# DESIGN AND SIMULATION OF AUTOMATED STORAGE AND RETRIEVAL SYSTEM (ASRS) USING SOLIDWORKS

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# ABSTRACT

This paper presents the design and simulation of Automated Storage and Retrieval System (ASRS) using SolidWorks software. ASRS is a system usually used to ease the storage and retrieval of a lot of things at one place. In this project, the most basic form of ASRS is depicted which is single-unit load aisle captive ASRS. The human ability to imagine differs from one person to another thus to introduce ASRS to people who knows and are indifferent to it, imagination is discarded as this project presents the ASRS in the form of three-dimensional (3D). SolidWorks is used to design the system due to the software being able to offer designers a way to design in 3D and provide simulation of its movements using motion analysis. It is also used to analyze critical parts in the system using Simulation Xpress study.

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# INTRODUCTION

## 1.1 Research Background

It is no longer a foreign matter that automation is integrating in humans' daily life. In fact, nowadays, people tend to search for automated ways to do their jobs or routine. Sometimes the term automation is used interchangeably with robotics. This is due to the work and researches of automation that may include robotics element and vice versa. According to Kenneth Yigael Goldberg, the difference in robotics and automation are in terms of quality control [1]. While researches in robotics tend to be more of the way to imitate movements of life-forms such as walking, jumping, running, surgical tasks and many more, researches in automation tend to focus on increasing the reliability, productivity and efficiency of any systems or robotic movements. For example, the quality of a system can be increased with new techniques, analysis models etc. In some cases when robotics is involved, such as a walking robot, researches of automation on it is meant to make the robot walk more efficiently, more cost productive and more reliable.

Although ASRS has already existed since the 1950s [2], there are still room for automation in the system. There are two primary versions of ASRS, one being fixed aisle and the other is carousels/Vertical Lift Module (VLM). These two versions mentioned differs from each other in the way the loads are stored and retrieved. Loads are usually products or materials that has been put on a pallet or a specific storage box. The design in this project uses a fixed aisle ASRS. A fixed aisle ASRS consists of fixed storage spaces and a mean of storing and retrieving the loads in the spaces, using a vertical/horizontal lift crane or a movable shuttle [2]. There are also different types of racks for a fixed aisle ASRS, with the most use ones being single-deep and double-deep racking system. As seen in Figure 1.1, a single-deep rack simply means that only one load can be stored or retrieved per one slot in the rack, while double-deep rack is a rack that can store and retrieve up to two load per slot in the rack.