# INTELLIGENT ASSIST DEVICES

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**Abstract**

The Intelligent Assist Device [8, 9, 10] is a computer-controlled manual material handling system, which is designed to be used by a worker for repetitive pick and place tasks in various industrial settings, such as distribution centers, warehouses and auto assembly plants. In these assist devices, the operator force on the device is sensed and amplified electronically by use of a computer to drive the device actuator. In other words, the intelligent assist device extends the worker's physical power by adding mechanical power to the maneuvering task. The correct amount of power to add is calculated instantaneously in the device computer. The result is that the intelligent assist device lifts a pre-programmed larger percentage of the total force of the load (gravity plus acceleration) while the operator lifts the remaining much smaller percentage. This smaller percentage is sensed physically by the operator, so the operator has a feel for the load weight and inertia. With the assistance of the intelligent assist device, a worker can manipulate any object in the same natural way that he/she would manipulate a lightweight object without any assistance. There are NO pushbuttons, keyboards, switches, or valves to control the motion of the intelligent assist device; the device computer controls the motion of the device and its load. It has been shown that intelligent assist devices greatly reduce the risk of back injuries when used by workers performing repetitive maneuvers (e.g. depalletizing). This reduction in injury, in turn, will greatly reduce the national cost of treating back injuries.

The author has designed the Intelligent Assist Device (IAD) based on a solid scientific foundation with one goal in mind: minimizing the risk of injuries associated with repeated maneuvers and maximizing the throughput while being robust and user-friendly during repeated maneuvers. The author has evaluated the use of IAD extensively for three applications: warehousing and distribution centers (e.g. Target Stores), auto assembly plants (GM), and delivery services (US Postal Services). The evaluation has been both quantitative and subjective. This article first describes the Intelligent Assist Device characteristics and then gives an overview of its broad applications in various industries.