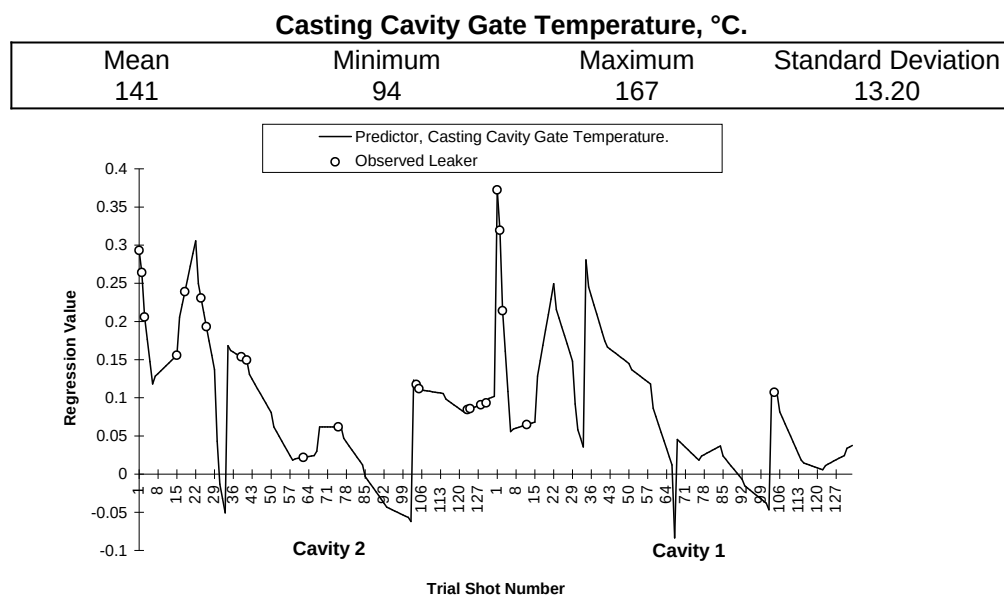


## Appendix F: Data from Casting Trial

### F.1 Linear Regressions Between Input Parameters and Leaker Occurrence

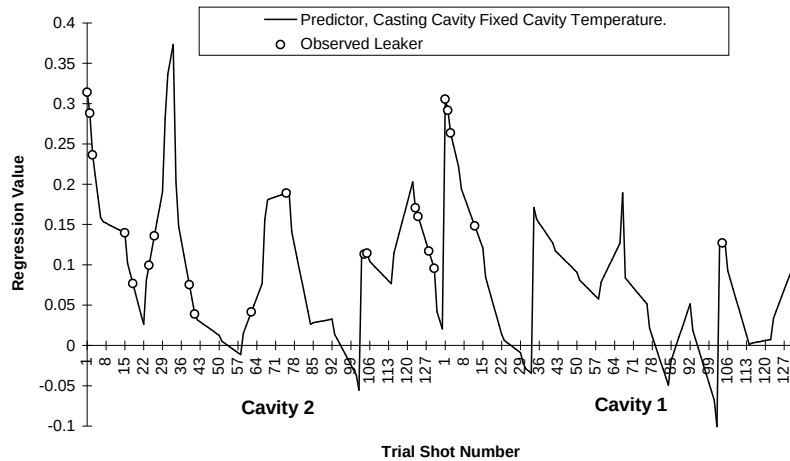
The following plots detail the likelihood of leaker occurrence as predicted by the single parameter named in the legend of each plot. The mean, minimum, maximum, and standard deviation of the parameter values recorded during the trial are also given for reference. The plots are listed in order of the strength of the correlation between the input parameter and the occurrence of leakers.

The plots for the die temperatures detail the results for each cavity and trial shot number. The remaining plots group the cavities together as for the shot end parameters and the metal temperature the regression value is the same for each cavity. An observed leaker on these plots indicates that either or both cavities produced a leaking casting.



