COMPARING THE DURABILITY OF TIRES

13. Final Comments

In order to isolate and measure the effects of tire durability on tire wear, we used matched pairs design and restated the data as single-sample data by taking the differences within each pair. We applied the statistical tools to the differences.

The scatterplot of tread depths of brand A versus brand B tires, the boxplot and histogram of differences strongly support the thesis that the tread depth of brand A tires tends to exceed the tread depth of brand B tires.

The normal quantile plot for the differences indicates that the assumption of normality necessary to apply the t-tools might be slightly violated. Though the t-tools are quite robust against nonnormality, they should be used with some caution in the experiment. The p-value of the t-test is zero providing strong evidence that brand A tires have better durability than brand B tires, on the average. Thus the data provide strong evidence that the durability has increased after the new technology was implemented. The mean difference between the tread depth of the two brands is estimated to be between 0.1486 and 0.4044 in 1/32 of an inch. The conclusions are consistent with the results provided by distribution-free procedures, the Wilcoxon Signed-Rank Test and the Sign Test.

Can we make any conclusions about the effects of the new technology on tire wear? Can we claim that the new technology has improved the durability of tires? The answer to the above question depends on the conditions the new technology was implemented under. The new technology might be implemented in different conditions than the old technology, in a different factory building, by a different group of workers, and so on. It is possible that the smaller tire wear could be attributed to these factors, but not to the new technology.