acceleration of the drop mass versus the time from the initial contact

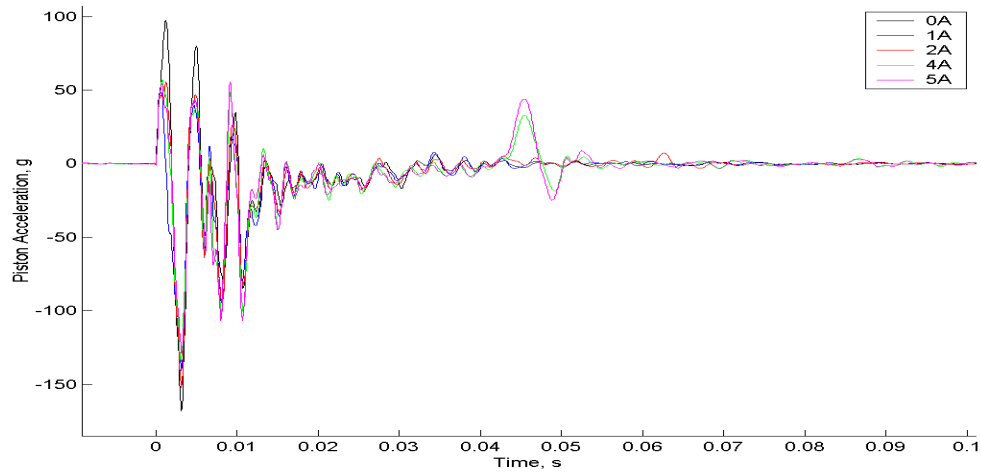


Figure A-92. Piston acceleration versus the time from the initial contact*

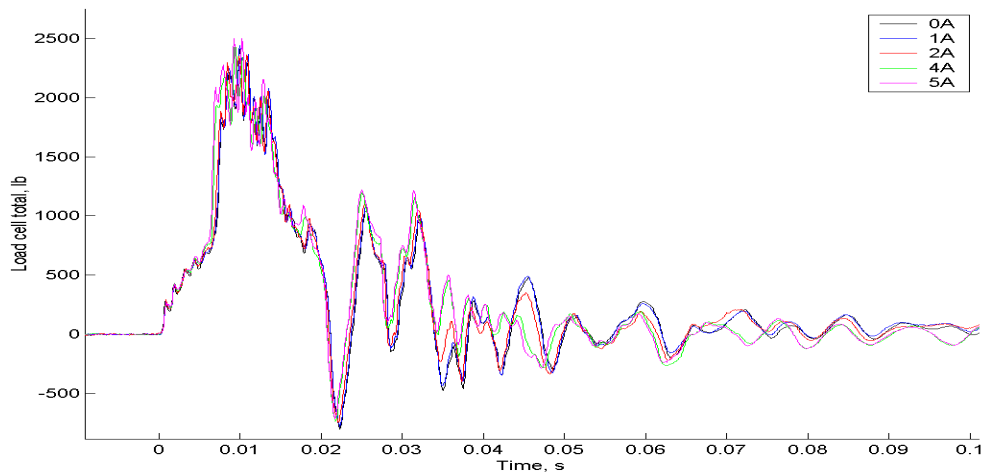


Figure A-93. Force transmitted to the base plate versus the time from the initial contact

Test 2: Mono-tube MR Damper Subject to 15 ft/s Impact

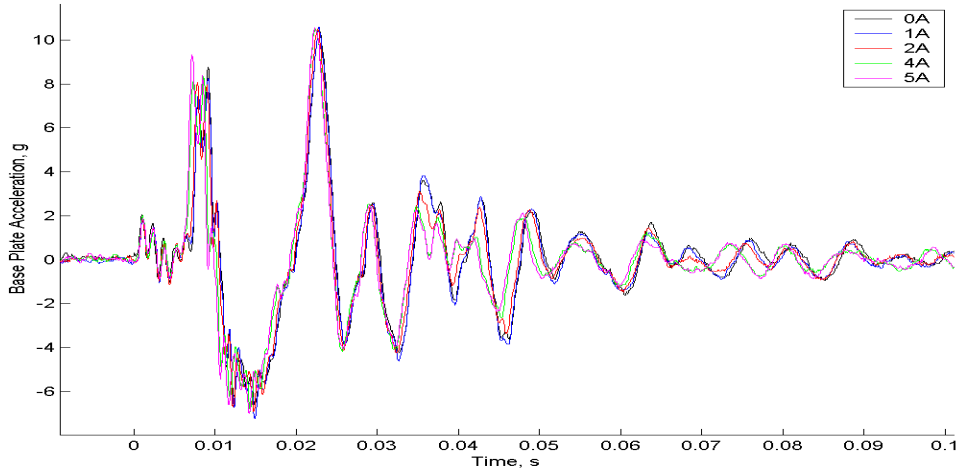


Figure A-94. Acceleration of the base plate versus the time from the initial contact

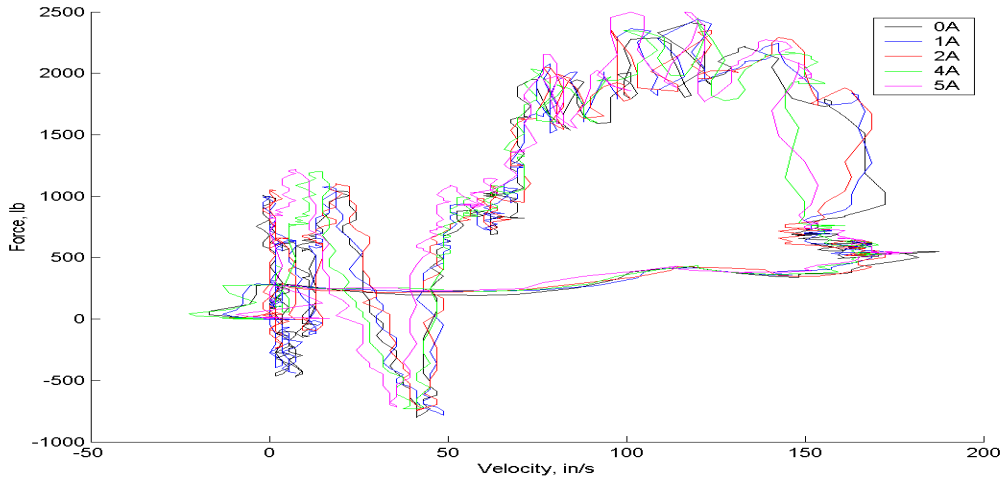


Figure A-95. Force transmitted to the base versus the piston velocity

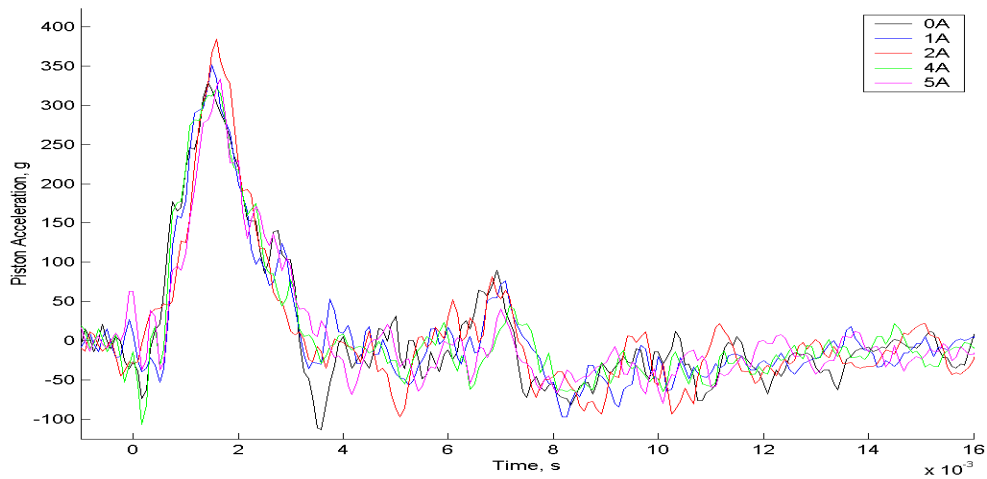


Figure A-96. Piston acceleration versus the time from the initial contact**

Test 3: Mono-tube MR Damper Subject to 15 ft/s Impact

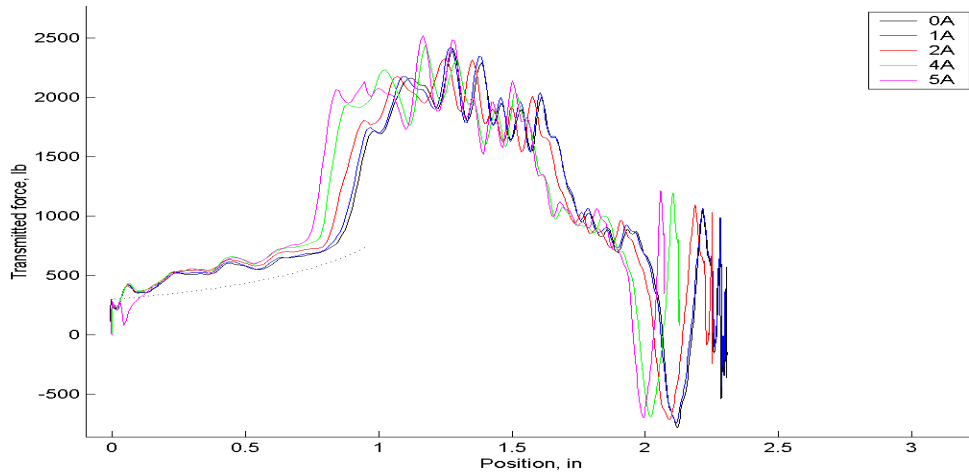


Figure A-97. Force transmitted to the base versus the piston displacement

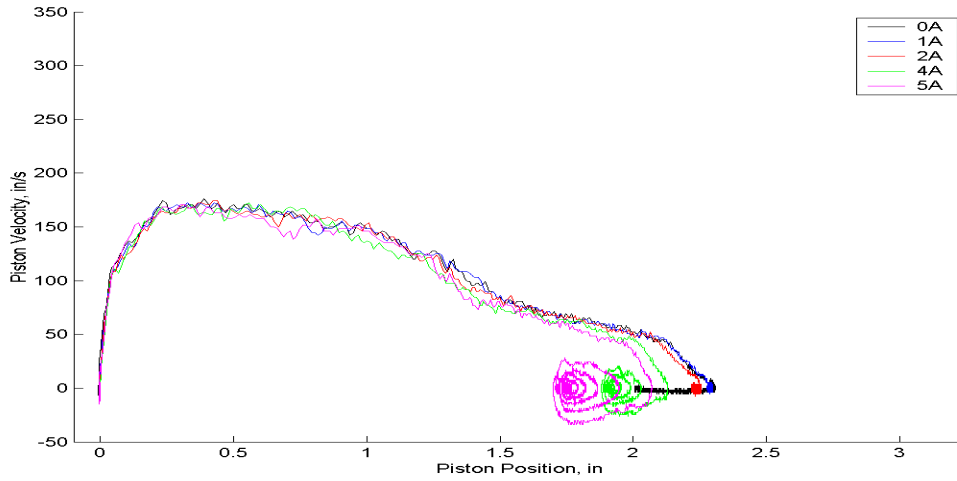


Figure A-98. Piston velocity versus the piston displacement

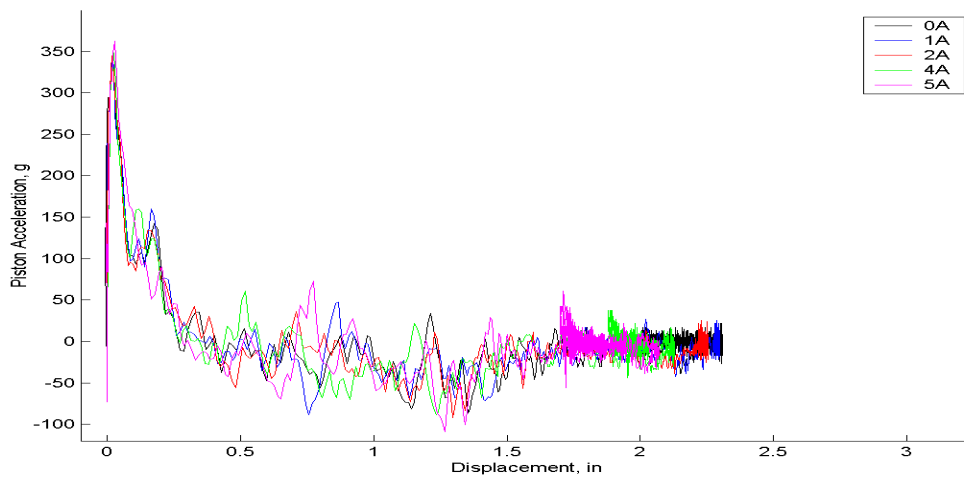


Figure A-99. Piston acceleration versus the piston displacement

Test 3: Mono-tube MR Damper Subject to 15 ft/s Impact

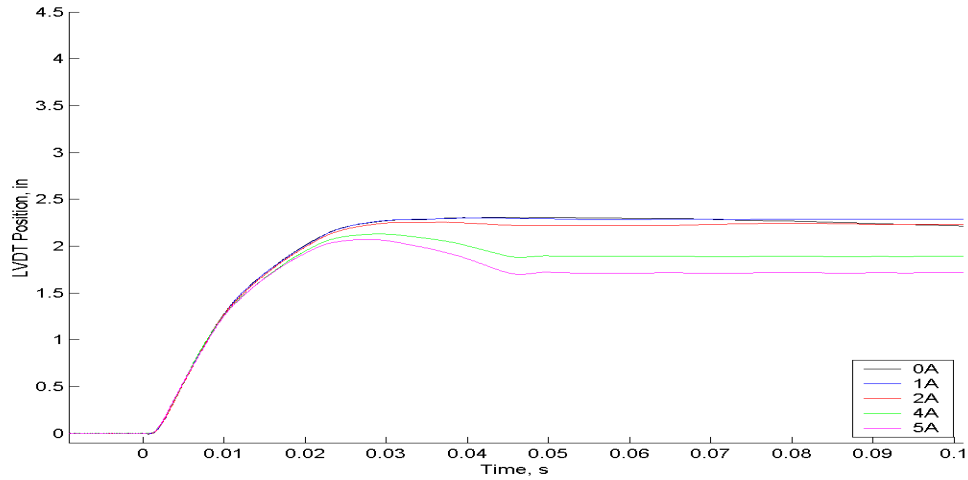


Figure A-100. Piston displacement versus the time from the initial contact

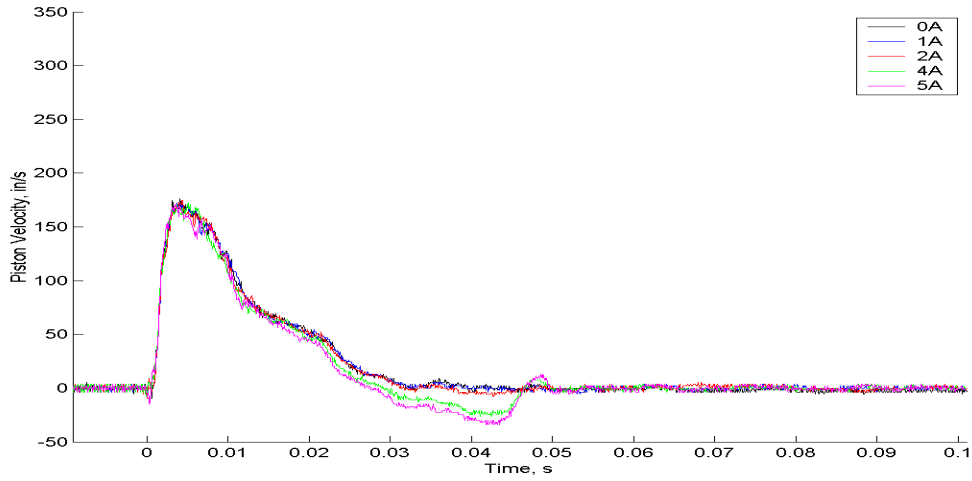


Figure A-101. Piston velocity versus the time from the initial contact

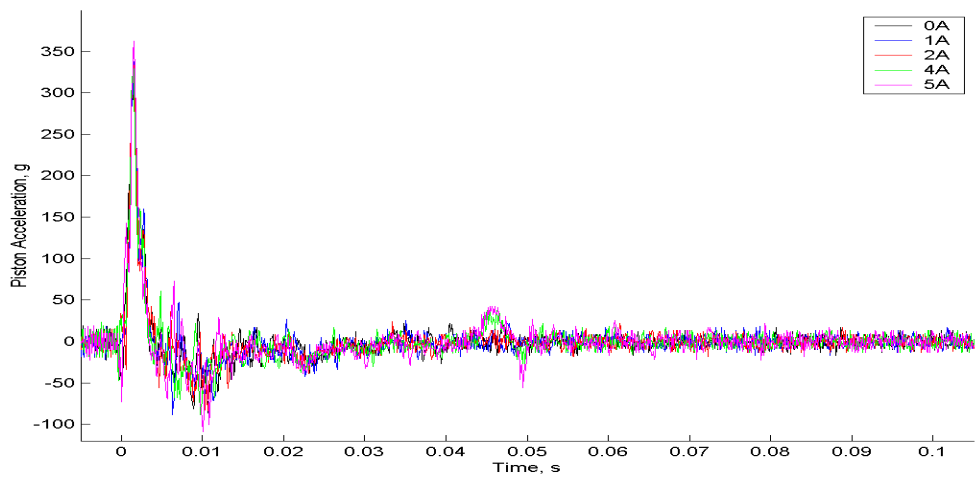


Figure A-102. Piston acceleration versus the time from the initial contact

Test 3: Mono-tube MR Damper Subject to 15 ft/s Impact

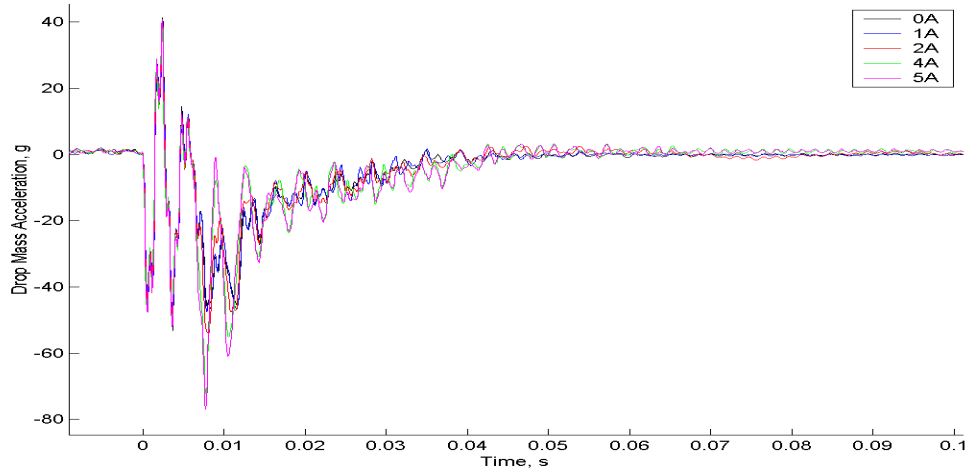


Figure A-103. Acceleration of the drop mass versus the time from the initial contact