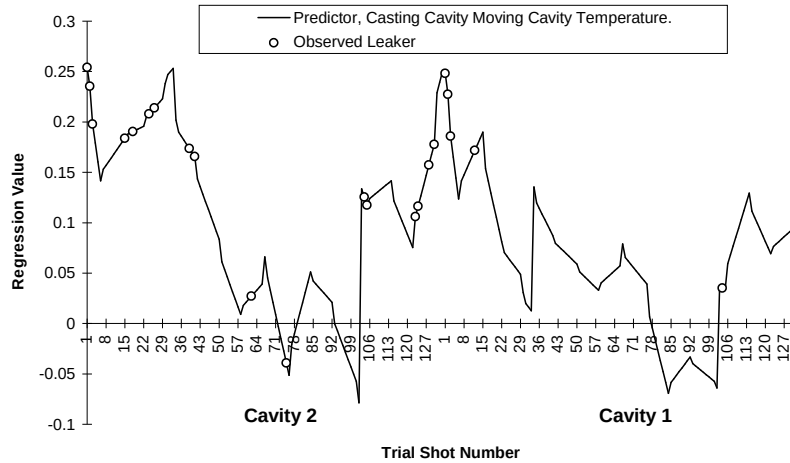
### Casting Cavity Fixed Cavity Temperature, °C.

Mean	Minimum	Maximum	Standard Deviation
117	71	146	12.77



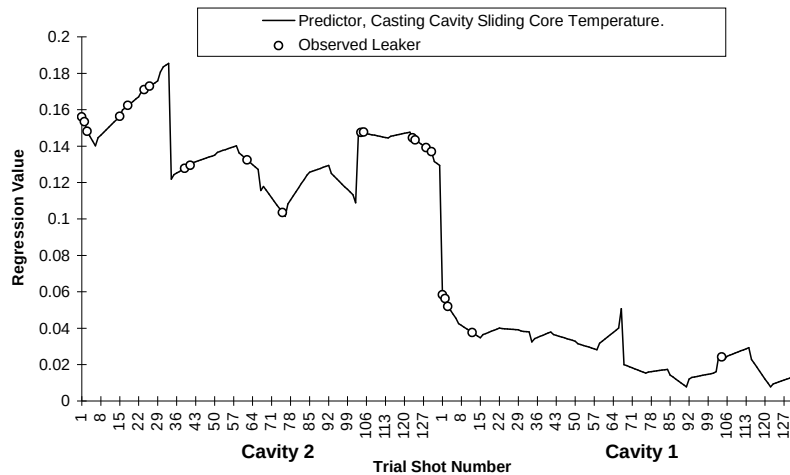
### Casting Cavity Moving Cavity Temperature, °C.

Mean	Minimum	Maximum	Standard Deviation
118	89	145	13.10



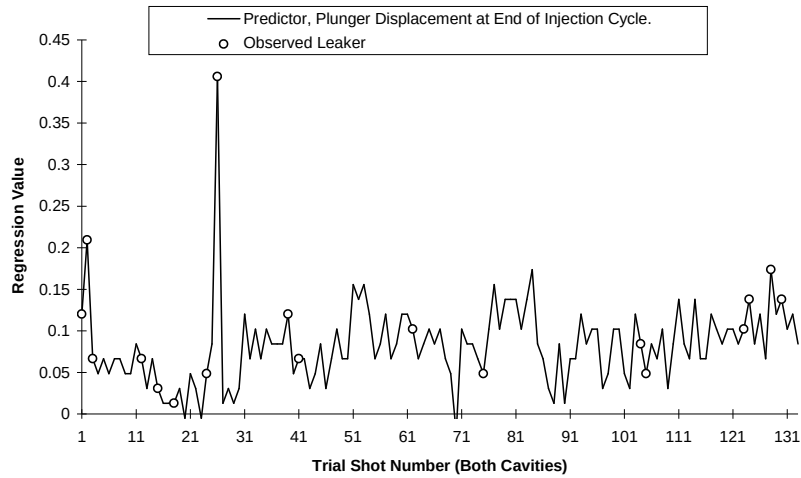
### Casting Cavity Sliding Core Temperature, °C.

