The aim of this PhD project is the identification of linear time varying systems, whose applications concern modal analysis (estimation of natural frequencies, damping factors and modes of structures) and VIB (vibration based inspection). These are structures in which certain quantities governing their behavior change with time, so that the system will respond differently to the same input at different times. Several techniques are exploited. At first a vector ARMA model is studied and analyzed: under the hypothesis that the actual input can be treated stochastically the system can be described by a mathematical model based on parameters. Recently some techniques, referred to as Blind Source Separation (BSS), and currently used in other domains, have been proposed for structural dynamics, these are studied by using different approaches and exploiting the theory that lies behind.