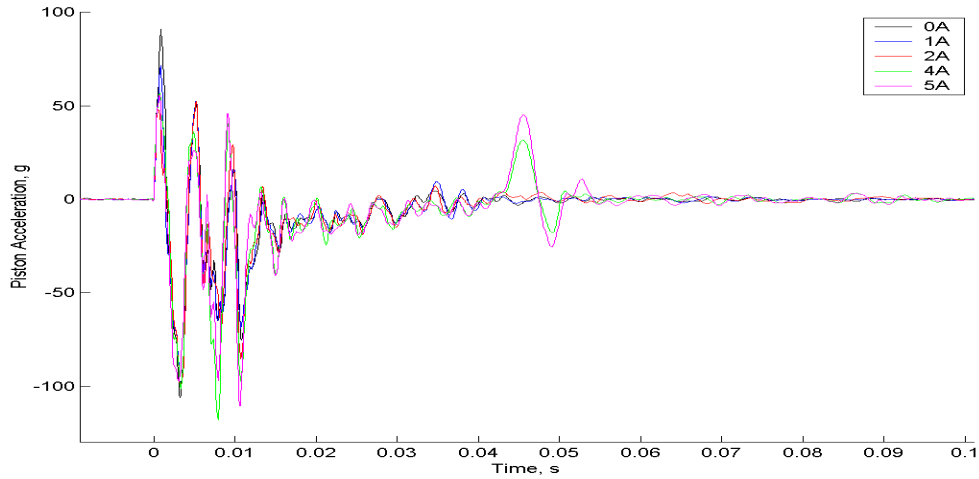


Figure A-104. Piston acceleration versus the time from the initial contact*

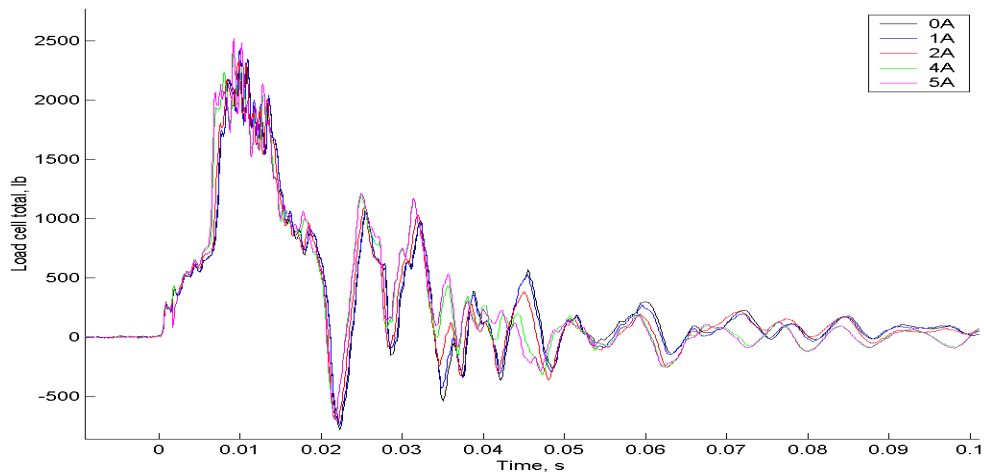


Figure A-105. Force transmitted to the base plate versus the time from the initial contact

Test 3: Mono-tube MR Damper Subject to 15 ft/s Impact

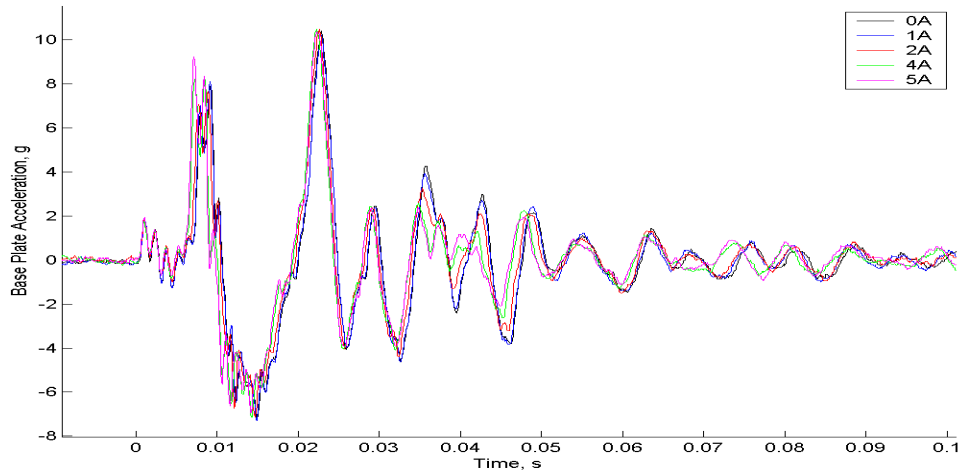


Figure A-106. Acceleration of the base plate versus the time from the initial contact

