Case Design Sheet

1. CASE DESCRIPTION

AGV for modern Logistics in industrial companies

PARTNER	LOCATION	TIME/DURATION
CONTI	Romania, Sibiu	2019.10 - now

2. DIGITAL TRANSFORMATION CHALLENGE

2.1. BUSINESS TRANSFORMATION

Actual business requirements demand from factories to improve the transportation of materials from Warehouse to Production line, from process to process and from Packing station to the Shipping Area. This improvement contributes to Just In Time (JIT) manufacturing that consists in a synchronized system of machines with minimum wait and small lot-sizes that allow companies to have good operational performance, low costs and stability of the processes in the long run.

For the moment companies have manual labor force, which is limited, but businesses fluctuate in terms of volumes. When volumes are high, or rising, the effect is to increase the frequency of the movement of logistic operators, which leads to fatigue. The modern solution is to replace human workforce with autonomous transport machines called Automated Guided Vehicles (AGV) in specific areas indoors, and milk-run machines for long transportation circuits.

2.2. CONCEPTUAL TRANSFORMATION

AGV implementation is part of Digitalization programs that modern industrial companies need to have to comply with Industry 4.0 concept. The program's intended reason is to provide a good understanding of functionality and usage of AGVs in logistic processes.

Integration of AGVs in logistic process contributes to Just in Time manufacturing by increasing efficiency of transportation process, reduce Work in Process levels of materials in production area and allowing to use progressively smaller lot-sizes to improve the materials flow.

2.2. TECHNICAL TRANSFORMATION

Implementation of AGV in industrial companies needs some specific elements to work with:

- 1 server for Fleet Management in IT department with Fleet Manager software available from equipment supplier, when purchasing the AGV solution
- create inhouse racks for pick-up and drop-off points near the production lines and inside the warehouse
- organize charging areas to maintain charged AGVs while idling
- dedicated floor markings to allow turn and align AGV with racks in front of the pick-up and drop-off points
- dedicated standards in Standard Catalogue (floor-markings in front of the racks, mode of operation with buttons, dimensions and associated costs of racks for rapid construction in Tool Shop)

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3. SOLUTION

Continental Automotive Systems decided to work with Omron Lynx AGVs to perform repetitive tasks of material transportation from Warehouse to Production area. Standard in Continental is the CTS loaders for all AGVs, module which match the internal rules for KLT manipulation.
Logistic operators from Warehouse work with AGVs by suppling materials in standard boxes called KLT. Based on electronic ordering systems, the AGV pick-up the full KLT and ship it to destination corresponding to drop-off racks in fixed position in Production area. In order to make the transport, the AGV receives wirelessly the route and drop-off point from Fleet Manager software in a server from IT Department.
The AGV moves unattended from Warehouse to Production area based on battery power, directed by routes from Fleet Manager and use sensors to avoid collisions along the path. When AGV is losing wireless signal, it usually stops waiting for human intervention. The logistic operator has four buttons to operate with, based on actual situation. On the side of AGV is a small display with a stopping reason. Based on the error message seen on display, the operator is trained to push one button to continue transportation, or cancel the transportation, or use combination of buttons to unlock the wheels and move it manually to a place where signal is powerful enough to take over the control of AGV. When battery level is low, the AGV will not engage in a new transport, instead he will search for closest charging area, where it will recharge completely before starting a new transport route.

4. KEY SKILLS AND COMPETENCES

Key skills and competences required for AGV implementation are:

- time measurement to establish time and frequency of AGV movements
- 3D simulation software to design routes and alternative routes if standard routes are blocked
- programming scripts for Fleet Manager
- coordination of AGV movements for creating the virtual map in Fleet Manager
- object recognition to avoid obstacles
- sensors maintenance/replacement
- programming skills to communicate wireless with vertical sliding doors between modules

5. RESULTS

DIGI FoF trainee will be able to learn how AGVs function. He/she will learn which are the requirements for AGV implementation, how to implement an AGV solution in an industrial company and a method to measure the efficiency of AGV implementation by tracking the activities and calculate the degree of fulfilment of orders transported from warehouse to production and vice-versa.

6. CONCLUSIONS AND RECOMMENDATIONS

Continental Automotive Systems is pleased with the results received after the implementation of AGVs in our logistic process, with the benefits presented below:

- Flexibility in the supply chain, supply of small, limited components with high frequencies (e.g. 15 minutes) to production areas.
- Reduce efforts for logistics operators (movers) by eliminating repetitive and exhausting tasks.
- Cost reductions: by reducing the size of batches of components for production and reducing components waiting times.
- Work safety: AGVs use multiple sensor systems to completely eliminate collisions with physical obstacles and accidents of pedestrians.

7. REFERENCES

- Robotics in Logistics, Mar. 2016, DHL Trend Research

8. APPENDICES

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