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Minitab Project – 3.1

INFS 608 Applied Statistics

# Overview:

Today we are looking into our newly developed golf ball coating and how it compares our current coating. The new coating is designed to make the ball more cut-resistant and longer lasting. However, we now need to determine how the travel distance of balls with the new coating compare to the balls with the current one. We have collected test travel distance data for both coating types and the following is an analysis along with any recommendations based on that analysis.

# Initial Analysis Setup

The analysis of this data will require using an one-tailed hypothesis test to see if there is a significant difference between the point estimates of mean data for the Current and New golf balls. We begin the hypothesis test with the following:

µc = Current Ball Coating

µN = New Ball Coating

H0 ­: µc - µN ≤ 0

The mean travel distance for balls with the new coating is at least as far or farther than balls with the current coating.

H1: µc - µN > 0

The mean travel distance for balls with the new coating is not as far as balls with current coating.

# Hypothesis Test Results

Two-Sample T-Test and CI: Current, New

Method

|  |
| --- |
| µc: mean of Current |
| µN: mean of New |
| Difference: µc - µN |

*Equal variances are not assumed for this analysis.*

Descriptive Statistics

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Sample | N | Mean | StDev | SE Mean |
| Current | 40 | 270.27 | 8.75 | 1.4 |
| New | 40 | 267.50 | 9.90 | 1.6 |

Estimation for Difference

|  |  |
| --- | --- |
| Difference | 95% Lower Bound for Difference |
| 2.77 | -0.70 |

Test

|  |  |
| --- | --- |
| Null hypothesis | H₀: µc - µN = 0 |
| Alternative hypothesis | H₁: µc - µN > 0 |

|  |  |  |
| --- | --- | --- |
| T-Value | DF | P-Value |
| 1.33 | 76 | 0.094 |

**Statistical Decision:** With an 95% Confidence, we conclude that we must fail to reject the null hypothesis. If you will recall, the null hypothesis was that the mean travel distance for a ball with the new coating would be as far or farther than a ball with the current coating.

**Statistical Interpretation:** Because the P-value for this test 0.094 is greater than the α = 0.05, we can conclude that there is no statistical significant evidence that a ball with the new coating will travel a shorter distance than a ball with the current coating.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Descriptive Statistics | | | |  |  |  |  |  |  |  |
| **Variable** | **N** | **Mean** | **SE Mean** | **StDev** | **Minimum** | **Q1** | **Median** | **Q3** | **Maximum** | **IQR** |
| Current | 40 | 270.27 | 1.38 | 8.75 | 255 | 263 | 270 | 275.75 | 289 | 12.75 |
| New | 40 | 267.5 | 1.56 | 9.9 | 250 | 262 | 265 | 275.5 | 289 | 13.5 |

Figure 1



Figure 2



Figure 3

Descriptive Statistics

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| N | Mean | StDev | SE Mean | 95% CI for μ |
| 40 | 270.27 | 8.75 | 1.38 | (267.48, 273.07) |

*μ: mean of Current*



Figure 4

Descriptive Statistics

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| N | Mean | StDev | SE Mean | 95% CI for μ |
| 40 | 267.50 | 9.90 | 1.56 | (264.33, 270.67) |

*μ: mean of New*



Figure 5

Descriptive Statistics

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Sample | N | Mean | StDev | SE Mean |
| Current | 40 | 270.27 | 8.75 | 1.4 |
| New | 40 | 267.50 | 9.90 | 1.6 |



Figure 6

# Recommendation

We can confidently recommend that we proceed with production of balls with the new coating. As the data indicates, the new coating will provide a more cut-resistant, longer lasting ball that will travel at least as far as the balls using the current coating.