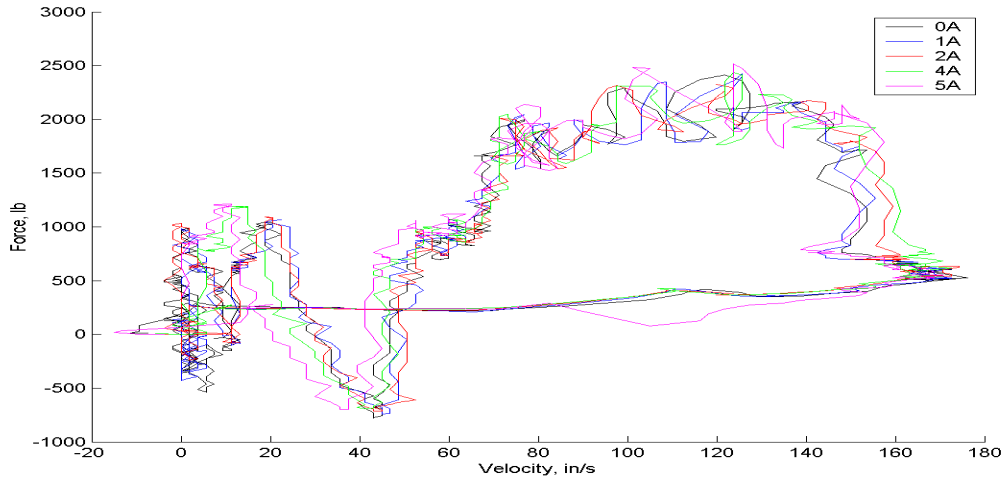


Figure A-107. Force transmitted to the base versus the piston velocity

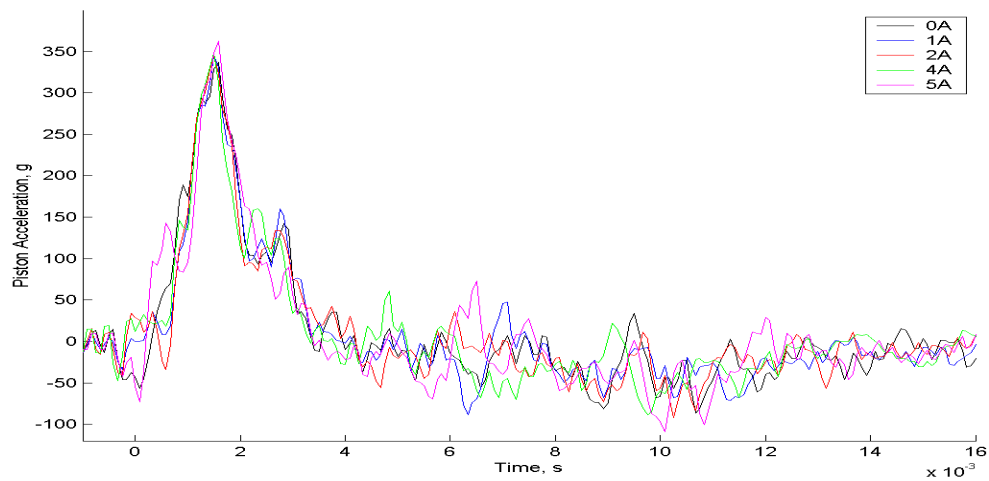


Figure A-108. Piston acceleration versus the time from the initial contact**

Mono-tube MR Damper Subject to a 11 ft/s Impact

Test 1: Mono-tube MR Damper Subject to 11 ft/s Impact

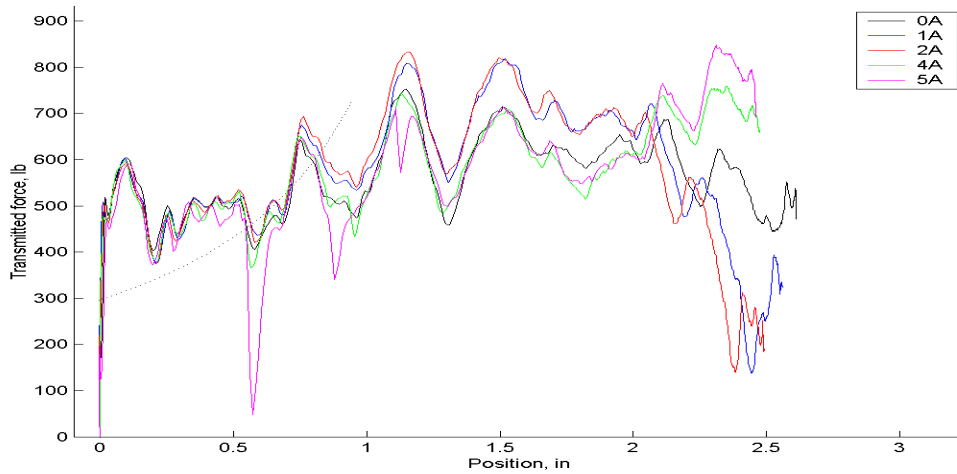


Figure A-109. Force transmitted to the base versus the piston displacement

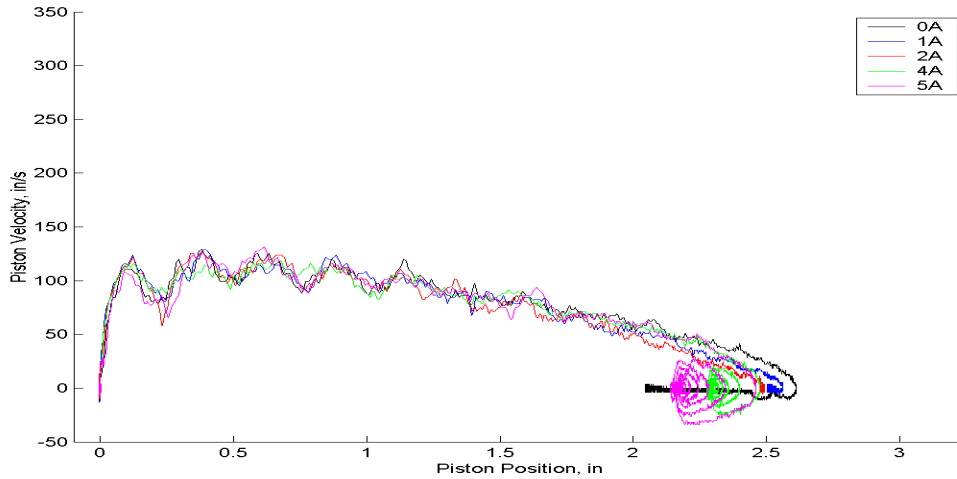


Figure A-110. Piston velocity versus the piston displacement

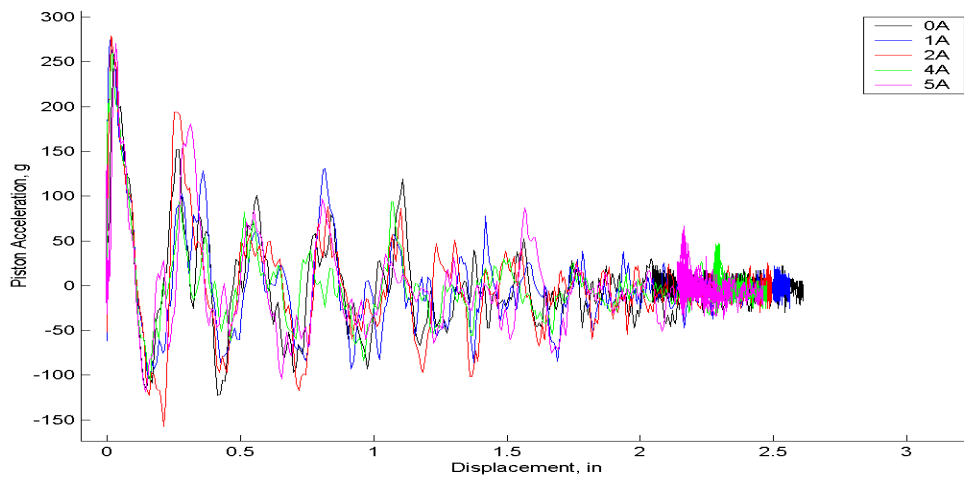


Figure A-111. Piston acceleration versus the piston displacement

Test 1: Mono-tube MR Damper Subject to 11 ft/s Impact

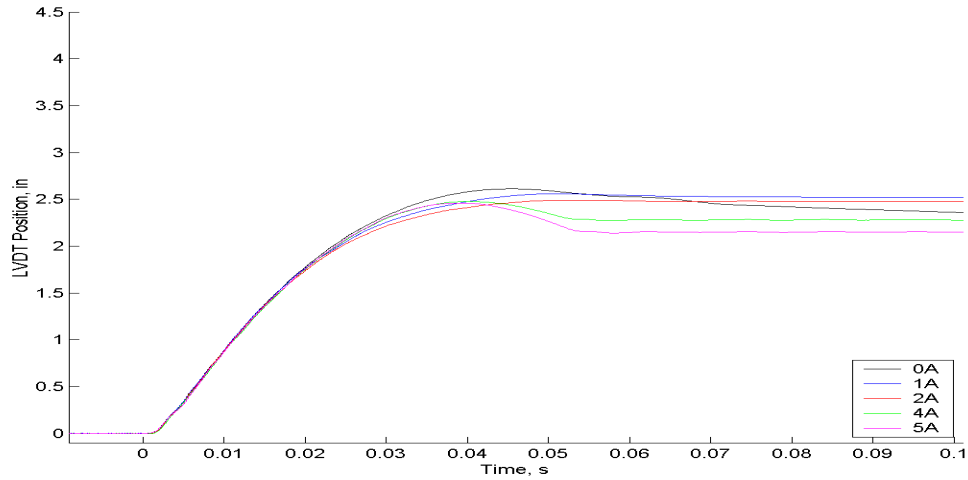


Figure A-112. Piston displacement versus the time from the initial contact

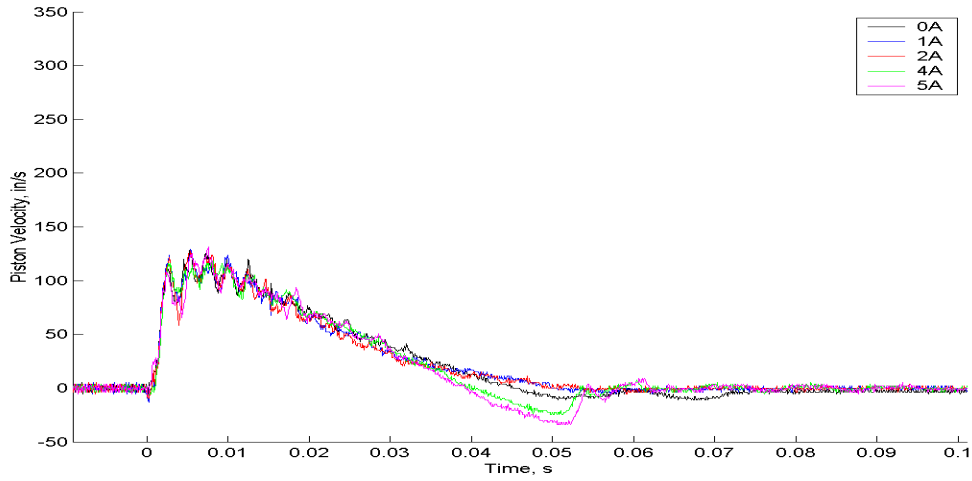


Figure A-113. Piston velocity versus the time from the initial contact

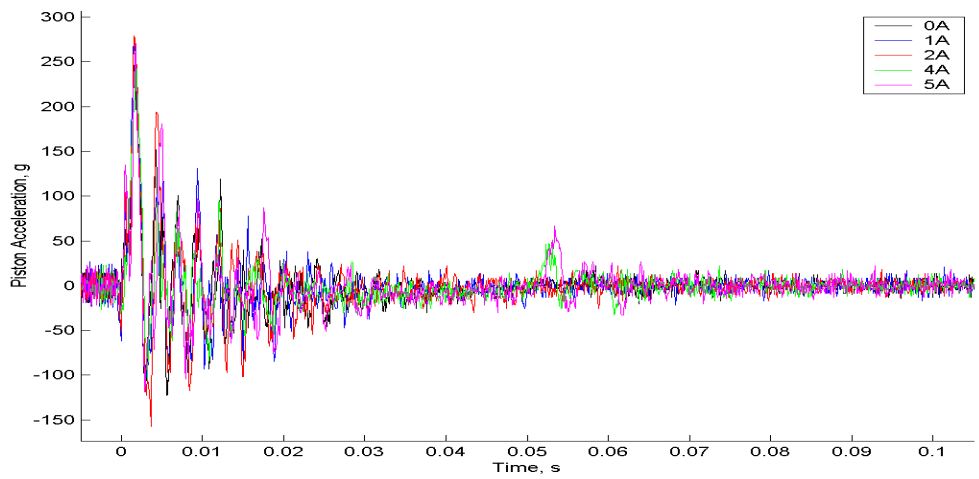


Figure A-114. Piston acceleration versus the time from the initial contact

Test 1: Mono-tube MR Damper Subject to 11 ft/s Impact

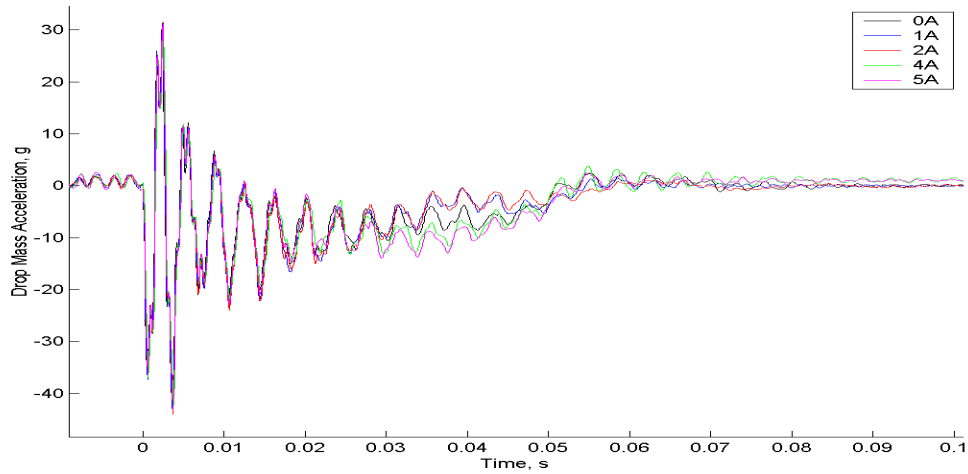


Figure A-115. Acceleration of the drop mass versus the time from the initial contact

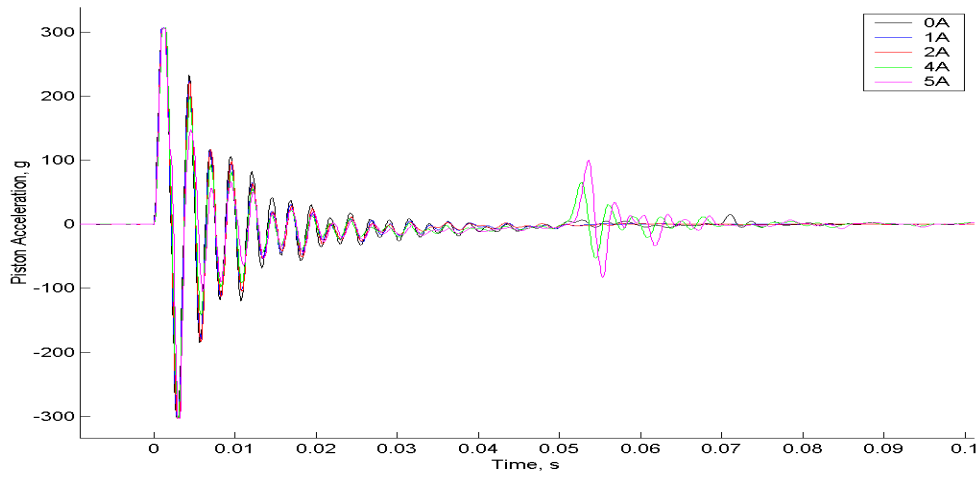


Figure A-116. Piston acceleration versus the time from the initial contact*

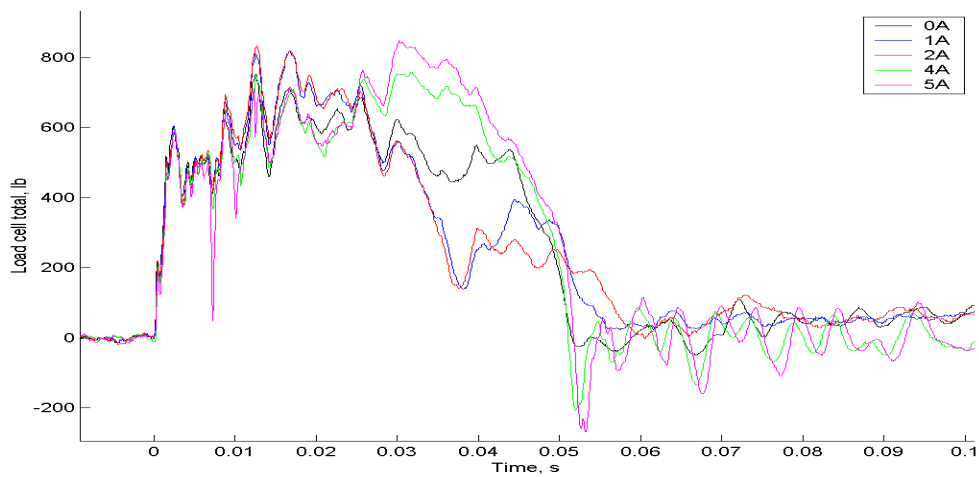


Figure A-117. Force transmitted to the base plate versus the time from the initial contact

Test 1: Mono-tube MR Damper Subject to 11 ft/s Impact

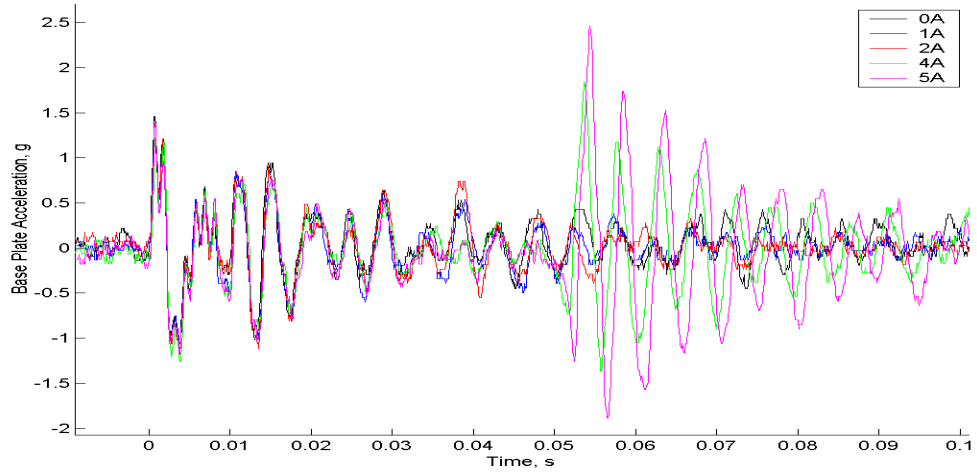


Figure A-118. Acceleration of the base plate versus the time from the initial contact

