INDEVA
INTELLIGENT DEVICES FOR HANDLING

Workplace design using "INDEVA - Intelligent DEVice for hAndling"

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Manual handling of loads

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Manual load handling activities are extremely common in all work and home environments.

In the work environment, these activities are as known regulated by Law 626/94

prescribes a number of obligations for the employer to prevent low back injuries for workers.

Manual handling of loads: traditional systems

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Hoists, cranes, forklifts, lifting platforms.

Disadvantages:

Limited and non-adjustable speed

Movement control via hand control with contact/workpiece control limited to a maximum of one hand

Use of elementary and limited gripping tools (hooks, straps,)

Manual handling of loads

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In modern production processes

Characterized by:

- Complex moving parts
- Limited gripping points
- Articulated work cycles,

Traditional means of handling are almost unusable

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Industrial manipulators

- Zeroing the weight of the object, handling the load as if it were weightless
- Handling directly with hands on the load
- Precise management of lifting speed
- Possible application of special gripping systems

Intelligent Device for Handling

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Conventional manipulators have some application and ergonomic limitations arising from pneumatically controlled technology,the one most commonly used.

- **Intelligent Device** for **Handling** or **INDEVA** is defined in the literature as a "single- or multiple-axis device that employs a hybrid computer-human programmable control system to amplify the human strength."
- It is an **industrial "intelligent" manipulator.** which allows the operator to manipulate, with almost zero effort, any object within the work area required by the work cycle

"INDEVA" Manipulator of the latest generation.

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Characteristics of an INDEVA:

- **High handling speeds**
- **Great responsiveness to the operator's intentions**
- **Intuitiveness in control**

INDEVA acts as a true extension of the operator's arm

Automotive job design

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The auto industry is undoubtedly among the most advanced in the application of modern ergonomic principles in technological choices and process design

The actions coordinated by ergonomists and safety specialists, consist of, among other things:

- Verification of workstations using simulation models
- Altimetry studies of transportation systems to ensure optimal vision and postures for line operators
- Study of workstations that enable the employment of personnel with reduced work capacity
- Assessment of the heaviness, from the point of view of load handling of workstations and adoption of repetitive strain injury prevention methods

The case presented below illustrates the approach used in the design of a workplace where it requires the handling and positioning of parts

Handling and mounting turbo manifolds Problem

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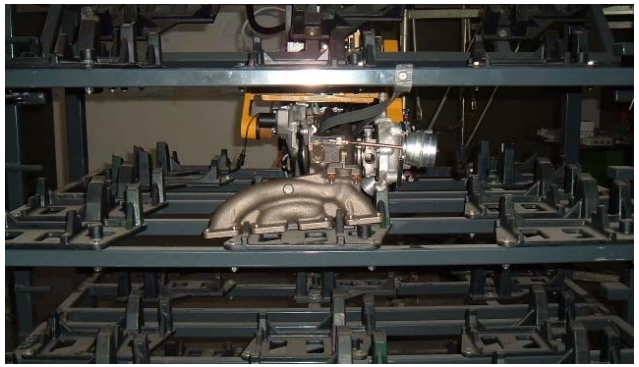
It is required to design a system for mounting turbo manifolds on engine crankcase.

Manifolds should be taken from special containers and mounted on engine crankcase in a cycle time of 25 sec.



The parts inside the pickup containers were in the condition of having such an undercut that the operator could not pick them up manually without having to bend the spine

