Inverse problems have been reported in a variety of studies to determine unknown parameters or unknown functions by using measurements of some quantities and a mathematical model of the problem. Several numerical experiments in inverse thermal problems have been done to estimate many aspects such as inlet (or initial) condition, boundary conditions and physical properties. The reported works deal with inverse conduction, radiation and convection problems. The instability inherent to the inverse problems was overcome by data over-specification. In this paper we examine an inverse heat convection problem of estimating unknown parameters of a variable boundary heat flux. The function estimation is reduced to a parameter estimation problem through a parameterization in terms of some trial functions. The physical problem treated here is a hydrodynamically developed thermally developing, three-dimensional steady state laminar flow of a fluid inside a circular sector ducts, insulated in the flat walls and subject to unknown wall heat flux at the curved wall. Results are presented for polynomial and sinusoidal trial functions and the unknown surface heat fluxes are determined. Depending on the nature of the flow, on the trial functions used, on the position of experimental points, the inverse problem sometimes could not be solved. Therefore an identifiability condition is defined in order to specify a condition under which the inverse problem can be solved. Once the parameters are computed is important to obtain the statistical significance of the inverse problem solution. Approximate confidence bounds, based on standard statistical linear procedure, for the estimated parameters are analyzed and presented."