In this thesis, a new technique has been developed for determining the composition of a collection of loads including induction motors. The application would be to provide a representation of the dynamic electrical load of Brisbane so that the ability of the power system to survive a given fault can be predicted. Most of the work on load modelling to date has been on post disturbance analysis, not on continuous on-line models for loads. The post disturbance methods are unsuitable for load modelling where the aim is to determine the control action or a safety margin for a specific disturbance. This thesis is based on on-line load models. Dr. Tania Parveen considers 10 induction motors with different power ratings, inertia and torque damping constants to validate the approach, and their composite models are developed with different percentage contributions for each motor. This thesis also shows how measurements of a composite load respond to normal power system variations and this information can be used to continuously decompose the load continuously and to characterize regarding the load into different sizes and amounts of motor loads.