Nowadays, it is well established that the degradation caused by the presence of solid particles between the contacting surfaces can severely reduce the lifetime of machine components. This study focuses on the failure of a dry rolling contact under the effect of solid contaminants. To achieve this goal, experiments have been conducted on an original experimental set-up which represents the real operating conditions of gears or roller bearings. In fact, dry rolling contact tests are carried out using the contact between two steel disks. In order to investigate the influence of three operating variables which are: Particles size (S), Rotational speed (V) and Load (Q) on the studied responses (i.e. wear (W) and surface roughness (Ra)), the Taguchi L9 orthogonal array was adopted. The analysis of the obtained experimental results is achieved using both response surface methodology (RSM) and analysis of variance (ANOVA) techniques. The results display that the particles size (S) is the dominant factor affecting the wear of a contaminated dry rolling contact (S: 59,93%), whereas it is found that the applied load (Q) has the most significant effect on the surface roughness (Ra) (Q: 69,94%). Finally, from developed RSM models of wear and surface roughness, it is judged that the obtained higher values of determination coefficient (more than 75%) show clearly the high correlation between the predicted and experimental data.