The goal of this paper is to evaluate performances of a new hysteresis current control strategy for autonomous three phase parallel active filter in harmonic currents elimination (by simulation an experiment) as well as the reactive power compensation (by simulation). This strategy, called the Optimized Hysteresis Control Strategy, is based on currents errors and their derivatives calculation each time the zero voltage vector is set at the AC side of the inverter of the active filter. The harmonic currents are identified using the method of the instantaneous real and imaginary powers. A voltage regulation loop is used to regulate the condenser DC voltage which ensure a constant DC voltage to the inverter. A digital software C++ simulation program was developed and implemented via the data acquisition board (AT-MIO-16X DAQ from National Instruments). Simulation and experimental results are presented