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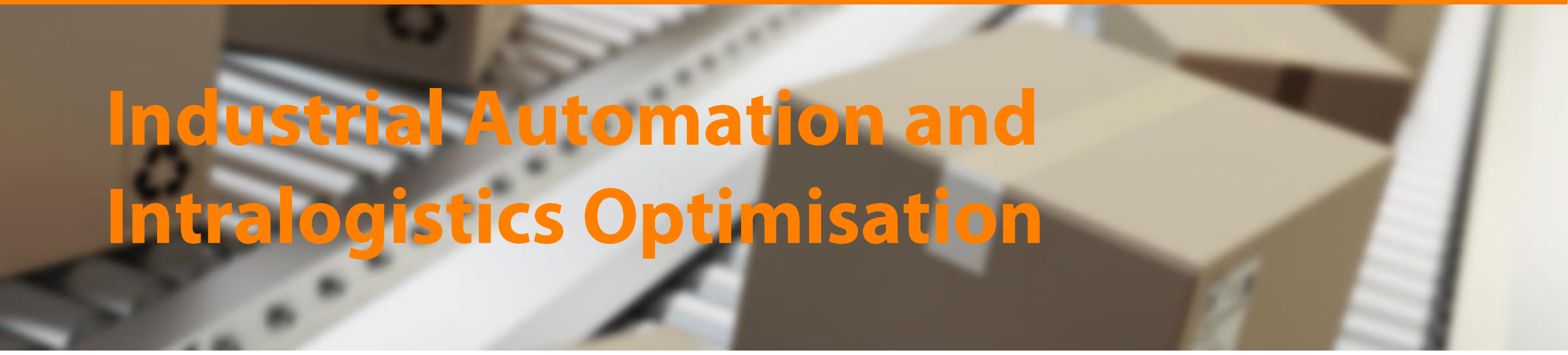
Focus On...
Technical insights



Industrial Automation and Intralogistics Optimisation

In the field of industrial automation, the transportation of products plays an essential role in the overall performance of the production plant.

***Intralogistics** today has the difficult task of meeting the need for operational flexibility while minimising impact on production times and costs under all circumstances.*

Some impressive techniques are currently being successfully used to design new-generation systems and improve the performance of existing facilities without the need for costly refurbishment work.

In many industrial settings, automation uses transportation systems which allow products to be moved from one part of the facility to another.

Alongside vehicle transport (whether by AGVs or manned vehicles) these systems constitute the backbone of **Intralogistics**.

In manufacturing, transport is primarily of semi-finished goods as they undergo the various stages of production, while in logistics, the movement of goods itself is the objective.

Linear transport by moving belts (**Conveyor System**) is one of the most widespread solutions for moving solid items of various types and sizes.

The monitoring system conventionally used consists of simple logical structures which operate locally with an “action-reaction” approach, based on photocells or proximity sensors positioned directly above the belt and limited status information received from subsequent transport mechanisms.

Using the correct terminology for signalling algorithms, this strategy can be called **Point Checking**, since it acts solely by assessing information (input) and generating commands (output) and is physically located at a given point in the production line.

“Just like when roads come together in a major city, local inefficiencies lead to bottlenecks in the flow which in turn cause obstruction and blockages.”

However, as production systems become increasingly complex, the relationship between their different parts becomes highly complicated: every intersection and confluence of conveyor belts becomes a source of inefficiency due to the need to coordinate the transport of items to avoid collisions.

Just like when roads come together in a major city, local inefficiencies lead to **bottlenecks** in the flow which in turn cause obstruction and blockages.

Furthermore, the conventional approach is too rigid to automatically handle malfunctions (the stopping of one or more belts) or exceptional loads to/from one or more destinations.

The three main consequences of this are:

- Reduction in **throughput**
- Increased **journey time** between two point in the system
- **Premature ageing** of the system due to overly frequent stop and start cycles.

The conventional approach described above is no longer sustainable in the competitive modern setting.

For these reasons, many production lines suffer from average performance far below standard and consequently fail to meet the productivity targets they are designed for.

The underlying limitation is that the aim of Point Checking strategies is not to optimise the line in whole or in part, but merely to apply simple principles of movement which ensure that no damage is caused to the goods or the system itself.

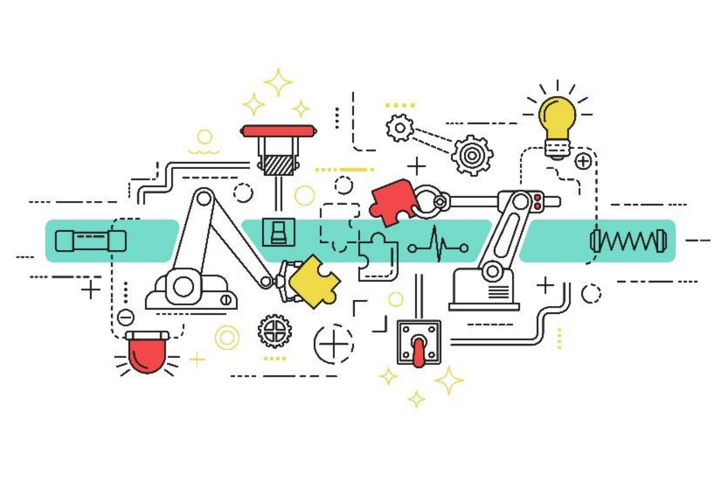


Image: Freepik.com

As an alternative to expanding or refurbishing the existing production line, **multi-level optimisation techniques** can be applied to correct inefficiencies caused by the gap between the complexity of the transport system and the simplicity of the monitoring rationale, with astonishing cost savings and without interrupting production.

The optimisation of conveyor systems draws on a number of techniques and entails a staged approach:

- **Analysis** of the line's current performance under typical working conditions
- Identification of critical subsystems (**bottlenecks**)
- **Modelling** of these subsystems
- Study and evaluation of **multi-level real time** optimisation algorithms
- **Calibration and checking** of the new monitoring strategies in a simulated setting
- Application to the production line and **fine-tuning.**

The result is the formulation of a series of algorithms which can apply **Local Control** strategies, defined as such when they act on a limited area of the system, and **Global Control**, when they cover the entire line.

Following the intervention, the production line benefits from the following:

- **Increased throughput**
- **Reduced** (maximum and average) **journey times**
- Ability to handle exceptional **peak loads** and fluctuations in the typical distribution of items on the belts
- **Balancing of traffic** to prevent obstructions, stoppages, slowing and delays
- Ability to **react actively** when one or more belts are unavailable
- Regulation of the flow of items both in terms of **transport quality** (positioning of items transported, gap between items, alignment), and in terms of the **duty cycle** of the conveyor belts (fewer stops and starts and consequently less wear and tear).

Adgenera offers its customers specific expertise in this type of intervention and the ability to adapt the solution to existing production lines.

By combining modelling, data analysis and automation, we can provide key-in-hand solutions, from the initial feasibility study to the final testing of the system.