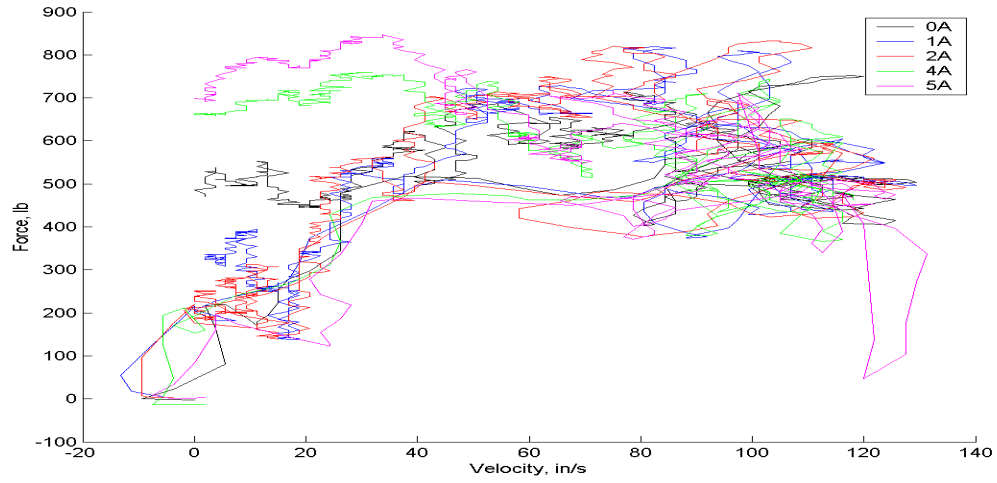


Figure A-119. Force transmitted to the base versus the piston velocity

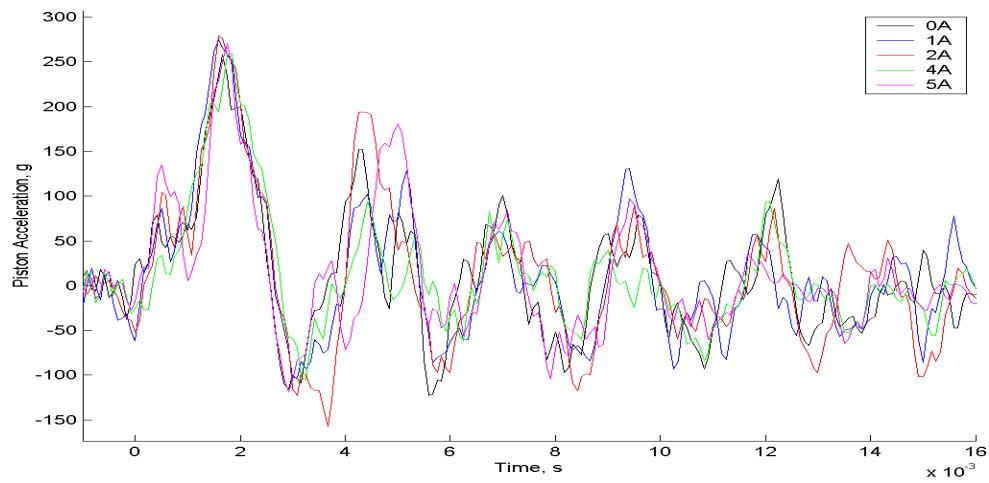


Figure A-120. Piston acceleration versus the time from the initial contact**

Test 2: Mono-tube MR Damper Subject to 11 ft/s Impact

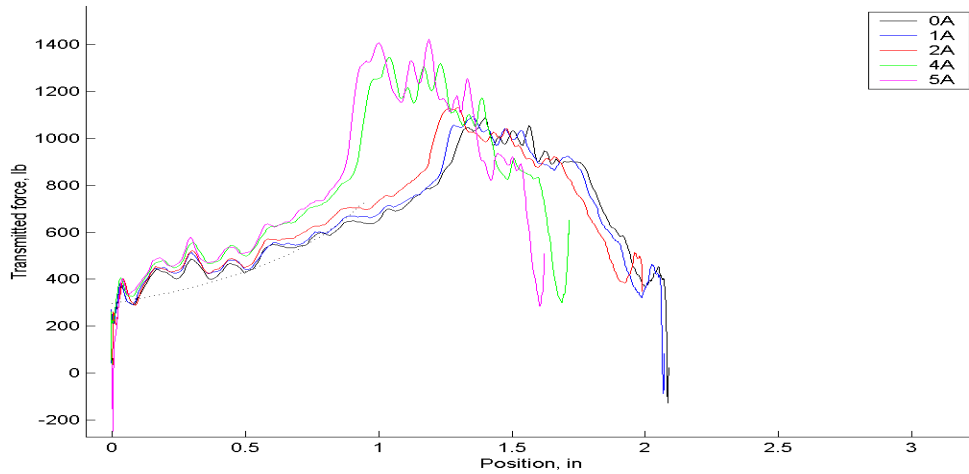


Figure A-121. Force transmitted to the base versus the piston displacement

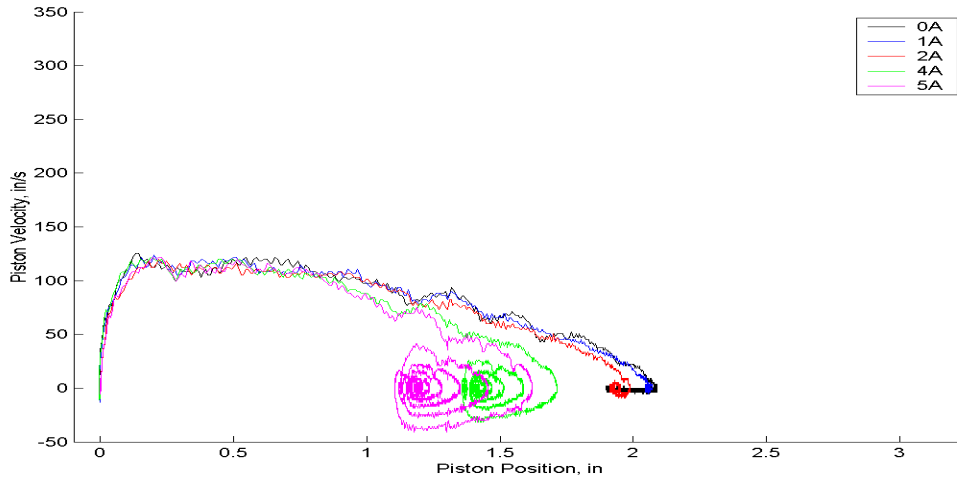


Figure A-122. Piston velocity versus the piston displacement

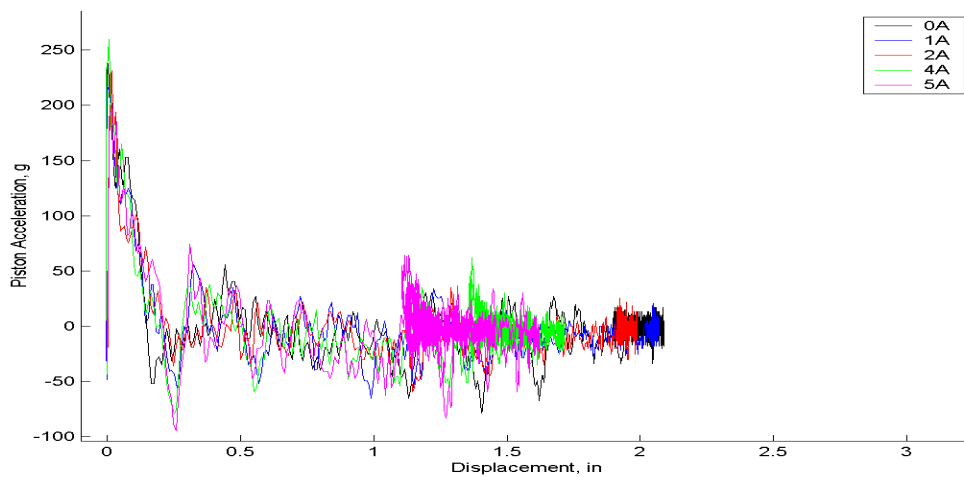


Figure A-123. Piston acceleration versus the piston displacement

Test 2: Mono-tube MR Damper Subject to 11 ft/s Impact

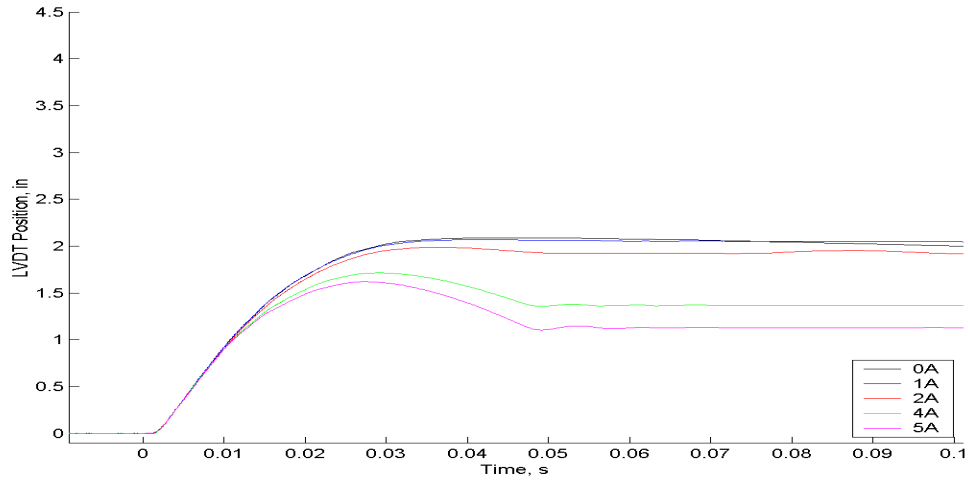


Figure A-124. Piston displacement versus the time from the initial contact

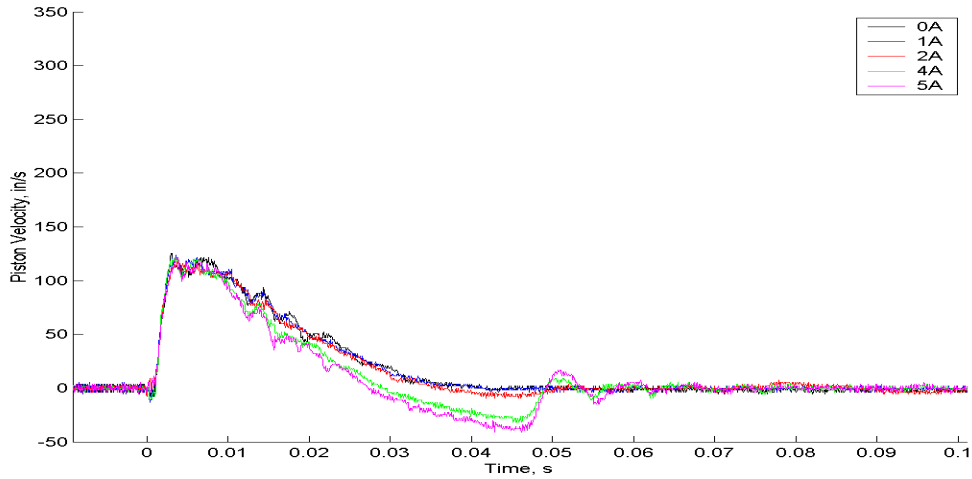


Figure A-125. Piston velocity versus the time from the initial contact

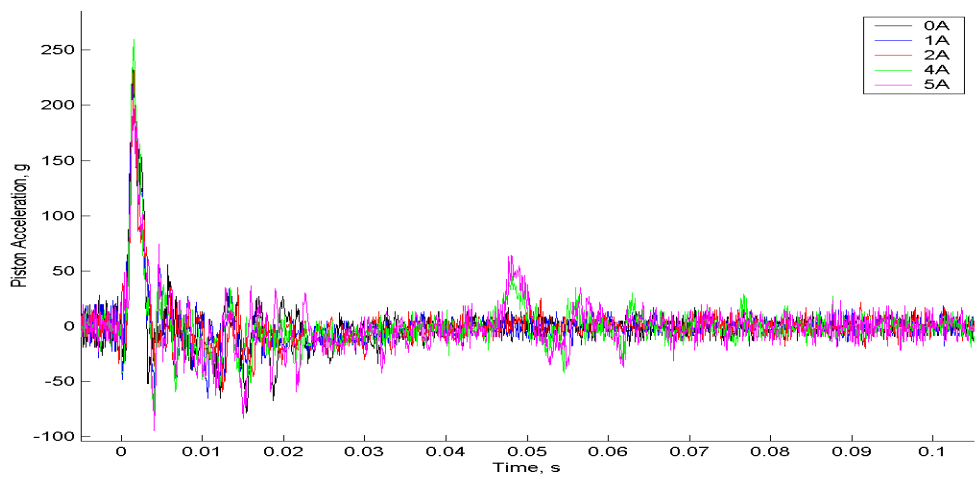


Figure A-126. Piston acceleration versus the time from the initial contact

Test 2: Mono-tube MR Damper Subject to 11 ft/s Impact

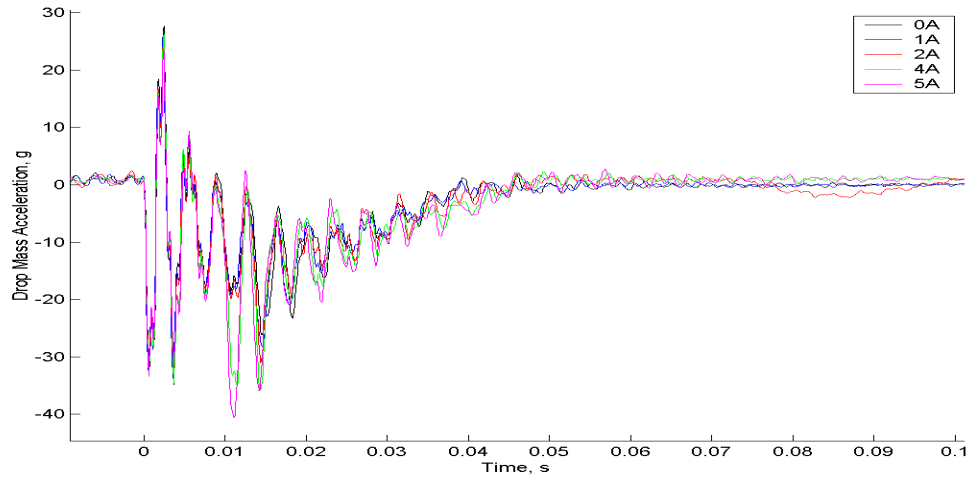


Figure A-127. Acceleration of the drop mass versus the time from the initial contact

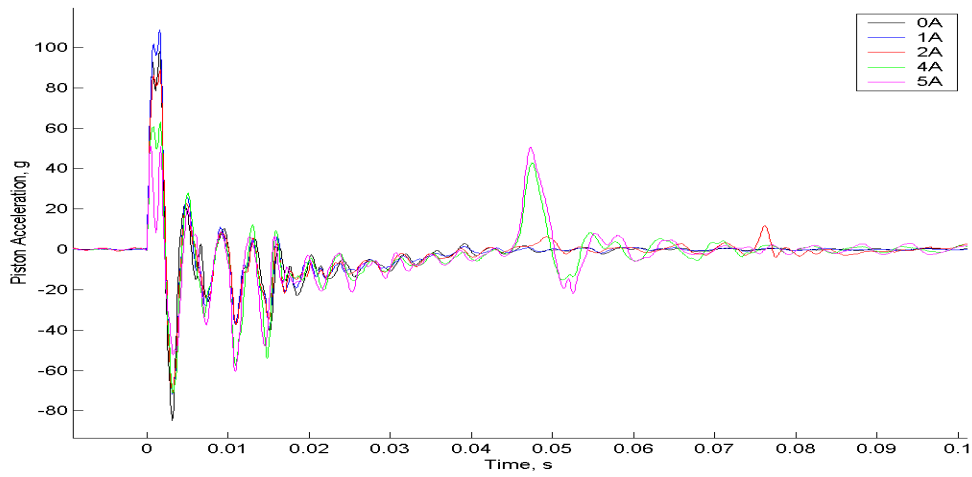


Figure A-128. Piston acceleration versus the time from the initial contact*

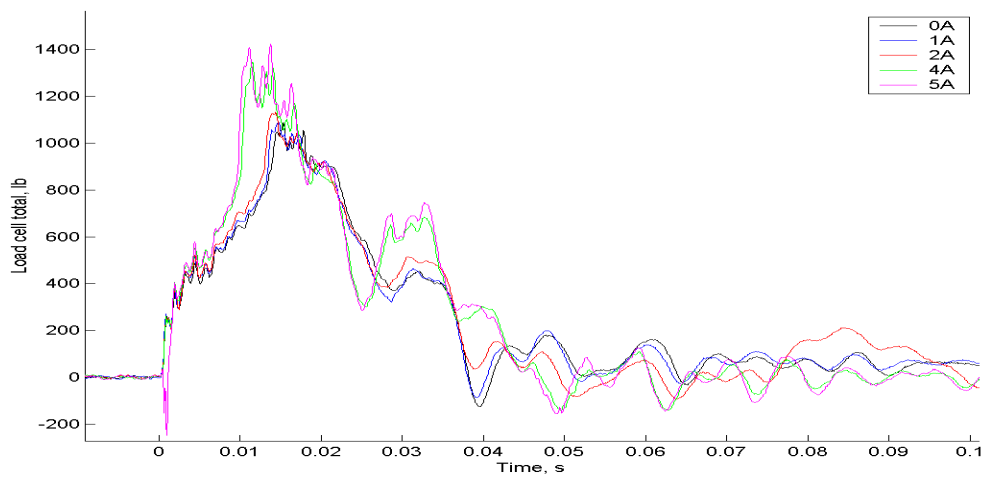


Figure A-129. Force transmitted to the base plate versus the time from the initial contact

Test 2: Mono-tube MR Damper Subject to 11 ft/s Impact

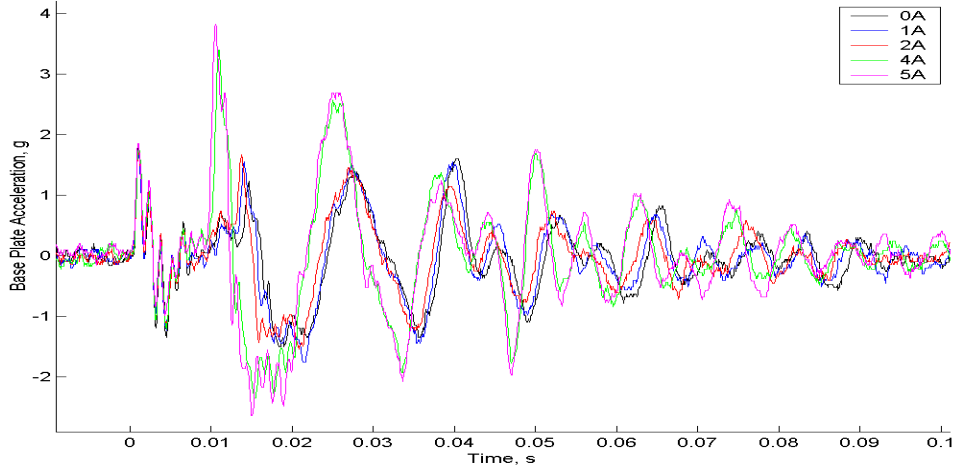


Figure A-130. Acceleration of the base plate versus the time from the initial contact