Mean	Minimum	Maximum	Standard Deviation
213	118	283	53.45



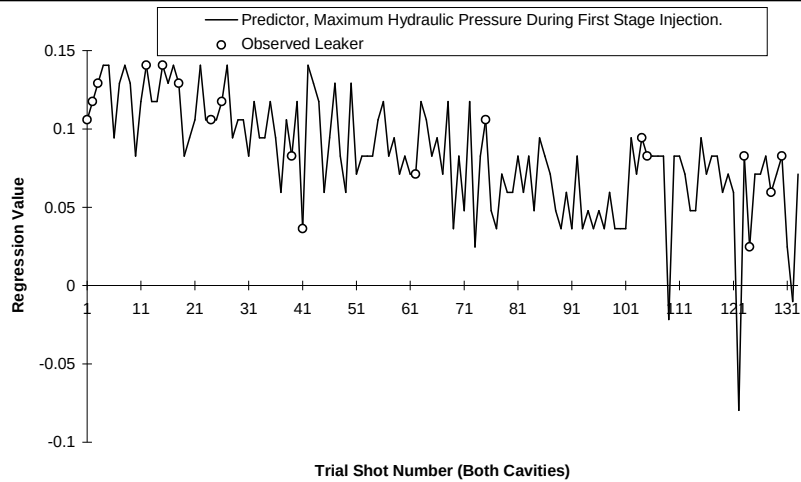
### Plunger Displacement at End of Injection Cycle, mm.

Mean	Minimum	Maximum	Standard Deviation
365	359	383	2.75



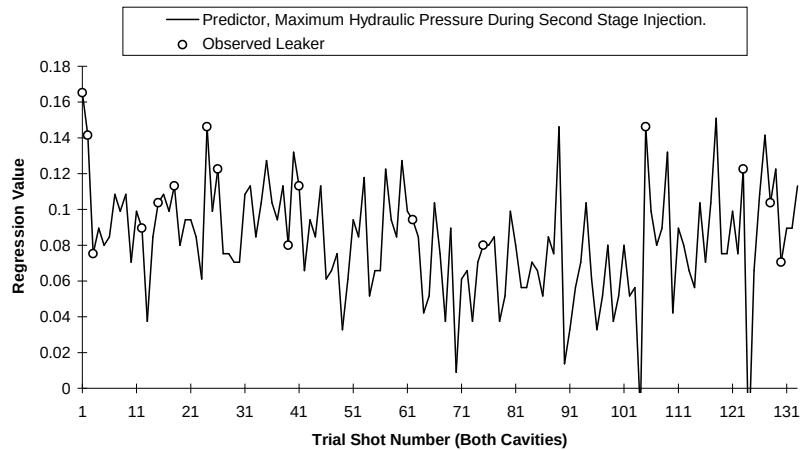
### Maximum Hydraulic Pressure During First Stage Injection, Bar.

Mean	Minimum	Maximum	Standard Deviation
5	0	19	3.07



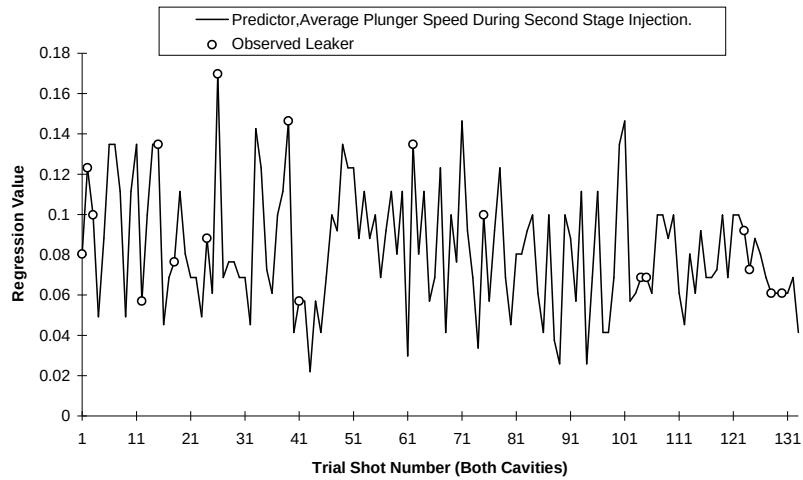
### Maximum Hydraulic Pressure During Second Stage Injection, Bar.

