In this paper we present a method for finding the transformation between a laser scanner and a robot manipulator. We present the design of a flat calibration target that can easily fit between a laser scanner and a conveyor belt, making the method easily implementable in a manufacturing line. We prove that the method works by simulating a range of different orientations of the target, and performs an extensive numerical evaluation of the target's design parameters to establish the optimal values as well as the worst-case accuracy of the method.