FAILURE TIMES OF BEARINGS

8.   The Nonparametric Approach

The F-test applied to our data has the underlying assumptions of normality and equal variances for the five experimental groups. However, the graphical displays studied in Section 3 indicate that the assumptions might be violated. On the other hand, the number of observations in each group (10) is relatively small; it is difficult to detect nonnormality or departures from the equal variances assumption of in such cases.

Under these circumstances, the nonparametric Kruskal-Wallis test procedure provides a very good alternative. This test finds frequent use whenever sample sizes are small and it may be less sensitive to departures from the assumption of equal variances, as compared to the F-test.

The Kruskal-Wallis test output in SPSS for our experiment is displayed below. The instructions how to obtain the output are given in the *Computer Instructions* module.

Kruskal-Wallis 1-Way Anova

TIME
by CODE

Mean Rank	Cases	Group Code
28.20	10	CODE = 1
12.60	10	CODE = 2
23.00	10	CODE = 3
24.80	10	CODE = 4
38.90	10	CODE = 5
Total	50	

Chi-Square	D.F.	Significance
16.9412	4	.0020

The p-value of the test is reported as 0.002 indicating strong evidence against the assumption of no differences in the group means. This is consistent with the results obtained with the F-test. The p-value obtained for the test is identical to the value displayed above.