Mean	Minimum	Maximum	Standard Deviation
134	117	159	6.70



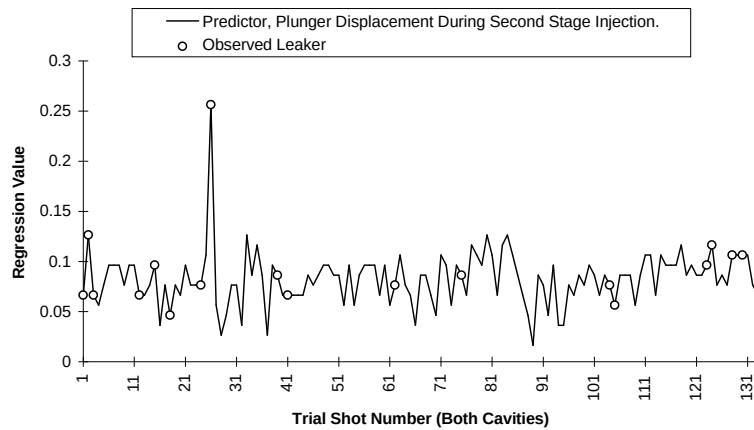
### Average Plunger Speed During Second Stage Injection, m/s.

Mean	Minimum	Maximum	Standard Deviation
1.93	1.77	2.15	0.08



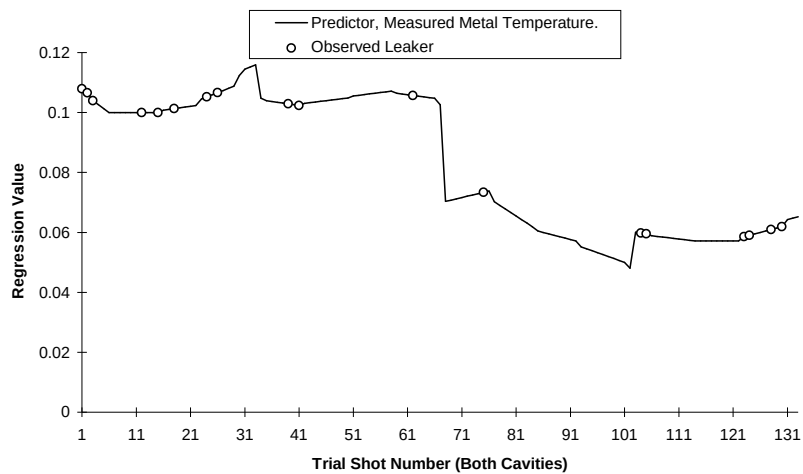
### Plunger Displacement During Second Stage Injection, mm.

