Extracting useful knowledge and predictive modeling of massive datasets is an extremely important task. In many real problems, data are imperfect or uncertain in nature. Such uncertainties create bias and make the task of predictive modeling more challenging. Typically, most traditional classification techniques demonstrate poor performance in an environment with imperfect data. So far, several mathematical formulations have been proposed for classification of imperfect data but typically in individual frameworks. In this research, the main algorithmic approach for simultaneously handling the imperfect data is cost-sensitive learning technique (CSL). We study the application of CSL with the well-known data mining algorithm, termed Support Vector Machine. We also explore the best performance measures to tackle the imperfect data along with addressing the real problems in quality control and business analytics.