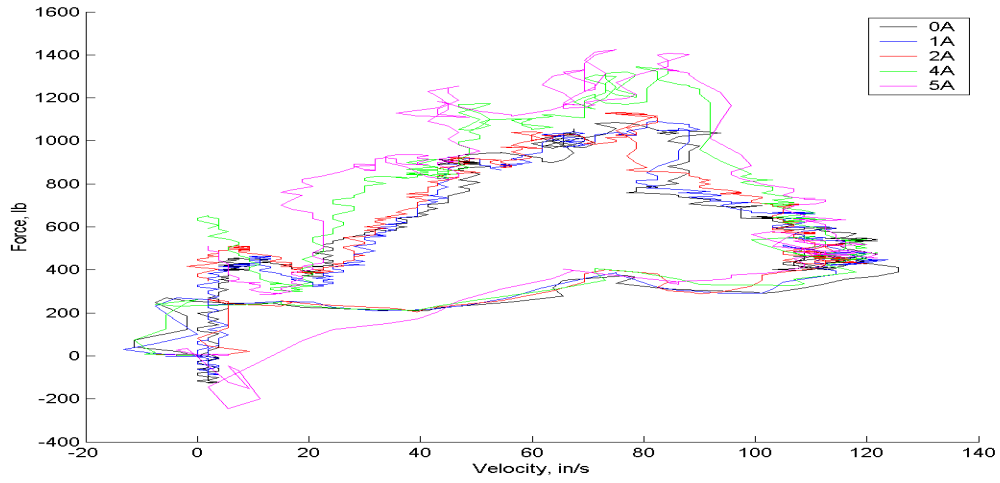


Figure A-131. Force transmitted to the base versus the piston velocity

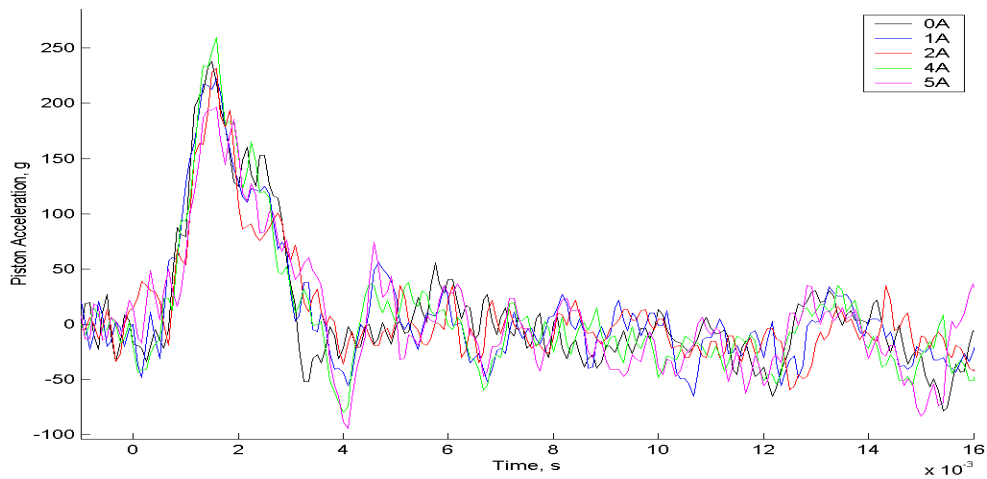


Figure A-132. Piston acceleration versus the time from the initial contact**

Test 3: Mono-tube MR Damper Subject to 11 ft/s Impact

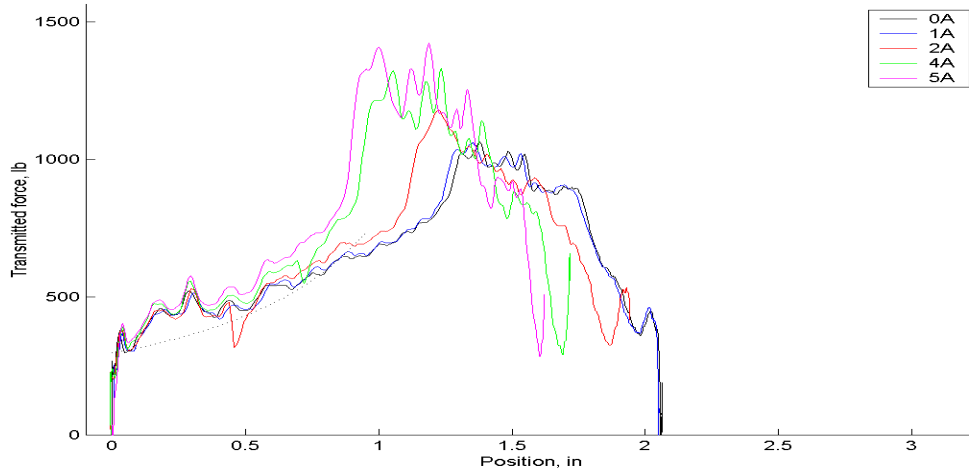


Figure A-133. Force transmitted to the base versus the piston displacement

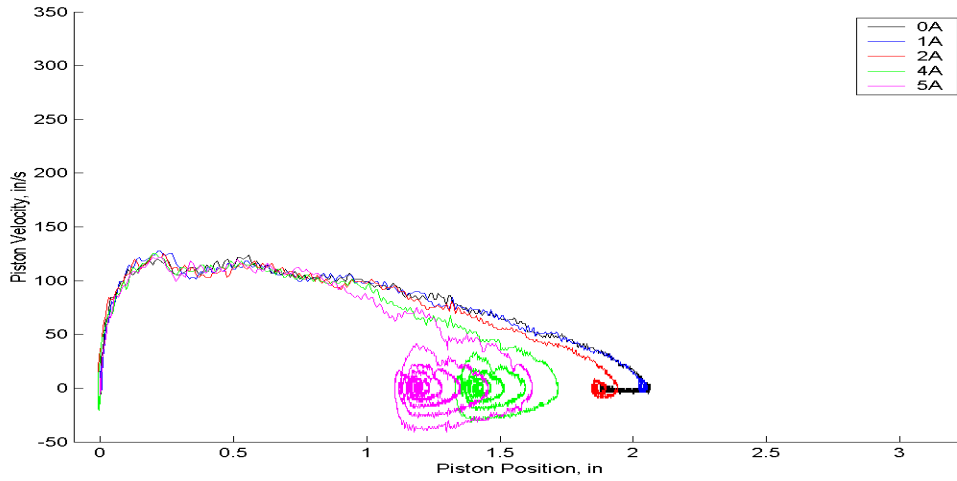


Figure A-134. Piston velocity versus the piston displacement

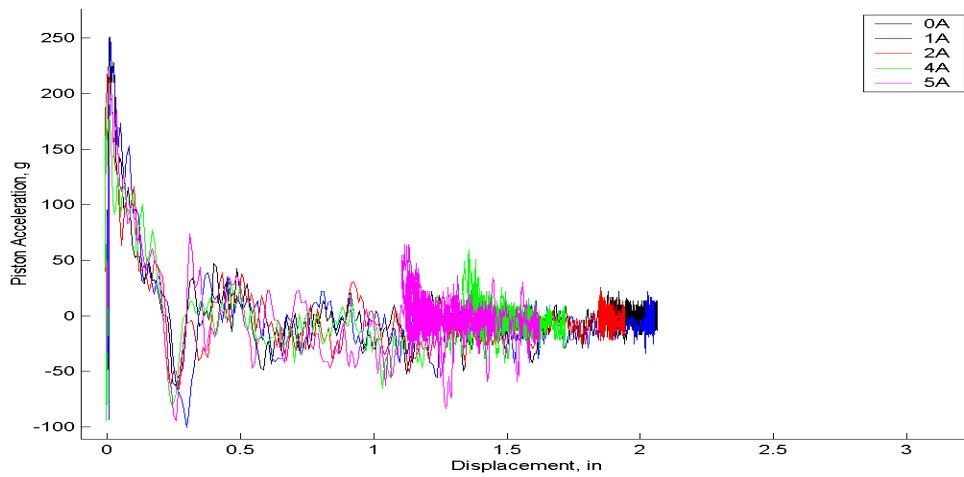


Figure A-135. Piston acceleration versus the piston displacement

Test 3: Mono-tube MR Damper Subject to 11 ft/s Impact

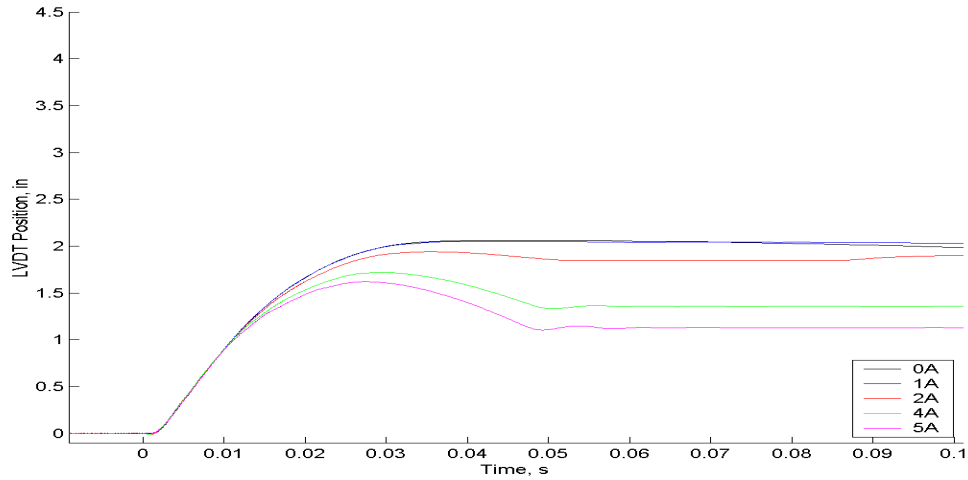


Figure A-136. Piston displacement versus the time from the initial contact

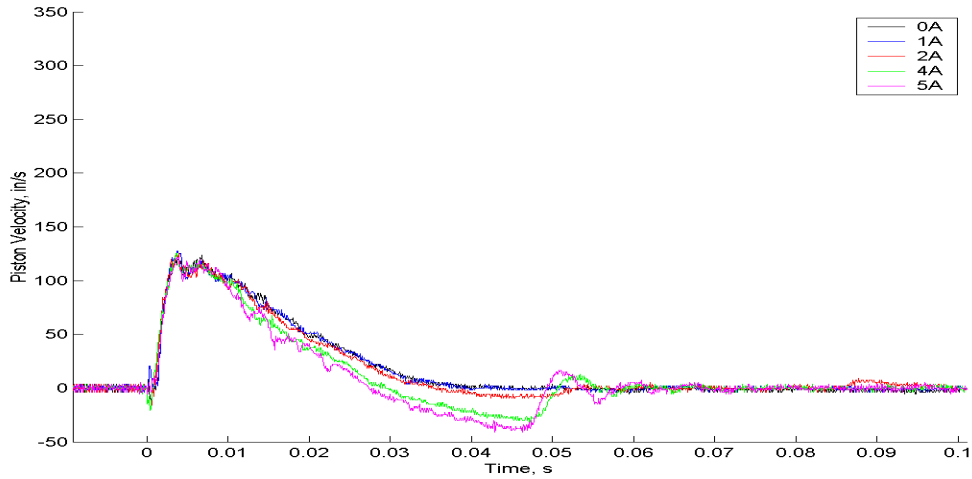


Figure A-137. Piston velocity versus the time from the initial contact

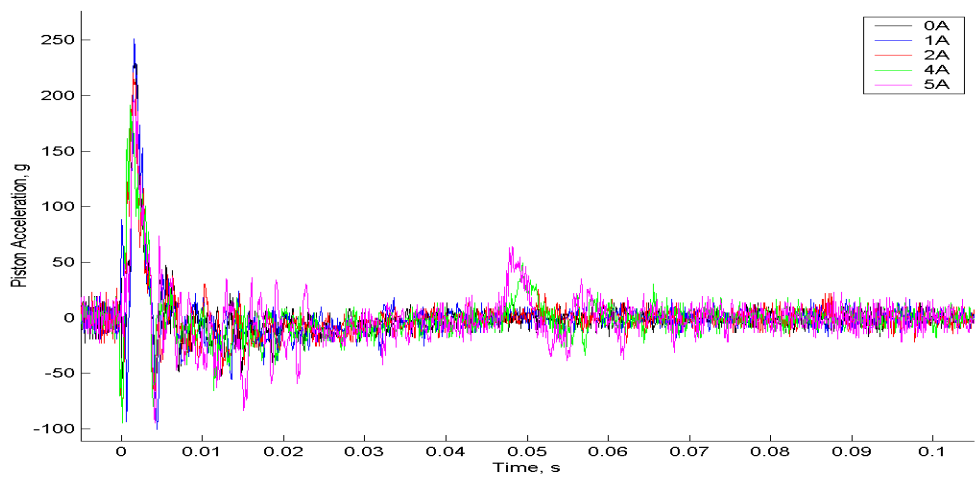


Figure A-138. Piston acceleration versus the time from the initial contact

Test 3: Mono-tube MR Damper Subject to 11 ft/s Impact

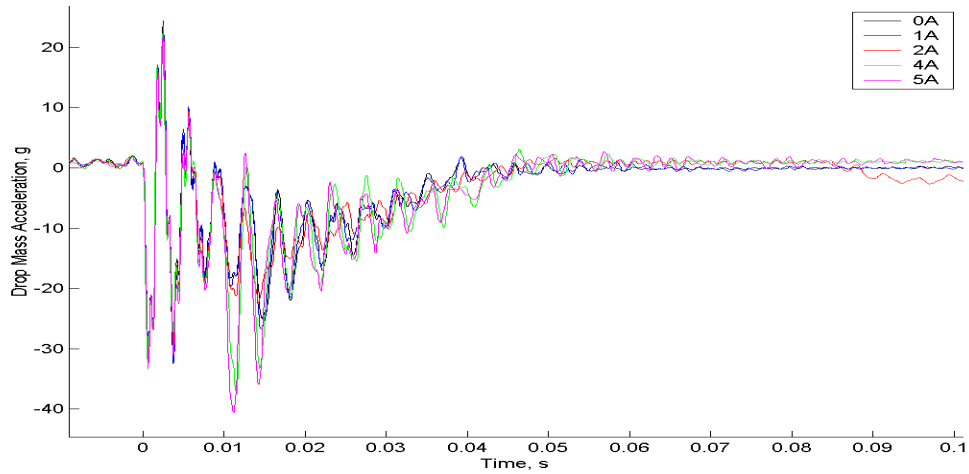


Figure A-139. Acceleration of the drop mass versus the time from the initial contact

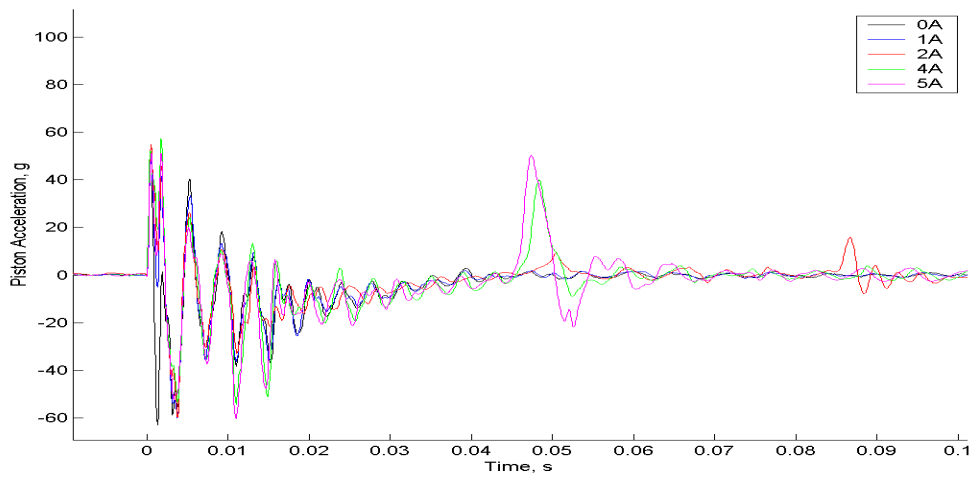


Figure A-140. Piston acceleration versus the time from the initial contact*

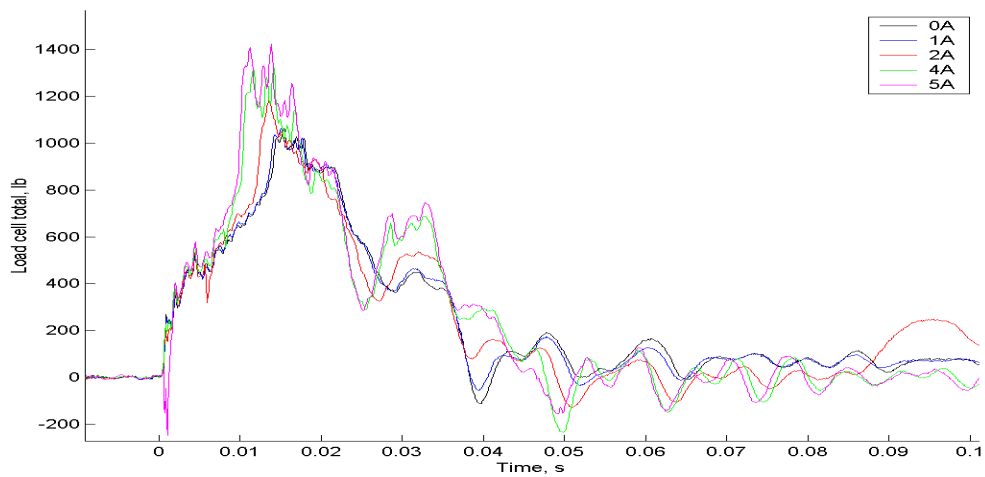


Figure A-141. Force transmitted to the base plate versus the time from the initial contact

Test 3: Mono-tube MR Damper Subject to 11 ft/s Impact

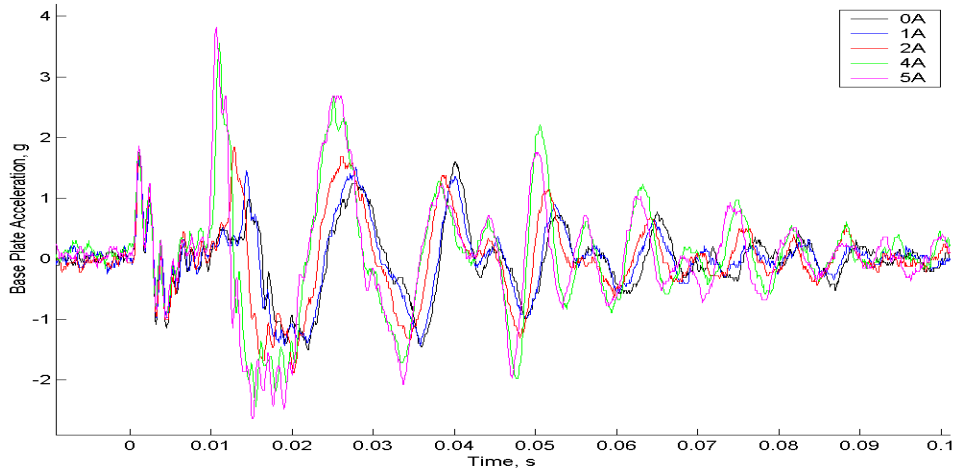


Figure A-142. Acceleration of the base plate versus the time from the initial contact