Mean	Minimum	Maximum	Standard Deviation
71	64	88	2.68



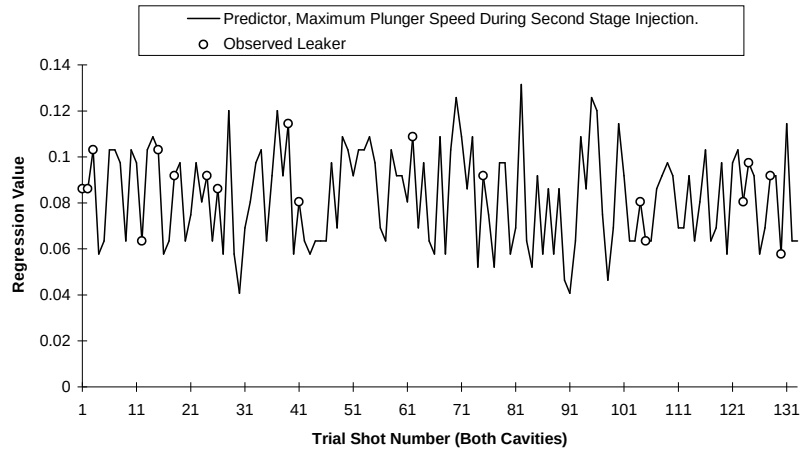
### Measured Metal Temperature, °C.

Mean	Minimum	Maximum	Standard Deviation
749	722	787	12.87



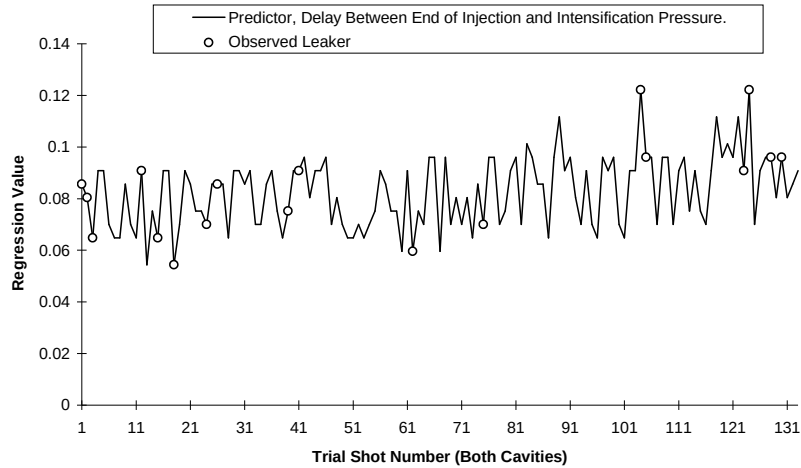
### Maximum Plunger Speed During Second Stage Injection, m/s.

Mean	Minimum	Maximum	Standard Deviation
3.34	2.60	4.20	0.37



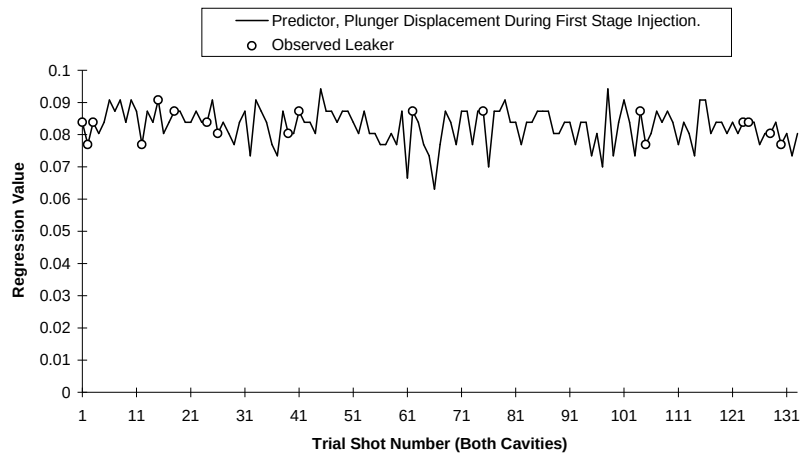
### Delay Between End of Injection and Intensification Pressure, ms.