Handling and mounting turbo collectors Lay out study

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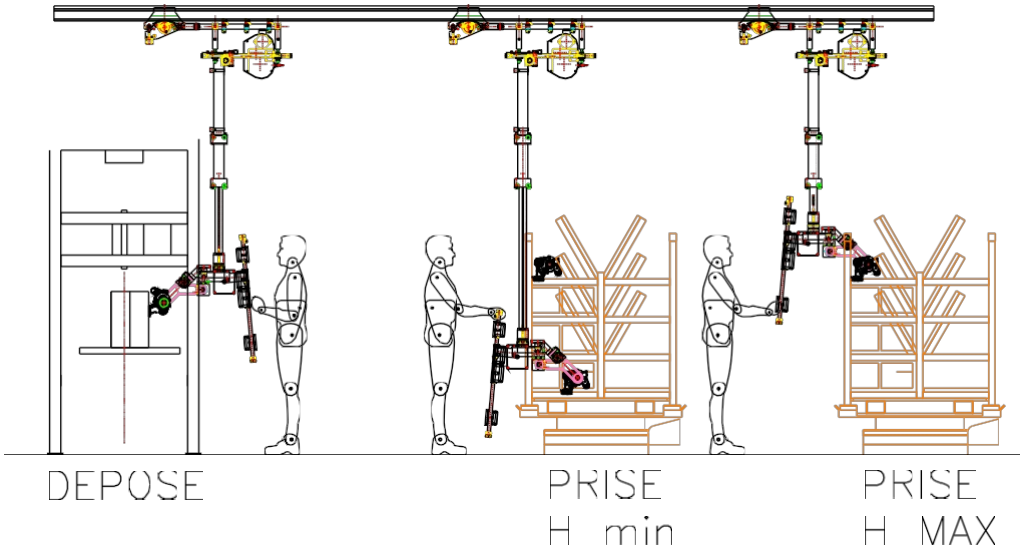

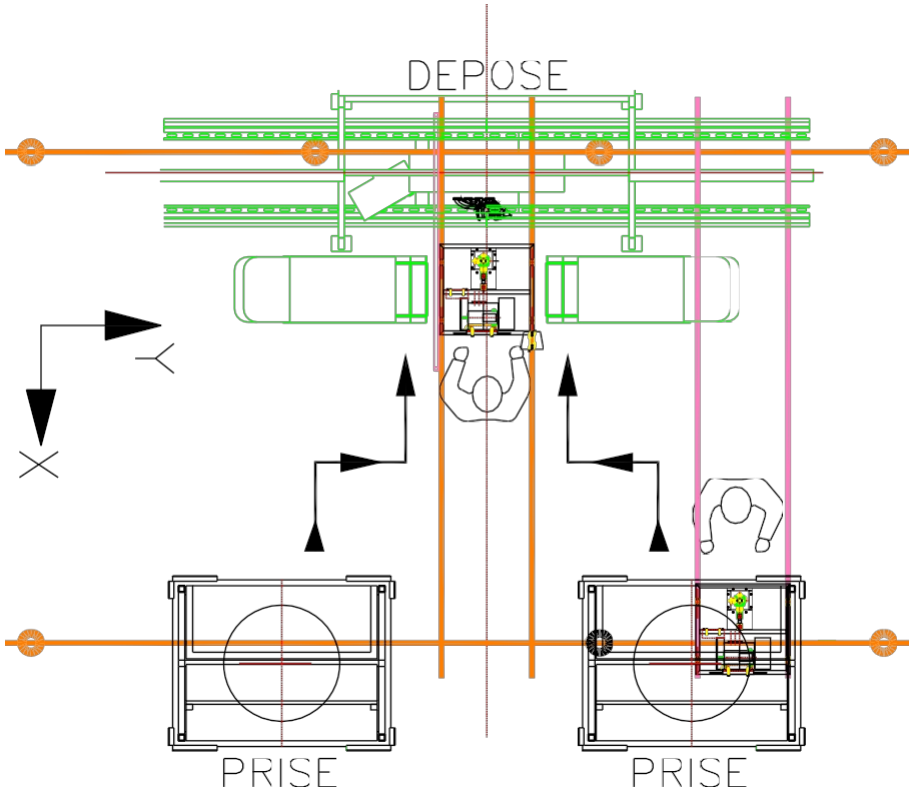

An analysis of the handling cycle and optimization of the layout of the work area where turbo manifold handling is accomplished was carried out.

The result of these processes is the creation of a work area that meets the ergonomic and safety requirements of the regulations

Handling and mounting turbo manifolds Configuration Manipulator

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By analyzing the customer's requirements and ergonomic analysis, it was decided to adopt a state-of-the-art Intelligent Device for Handling (INDEVA) .

Thus, total zeroing of the weight to be moved in space (x-y-z) was achieved by meeting the requirements of sensitivity and speed.

Handling and mounting turbo collectors
Studio Equipment

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The equipment was designed taking into account all the ergonomic principles outlined in UNI ISO EN 14738 and UNI ISO EN 1005 parts 1-2-3-4.

Special care was taken to study the equipment control handles by evaluating and then optimizing the positions and heights of these in the gripping and storage phases.