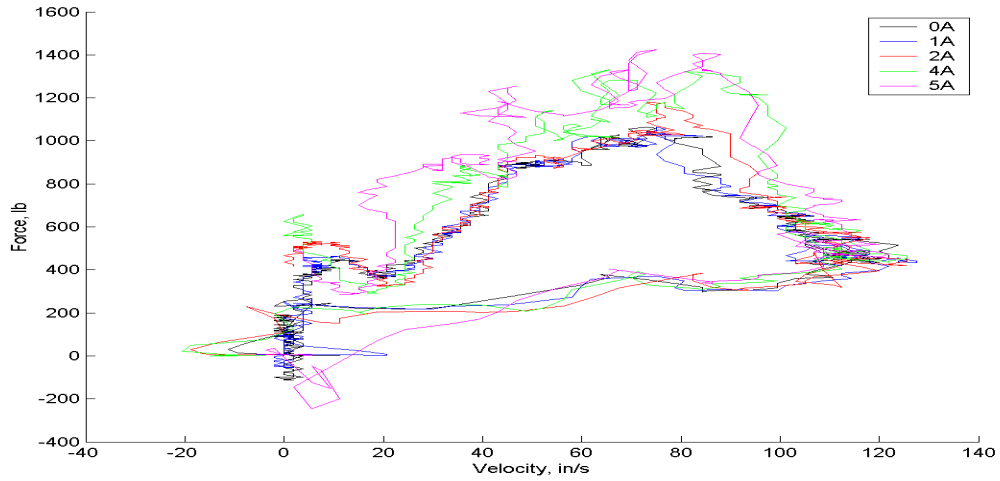


Figure A-143. Force transmitted to the base versus the piston velocity

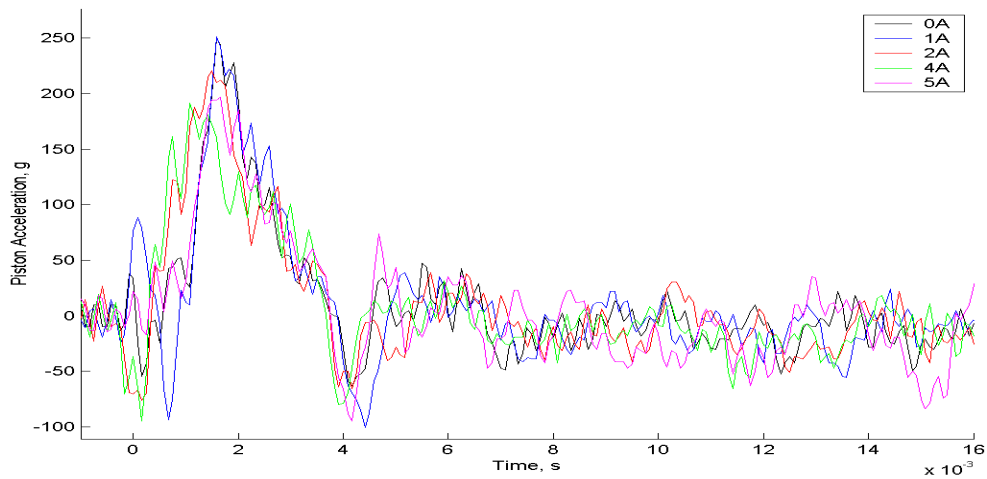


Figure A-144. Piston acceleration versus the time from the initial contact**

Mono-tube MR Damper Subject to a 7 ft/s Impact

Test 1: Mono-tube MR Damper Subject to 7 ft/s Impact

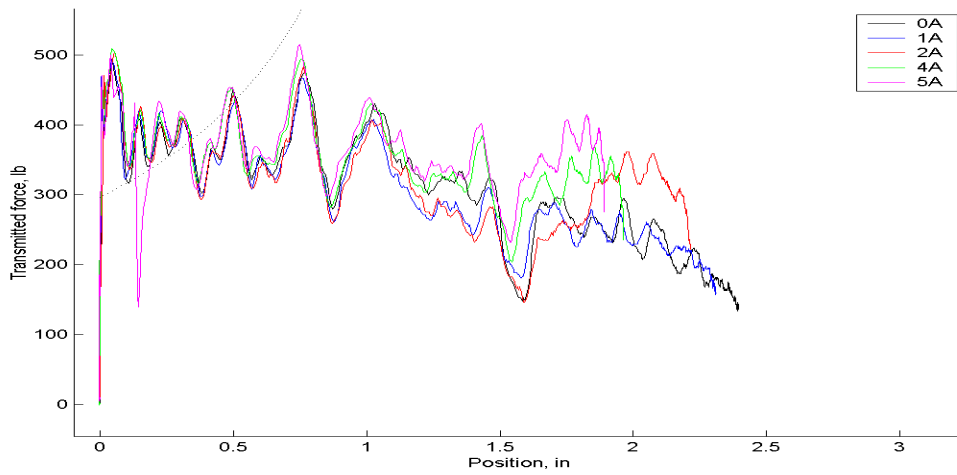


Figure A-145. Force transmitted to the base versus the piston displacement

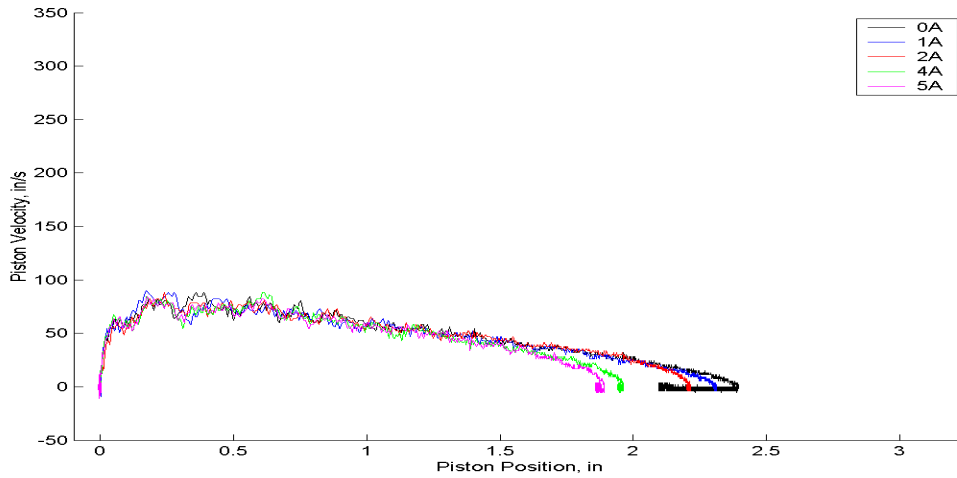


Figure A-146. Piston velocity versus the piston displacement

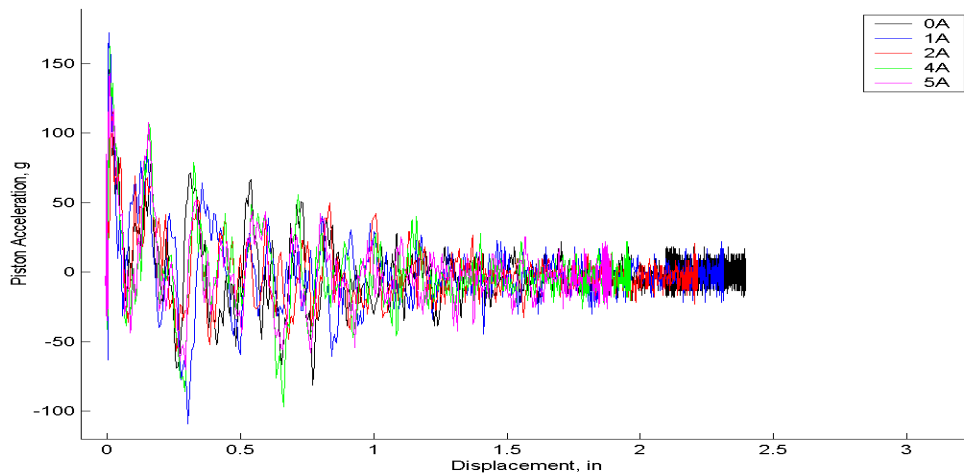


Figure A-147. Piston acceleration versus the piston displacement

Test 1: Mono-tube MR Damper Subject to 7 ft/s Impact

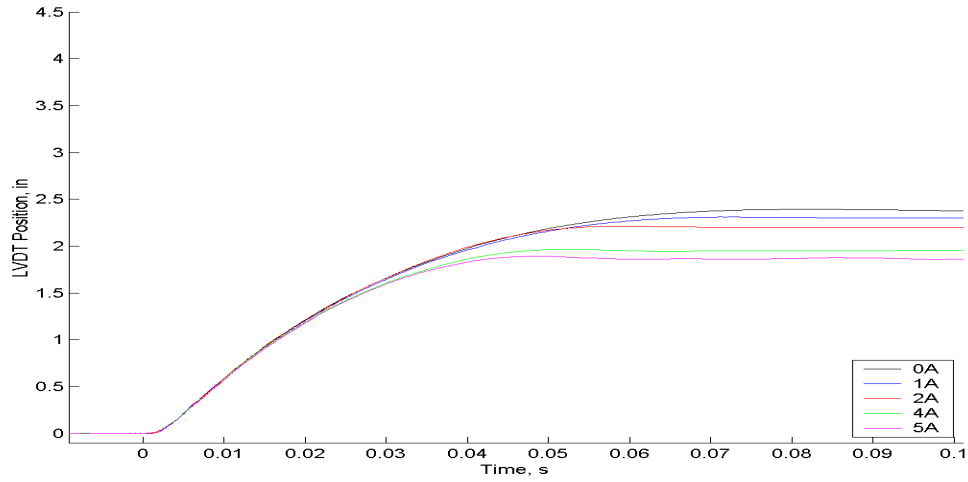


Figure A-148. Piston displacement versus the time from the initial contact

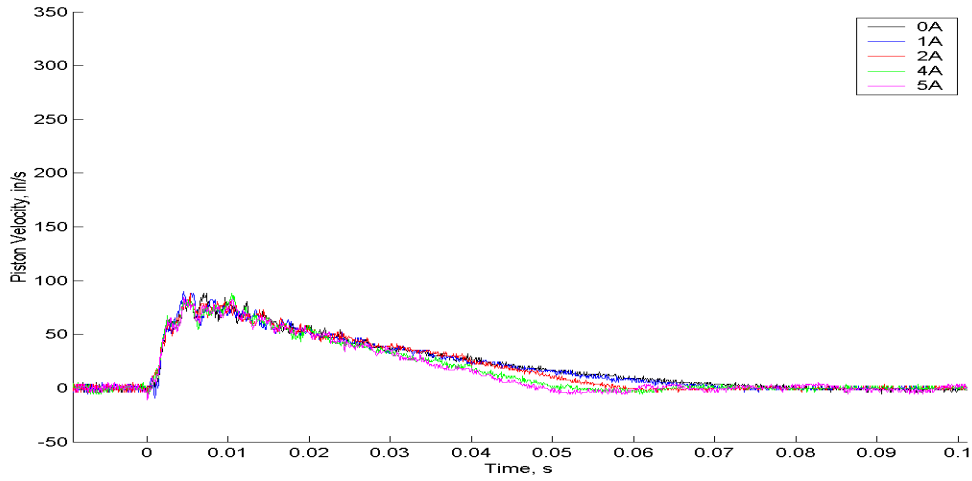


Figure A-149. Piston velocity versus the time from the initial contact

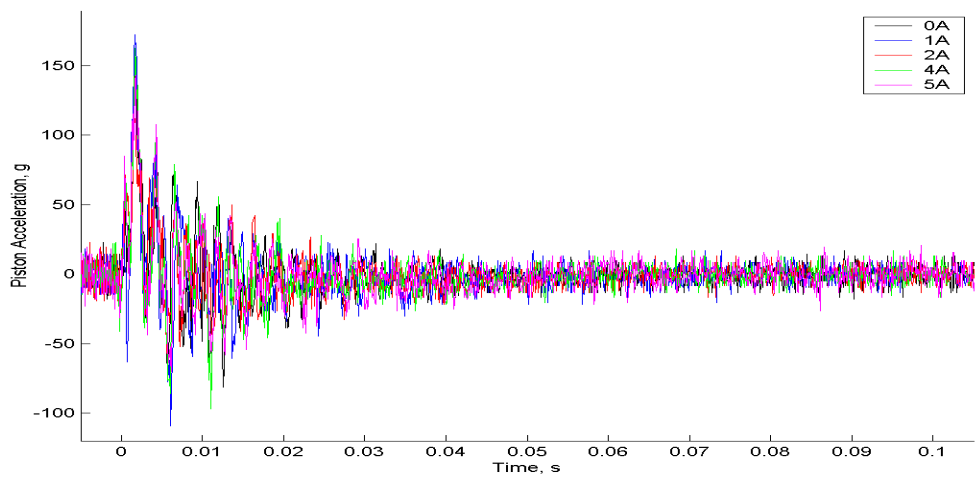


Figure A-150. Piston acceleration versus the time from the initial contact

Test 1: Mono-tube MR Damper Subject to 7 ft/s Impact

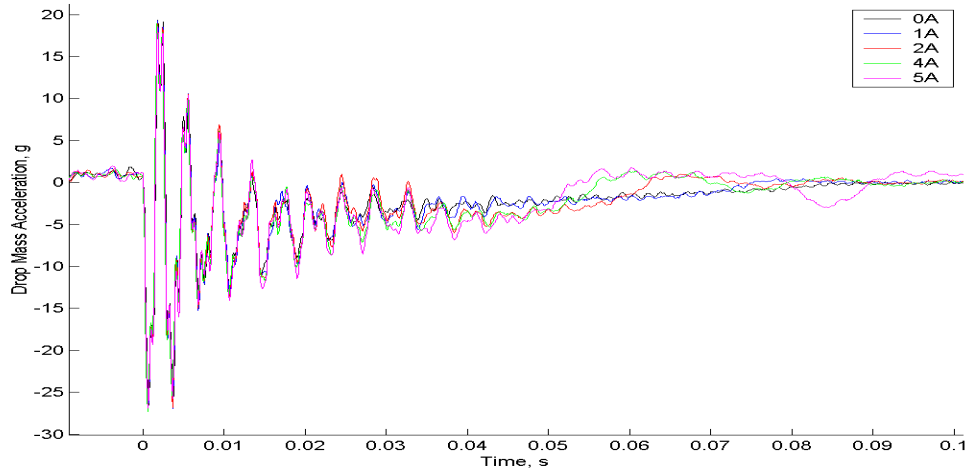


Figure A-151. Acceleration of the drop mass versus the time from the initial contact

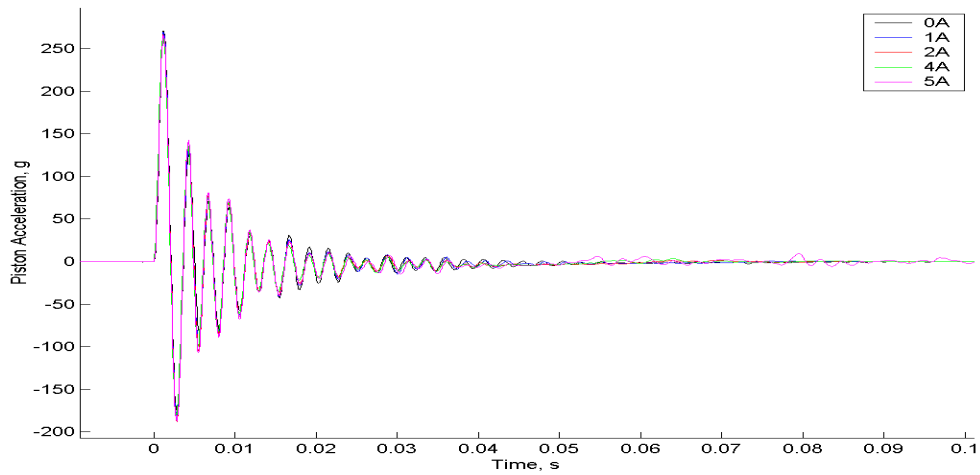


Figure A-152. Piston acceleration versus the time from the initial contact*

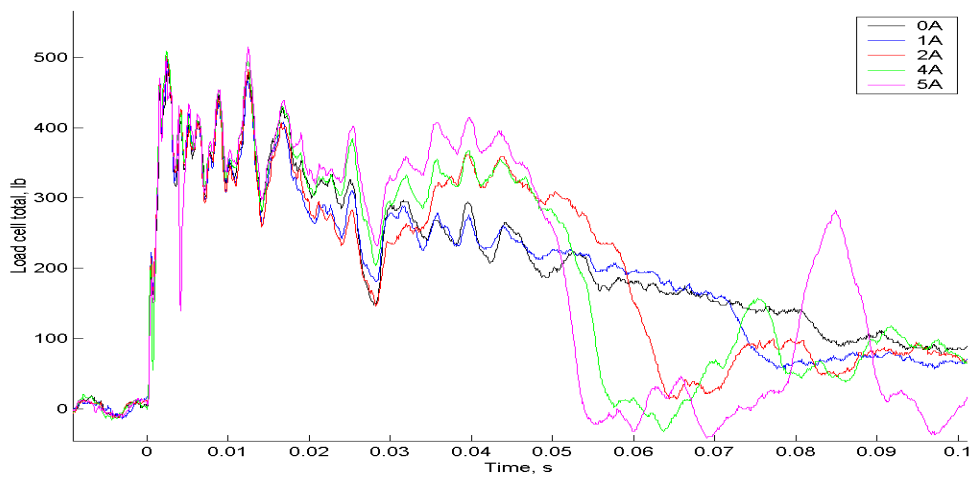


Figure A-153. Force transmitted to the base plate versus the time from the initial contact

Test 1: Mono-tube MR Damper Subject to 7 ft/s Impact

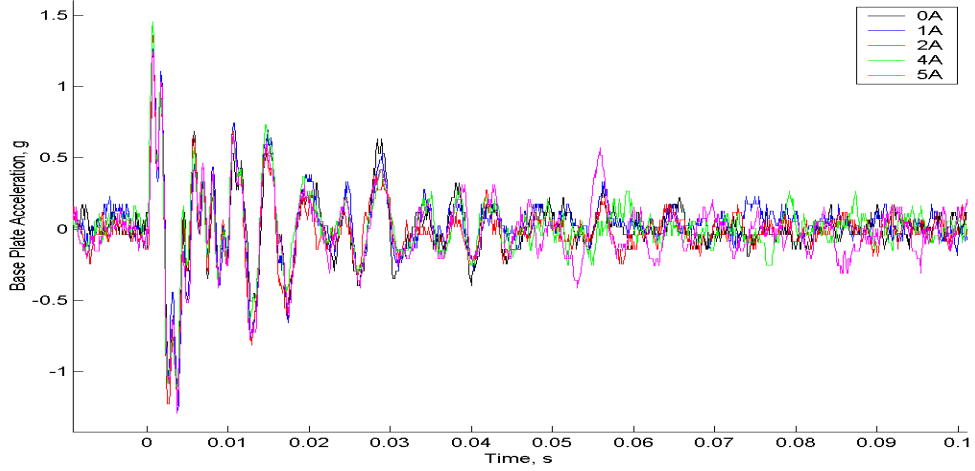


Figure A-154. Acceleration of the base plate versus the time from the initial contact

