Abstract: In this paper, a global conditioning index, $\eta$ and condition number, $\kappa$ are examined for the workspace optimization of the sixteen fundamental robot manipulators classified by Huang and Milenkovic (1983). Our goal was to find the optimum link lengths and volume for these robot manipulators. There are two design objectives: maximize the workspace area covered by the robot manipulator and minimize the condition number. As examples, SN (spherical) three-link robot manipulators and RR three-link robot manipulators were studied based on the stated design objectives. Also, optimization results of these sixteen industrial robot manipulators were obtained and compared to each other.

Keywords: Robot kinematic design, robot workspace optimization.