Now more than ever, the global competition have changed the way manufacturing companies operate. These changes have affected maintenance and made its role even more crucial for business success. To remain competitive, the

manufacturing companies are forced to continuously increase the efficiency and the profitability of their facilities that are growing in complexity. Rotating machines cover a wide range of these facilities. However, no matter how well they are

designed and manufactured, as the service time goes by, various problems will appear, blocking the running of the machine and causing serious accidents inevitably. Vibration-based condition monitoring aim is to detect the initiation of faults and

symptoms related to their different degradation conditions. In this thesis, a novel methodology for rotating machines diagnosis has been developed which combines a self adaptive time-frequency analysis method, Hilbert empirical wavelet transform, and the singular value decomposition. The fault feature extraction and classification method has been verified using results from both dynamic modeling and simulation of an electromechanical system and test rigs. The lectromechanical

system comprising a three phase induction motor coupled with a single stage spur gearbox with effects of faults due to 45 shaft slant crack, tooth cracking, and tooth surface pitting. Experiments have been conducted on the data sets extracted from two tests campaigns and collected at different speed and load conditions. The first one consists of a gearbox with five pinion fault types while the second one is an induction motor driven mechanical system with three fault statuses in the bearing