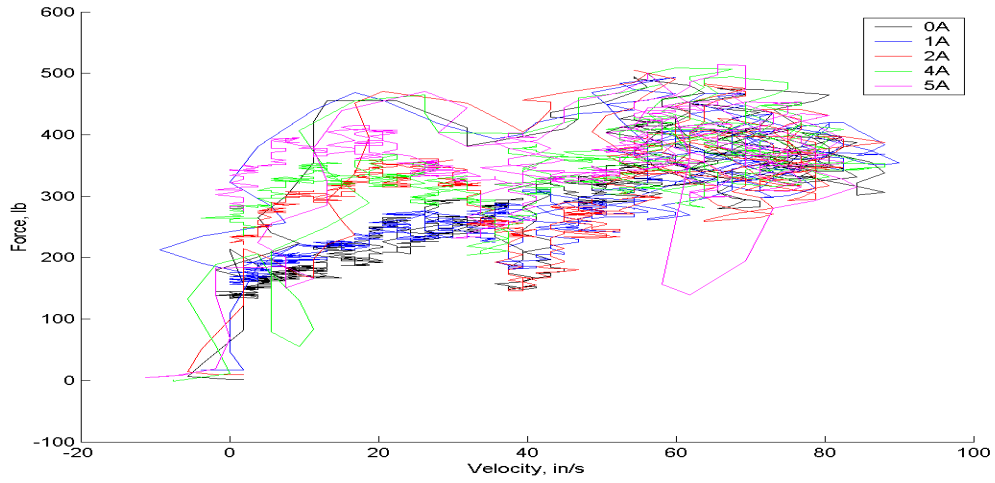


Figure A-155. Force transmitted to the base versus the piston velocity

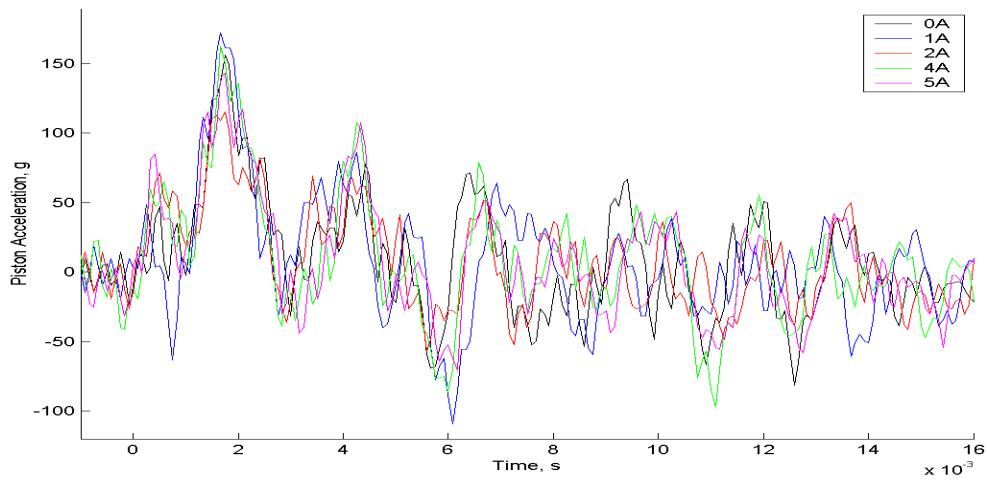


Figure A-156. Piston acceleration versus the time from the initial contact**

Test 2: Mono-tube MR Damper Subject to 7 ft/s Impact

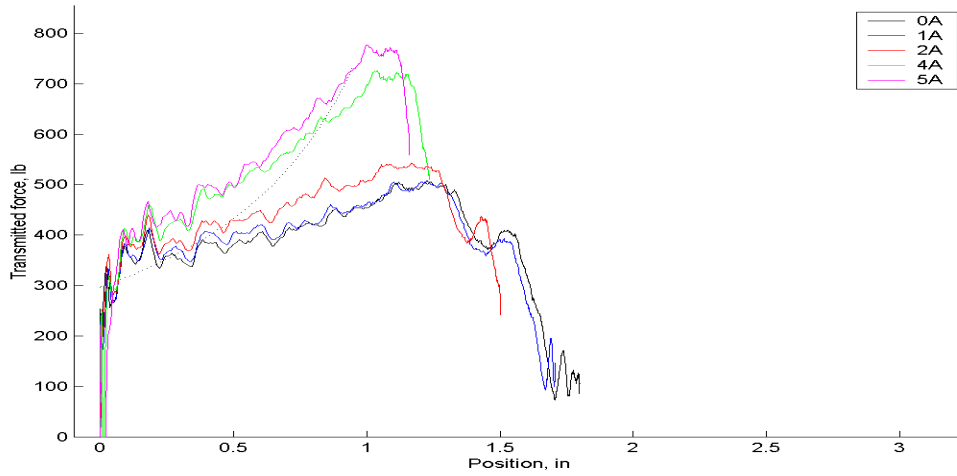


Figure A-157. Force transmitted to the base versus the piston displacement

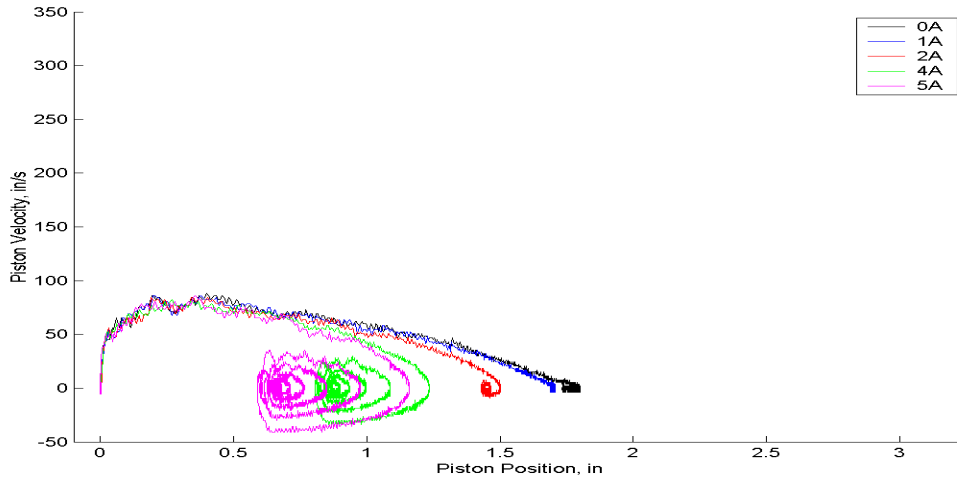


Figure A-158. Piston velocity versus the piston displacement

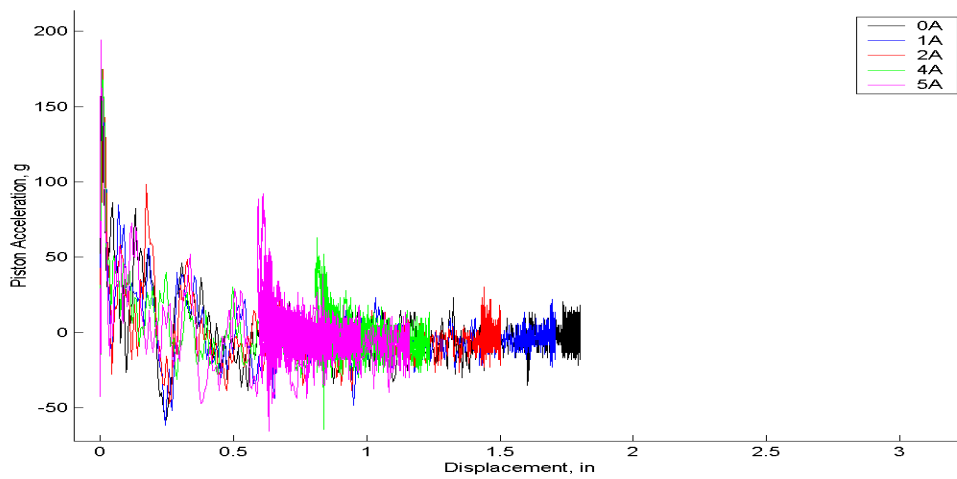


Figure A-159. Piston acceleration versus the piston displacement

Test 2: Mono-tube MR Damper Subject to 7 ft/s Impact

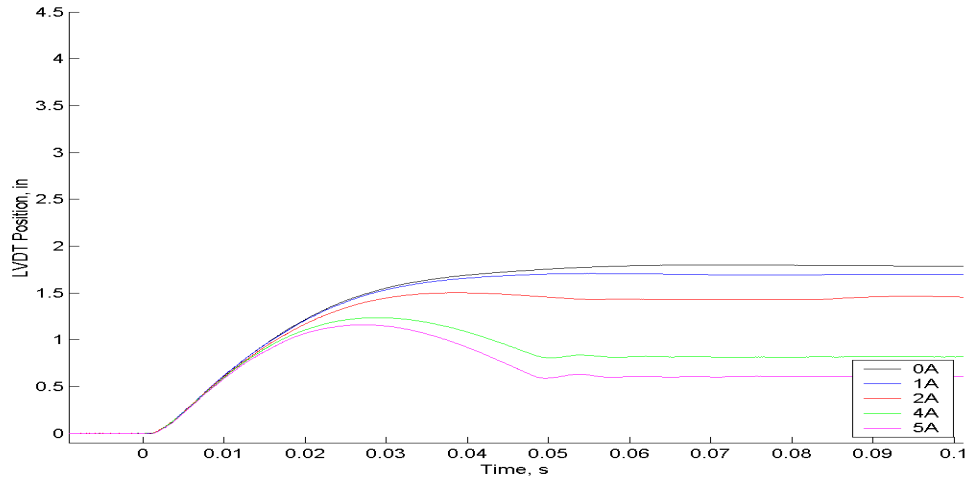


Figure A-160. Piston displacement versus the time from the initial contact

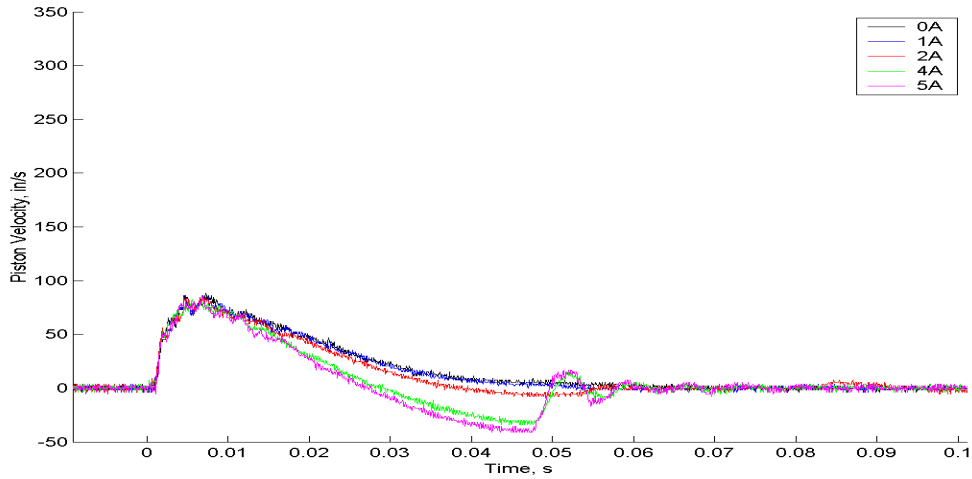


Figure A-161. Piston velocity versus the time from the initial contact

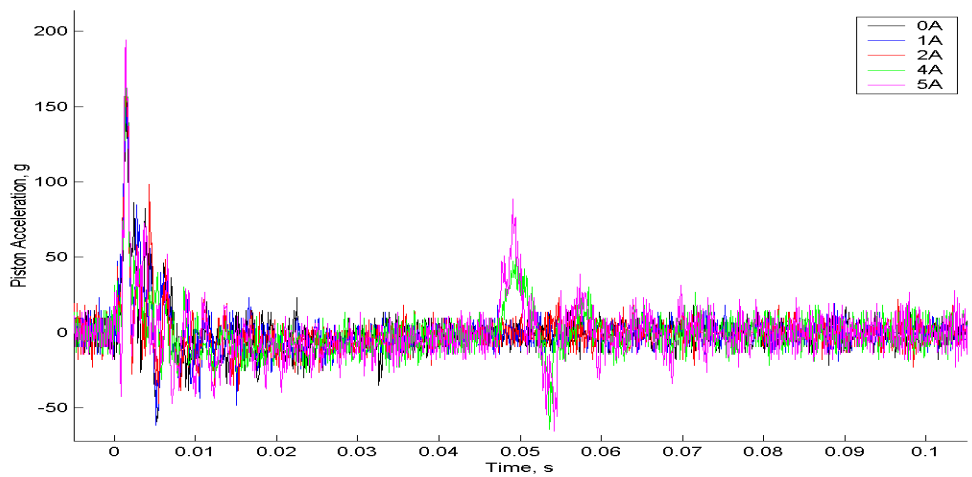


Figure A-162. Piston acceleration versus the time from the initial contact

Test 2: Mono-tube MR Damper Subject to 7 ft/s Impact

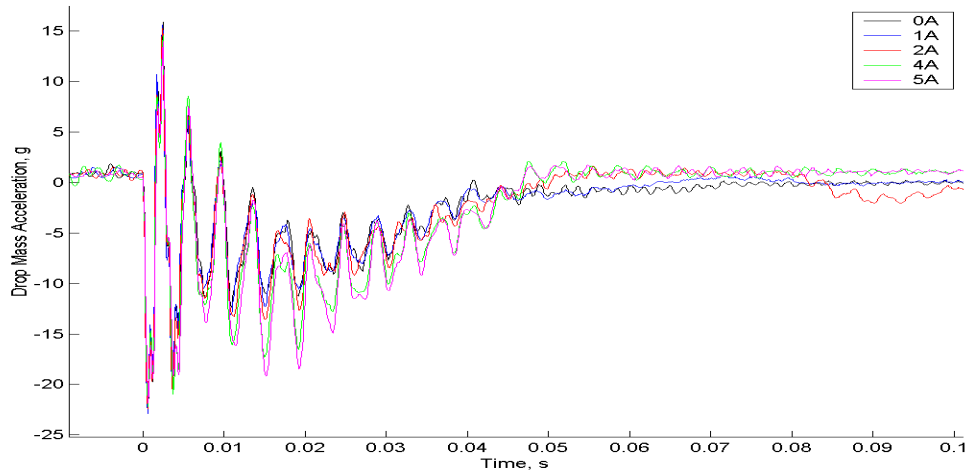


Figure A-163. Acceleration of the drop mass versus the time from the initial contact

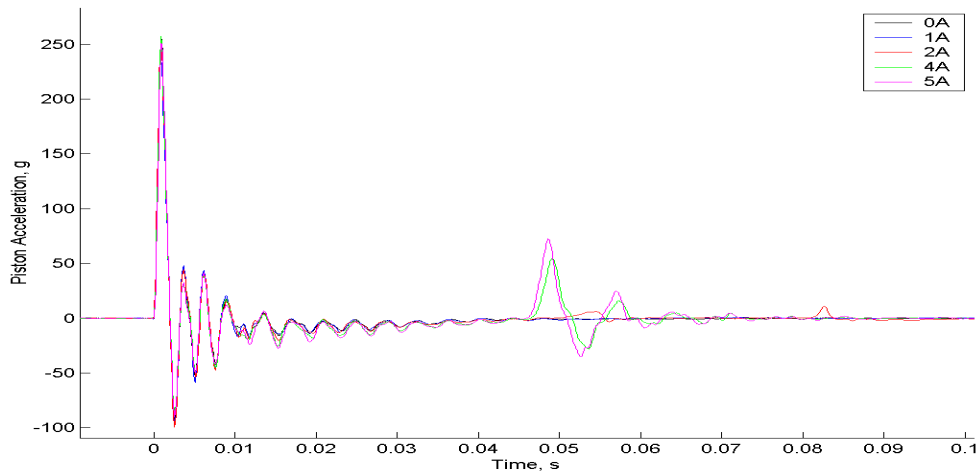


Figure A-164. Piston acceleration versus the time from the initial contact*

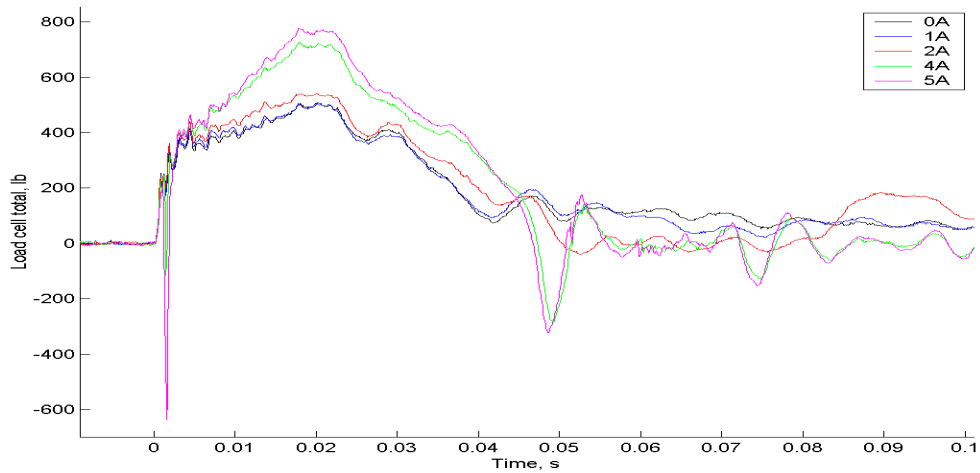


Figure A-165. Force transmitted to the base plate versus the time from the initial contact

Test 2: Mono-tube MR Damper Subject to 7 ft/s Impact

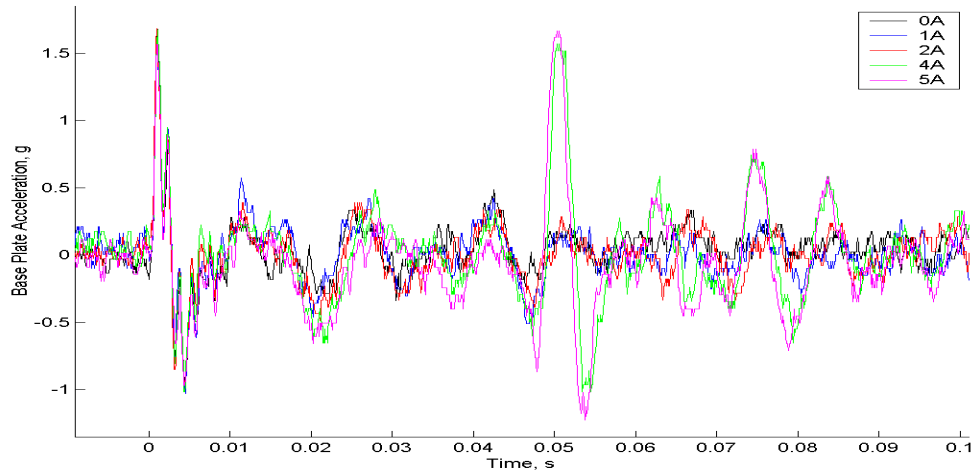


Figure A-166. Acceleration of the base plate versus the time from the initial contact

