

## SUMMARY OF Ph.D. DISSERTATION

School Science for Open and Environmental System	Student Identification Number	SURNAME, First name  DOYO, Daisuke
Title  A Study on Training for Controlling Pressure Strength in Manual Assembly Work		
Abstract <p>In industries like home appliances, business machines and communication devices, line production is common because of difficulty in acquiring multi skill workers, and manual assembly is common because of cost ineffectiveness of automated line. In production lines of these industries, much of the work performed by workers' manual assembly, and much of those works consisted from attaching parts or components by applying pressure with simple tools and/or the hand. While these tasks are generally not considered to be difficult, many workers are unable to complete their work without making mistakes and within the prescribed standard time.</p> <p>In order to attach a part precisely, workers are required two controls both of the hand and arm movement that is required to maintain the correct position and angle and the pressing strength used to attach the part. Because hand and arm movements are visible and are easy to train, the effective training methods was developed for these movements and had been verified in previous research. This thesis focuses on an area that has not been addressed in previous research, that is, methods to train skills required to control pressing strength. The objective of this thesis is to propose an effective training method for skills required in controlling pressing strength by examining issues involved in pressing training.</p> <p>In Chapter 1, problems within existing work training based on actual manual assembly work conditions are identified, and the objective of this thesis is described.</p> <p>In Chapter 2, a work model, experimental facilities and a method of evaluation used in this thesis are described.</p> <p>In Chapter 3, the relationship between the amount of pressing strength and the difficulty of training is analyzed. A method by using a power-scale (by which how to feel pressing strength is expressed numerically) to determine training difficulty and the characteristics of behavior in subjects' control of pressing strength are described.</p> <p>In Chapter 4, subjects' learning processes with difficult target strength that is clarified in Chapter 3 are analyzed, and the characteristics of behavior in their control of pressing strength and the changes in their feelings of target strength through the learning process are described.</p> <p>In Chapter 5, training methods are examined from two perspectives: first one is a design oriented approach based on general theories of motor learning and second one is an analytic approach based on findings in Chapters 3 and 4. An effective training method is proposed and its effectiveness is verified.</p> <p>In Chapter 6, as a way to verify the effectiveness of the proposed training method in Chapter 5, an experiment of attaching E-ring works was conducted. This experiment verified the effectiveness of the proposed training method.</p> <p>In Chapter 7, the conclusions of this thesis as well as the challenges that lie ahead are presented.</p>		