Mean	Minimum	Maximum	Standard Deviation
58	50	63	2.61



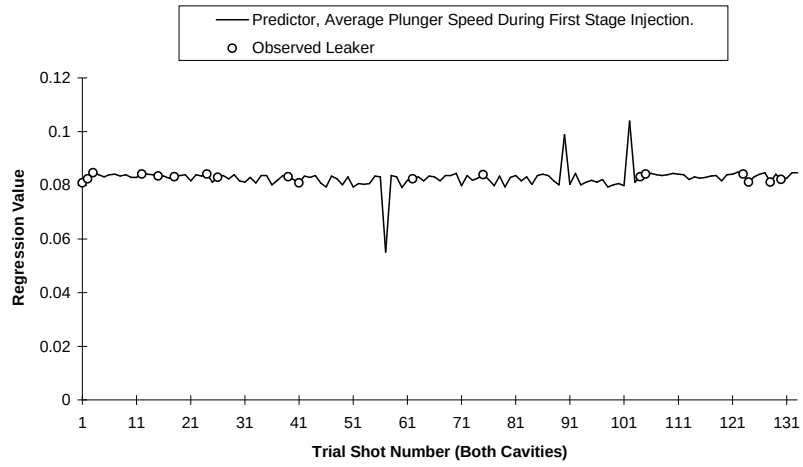
### Plunger Displacement During First Stage Injection, mm.

Mean	Minimum	Maximum	Standard Deviation
289	286	295	1.57



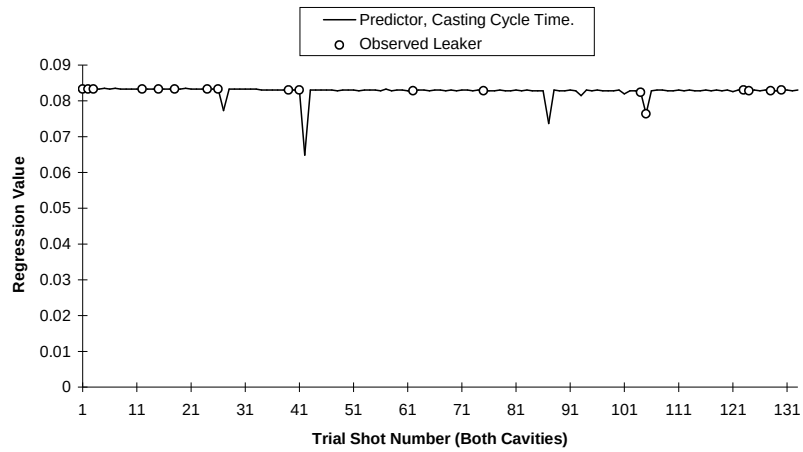
### Average Plunger Speed During First Stage Injection, m/s.

Mean	Minimum	Maximum	Standard Deviation
0.30	0.19	0.38	0.01



### Casting Cycle Time, s.

Mean	Minimum	Maximum	Standard Deviation
51	47	131	8.64



## F.2 Results of Analysis of Alloy Composition of Castings Made During Trial

Table F .1 shows results of compositional analysis carried out on three water inlet castings sampled during the course of the trial discussed in Chapter 4. During the course of the trial the holding furnace was refilled with molten alloy from the melting furnace twice. The data in Table F .1 represents one casting made between each refill. The variation witnessed was deemed insufficient to warrant analysis of further castings.

	Casting Sampled Near Start of the Trial	Casting Sampled Near Middle of the Trial	Casting Sampled Near End of the Trial
Aluminium	Balance (85.93)	Balance (85.52)	Balance (86.00)
Silicon	8.41	8.7	8.34
Copper	3.08	3.2	3.05
Iron	0.89	0.86	0.88
Magnesium	0.2	0.2	0.2
Zinc	1.11	1.15	1.15
Lead	0.06	0.06	0.06
Chromium	0.03	0.03	0.03
Nickel	0.05	0.05	0.05
Manganese	0.21	0.2	0.21
Titanium	0.019	0.019	0.019
Tin	0.01	0.01	0.01
Strontium	<0.001	<0.001	<0.001
Zirconium	0.005	0.005	<0.005

Table F.1 Results of Analysis in Weight % for Three Sample Castings.