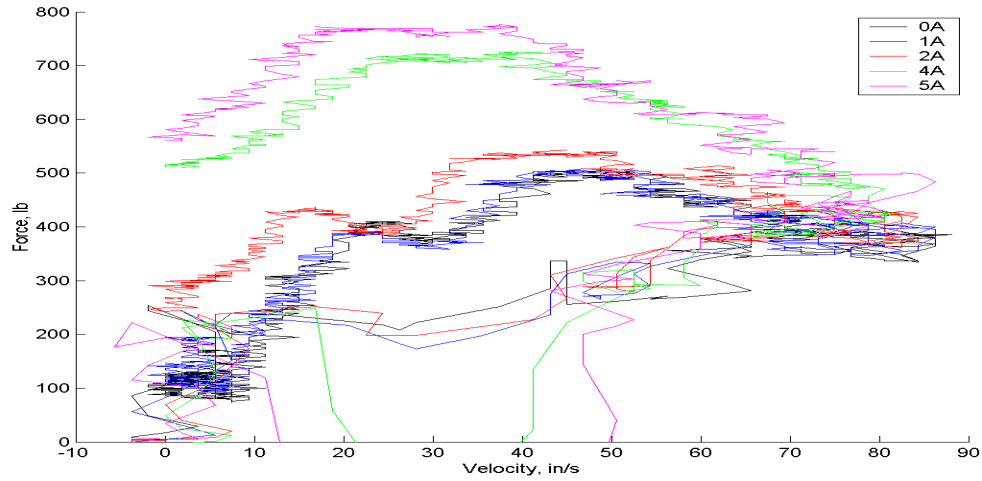


Figure A-167. Force transmitted to the base versus the piston velocity

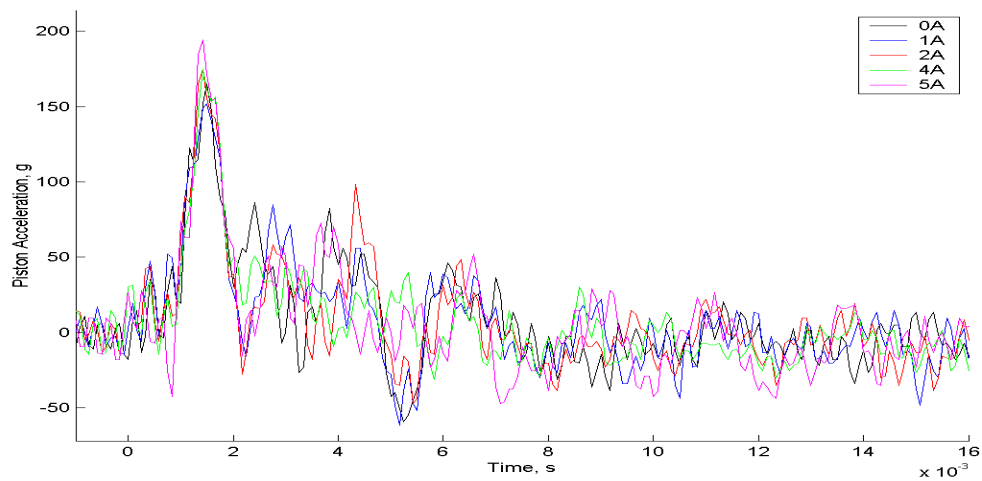


Figure A-168. Piston acceleration versus the time from the initial contact**

Test 3: Mono-tube MR Damper Subject to 7 ft/s Impact

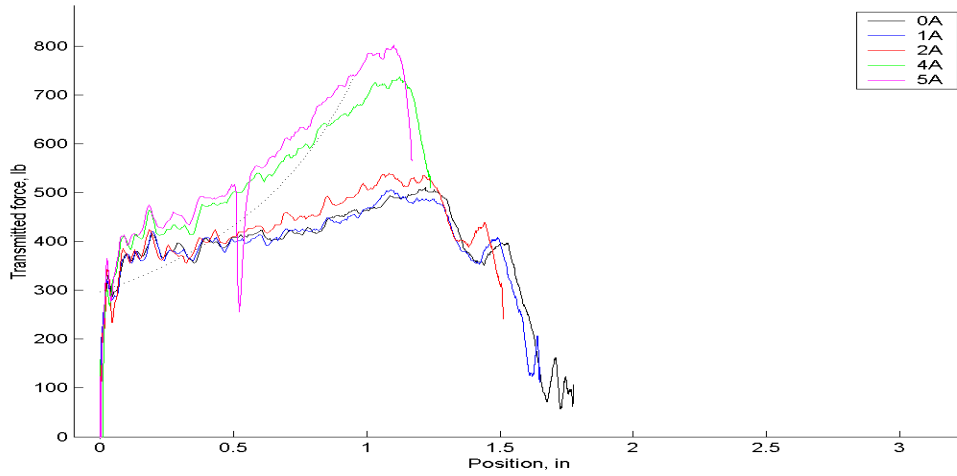


Figure A-169. Force transmitted to the base versus the piston displacement

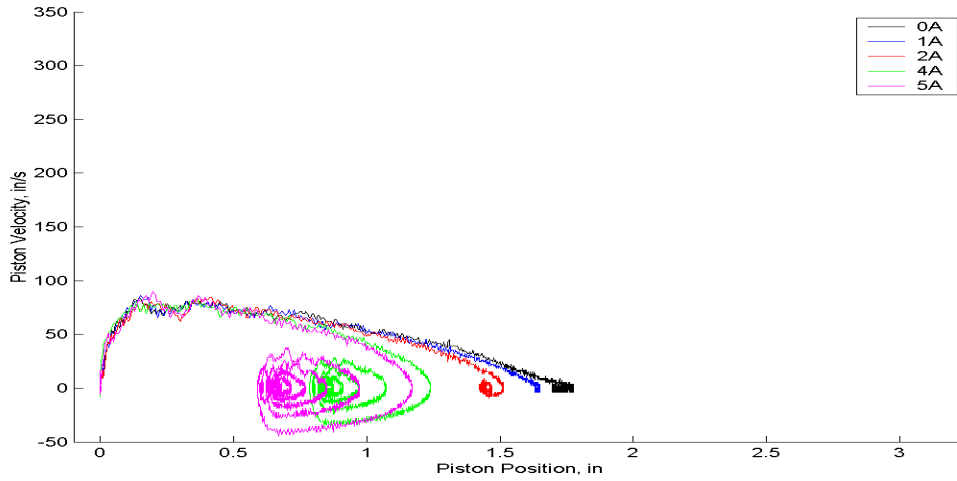


Figure A-170. Piston velocity versus the piston displacement

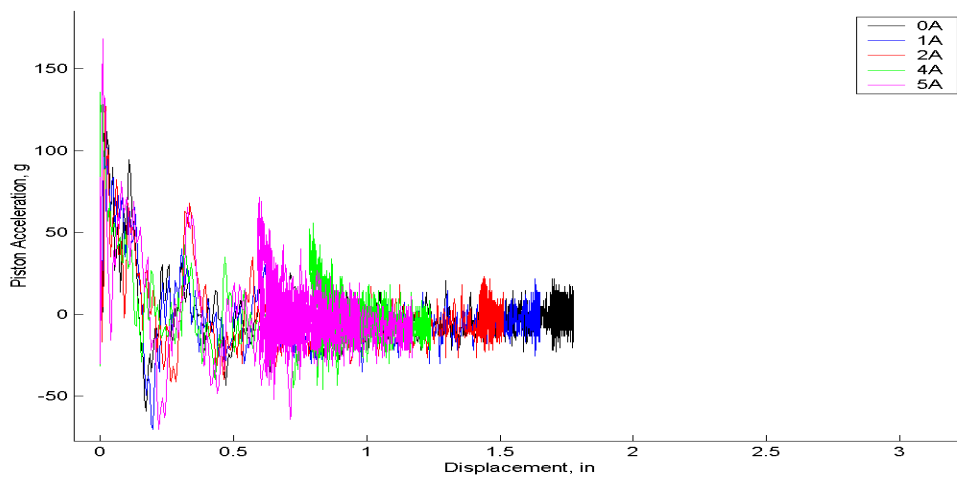


Figure A-171. Piston acceleration versus the piston displacement

Test 3: Mono-tube MR Damper Subject to 7 ft/s Impact

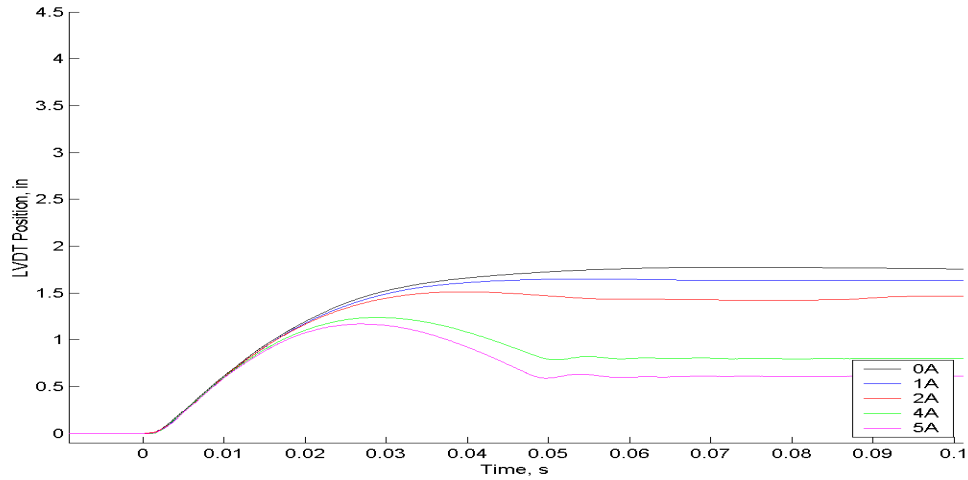


Figure A-172. Piston displacement versus the time from the initial contact

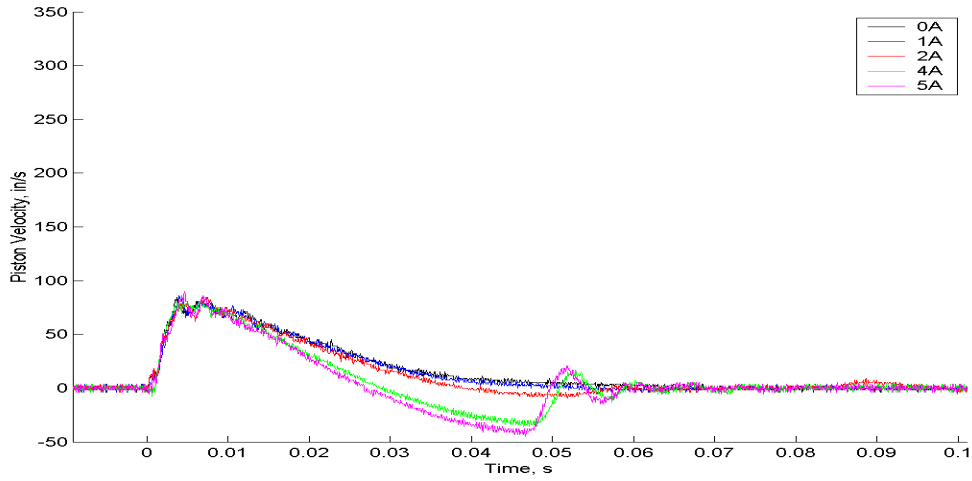


Figure A-173. Piston velocity versus the time from the initial contact

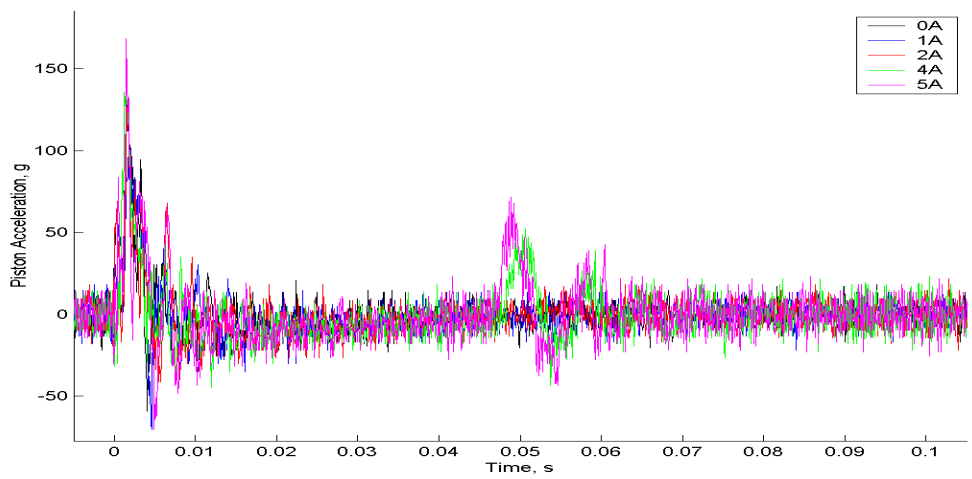


Figure A-174. Piston acceleration versus the time from the initial contact

Test 3: Mono-tube MR Damper Subject to 7 ft/s Impact

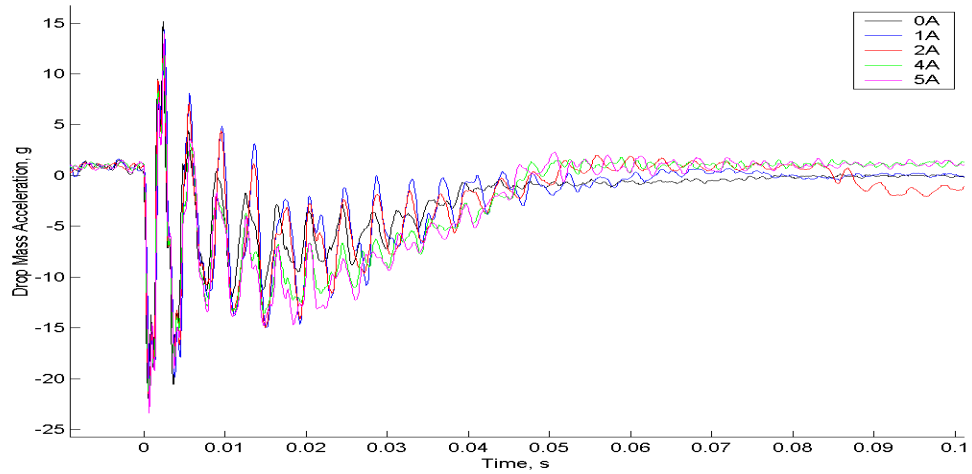


Figure A-175. Acceleration of the drop mass versus the time from the initial contact

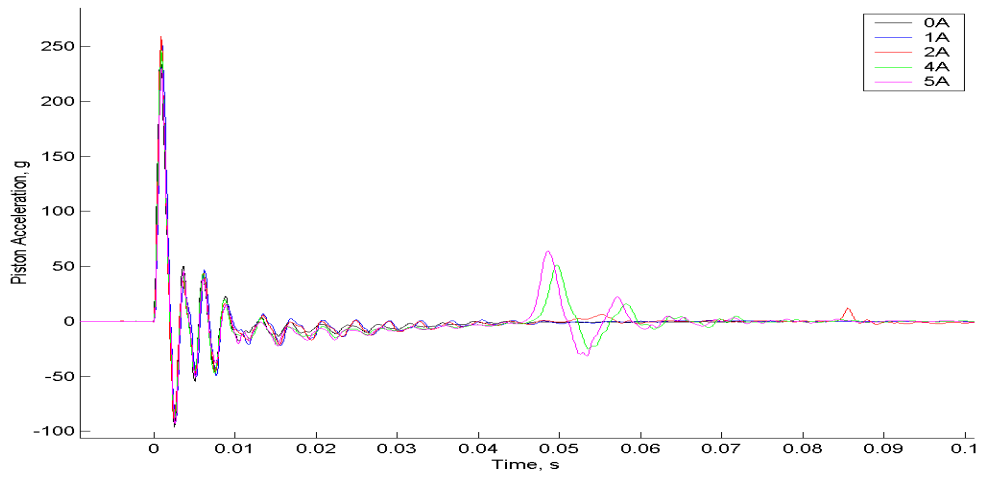


Figure A-176. Piston acceleration versus the time from the initial contact*

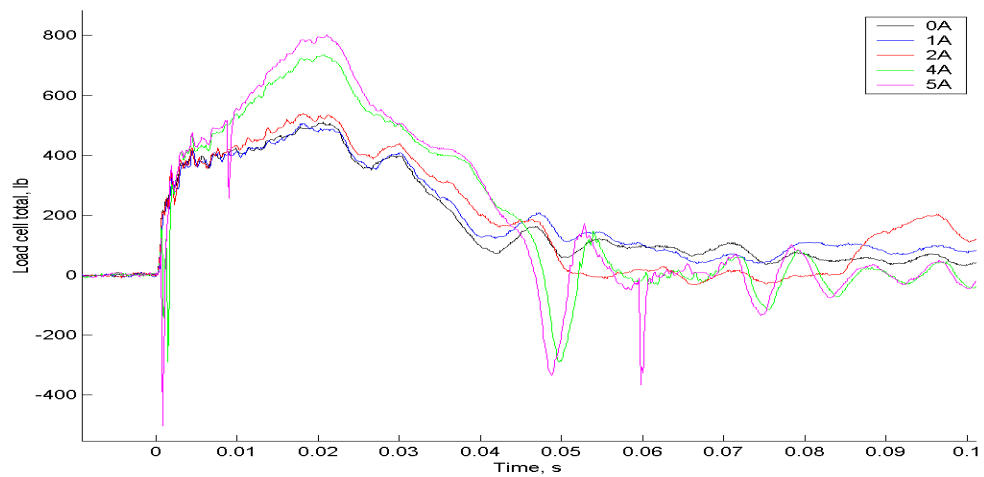


Figure A-177. Force transmitted to the base plate versus the time from the initial contact

Test 3: Mono-tube MR Damper Subject to 7 ft/s Impact

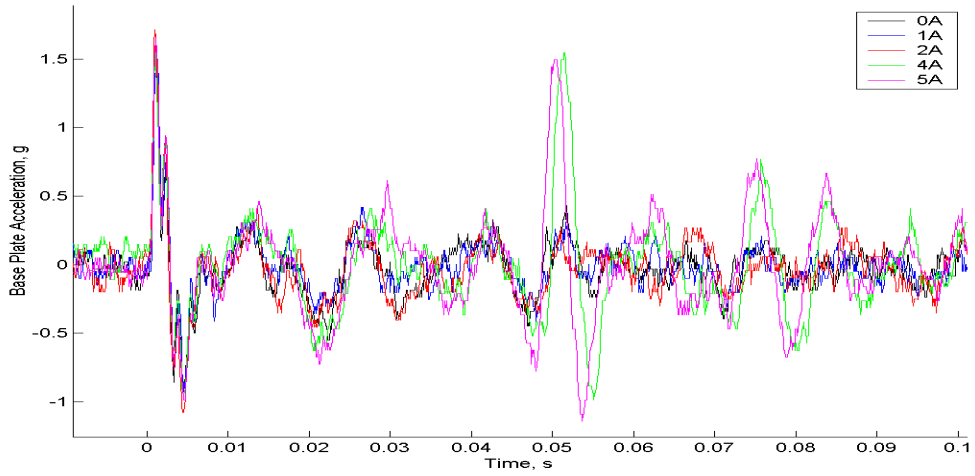


Figure A-178. Acceleration of the base plate versus the time from the initial contact

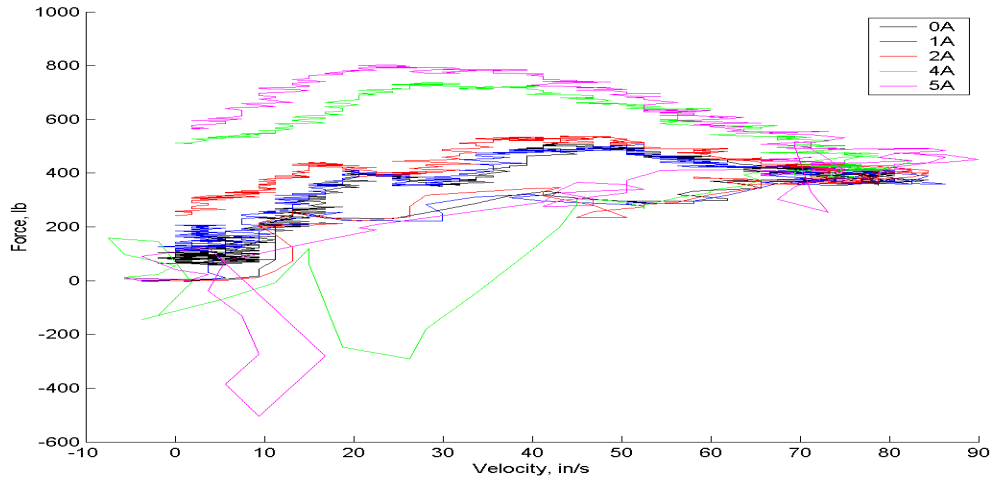


Figure A-179. Force transmitted to the base versus the piston velocity

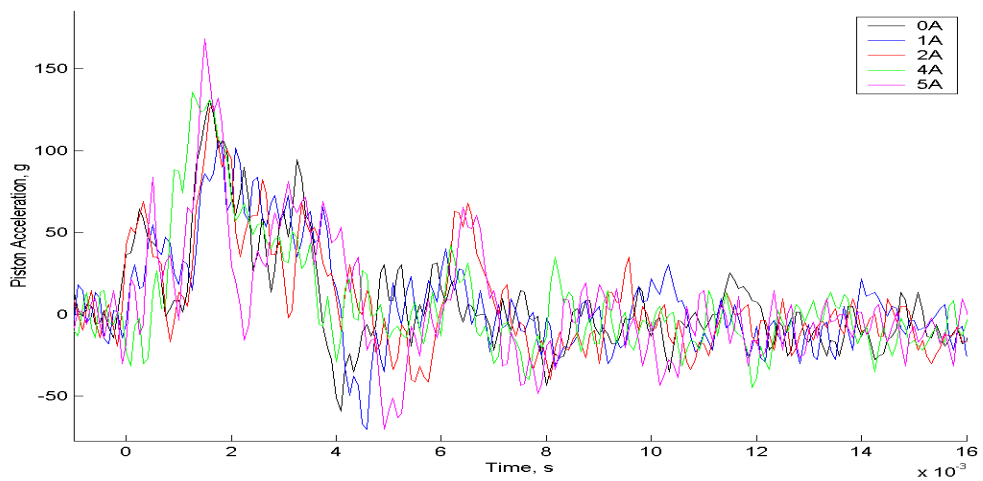


Figure A-180. Piston acceleration versus the time from the initial contact**