

Research and Optimization of the Influence of Process Parameters on Ti Alloys Surface Roughness Using Femtosecond Laser Texturing Technology

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| ANOVA for Roughness R_a | | | | | | | |
|---------------------------------------|--|---|---|--|--|--|---------------------------|
| Factors: | $R_{ao}, R_{aoLM}, R_a, R_{aLM}, R_{amc}, R_{amcLM}$ | | | | | | |
| Null hypothesis: | All means are equal | | | | | | |
| Alternative hypothesis: | Not all means are equal | | | | | | |
| Significance level: | $\alpha = 0.05$ | | | | | | |
| Source | DF | Seq SS | Contribution | Adj SS | Adj MS | F-Value | p-Value |
| Factor | $r-1$ | $\sum n_i (\bar{y}_i - \bar{y})^2$ | $\frac{\text{Seq SS}_{\text{Factor}}}{\text{Seq SS}_{\text{Total}}}$ | $\text{Seq SS}_{\text{Total}} - \text{Seq SS}_{\text{Factor}}$ | $\frac{\text{Seq SS}_{\text{Factor}}}{DF_{\text{Factor}}}$ | $\frac{\text{Adj MS}_{\text{Factor}}}{\text{Adj MS}_{\text{Error}}}$ | $\frac{y_i - \bar{y}}{S}$ |
| | | | $\text{Seq SS}_{\text{Total}}$ | | | | |
| | | | $\text{Seq SS}_{\text{Error}}$ | | | | |
| Error | $n-r$ | $\sum_i \sum_j (y_{ij} - \bar{y}_i)^2$ | $\frac{\text{Seq SS}_{\text{Error}}}{\text{Seq SS}_{\text{Total}}}$ | $\text{Seq SS}_{\text{Total}} - \text{Seq SS}_{\text{Error}}$ | $\frac{\text{Seq SS}_{\text{Error}}}{DF_{\text{Error}}}$ | | |
| | | | $\text{Contr. Factor} + \text{Contr. Error}$ | | | | |
| Total | $n-1$ | $\sum_i \sum_j (y_{ij} - \bar{y})^2$ | | | | | |
| Model Summary | | | | | | | |
| S | | $R\text{-sq}$ | $R\text{-sq(adj)}$ | $PRESS$ | $R\text{-sq(pred)}$ | | |
| $\sqrt{\text{Adj MS}_{\text{Error}}}$ | | $1 - \frac{\text{Seq SS}_{\text{Error}}}{\text{Seq SS}_{\text{Total}}}$ | $1 - \frac{\text{Adj MS}_{\text{Error}}}{\text{Seq SS}_{\text{Total}}/DF_{\text{Total}}}$ | $\sum_{i=1}^n (y_i - \hat{y}_i)^2$ | $1 - \frac{PRESS}{\text{Seq SS}_{\text{Total}}}$ | | |

Figure S1. ANOVA sample comparison test of roughness.

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