Cutting Optimisation with the AtlasWMS CutITsmart System

Epilog, d. o. o., from Ljubljana has implemented cutting material optimisation for the Swiss company Agta Record with the CutITsmart software solution, which has been built into their AtlasWMS warehouse management system. The aim of the optimisation project for the cutting of long aluminium profiles in the intermediate goods warehouse was to achieve a 3% saving in material with an unchanged speed of operation performance and system accessibility.

Following the introduction of the system, material utilisation decreased by approximately 4%, and the project implementation costs will be returned within just a few of months of operation. On the basis of precise statistics regarding the remaining pieces, the length of input material ordered from suppliers can be adapted, which will further minimise the remaining pieces.

Outline of the Companies

Epilog d.o.o. is a specialised high–tech company based in the Technology Park in Ljubljana. Their primary activity is the development and implementation of warehouse management systems and internal logistics. Their most important solution is the warehouse management system AtlasWMS, and they export 95% of their services to the markets of Western Europe.

Agta Record Group is one of the leading European manufacturers of automatic doors. They are well known for the fact that every door coming from their production line is carefully adapted to the needs of its end user. In addition to their headquarters in Fehraltorf, Switzerland, they have 26 subsidiaries and more than 200 representative offices in 40 countries around the world responsible for global servicing. In Fehraltorf, they develop and manufacture the majority of their automatic doors and related devices for geographically very diverse markets. Agta Record doors are used to equip business premises, shopping malls, airports and other public buildings.

Project Guidelines

The two main materials used by Agta Record for the manufacture of their doors are aluminium and glass. Aluminium profiles (bars), which are ordered from suppliers in different standard lengths (most often between 5 and 6 metres), are stored in six-metre-long metal cassettes in a high–rack automated intermediate goods warehouse next to the production lines *(Illustration 1)*. An automatic feeder supplies the metal cassettes with the bars to a workstation equipped with a semi-automated saw. In front of the automated warehouse there is also an area for the classic (manual) warehousing of larger amounts of goods.

A worker at a workstation saws the bars according to the instructions on the screen of the Atlas WMS warehouse management system with regard to a work order for doors. The AtlasWMS system was introduced some years ago within a renovation project of the automation of the existing warehouse. AtlasWMS automatically sets the length of the saw cut for each bar individually. Every cut piece is given a two-dimensional bar code that clearly identifies

Illustration 1: Input material warehouse and production line

the cut piece and contains instructions for further production operations. Cutting according to the "work order by work order" principle results in a large quantity of remaining pieces, with remaining pieces that are too short to be used in the next order being discarded. The purchase price of a new profile is approximately 7 Swiss francs per kilogram, while the scrap price is less than one Swiss franc per kilogram. Thus, for every kilogram of waste there is a loss of around 6 Swiss francs.

Challenge

Two years ago, Agta Record changed their business software and introduced a new M3 ERP system. One of the requirements of the management was for the profile cutting system to include cutting optimisation. Cutting material according to the work order by work order principle was to be replaced by the common cutting of several orders at the same time, done in such a way as to minimise remaining pieces. The expected savings of 3% on material represents a significant decrease in annual material costs.

Agta Record had already decided to buy cutting optimisation software, but there was a problem with the connection to the ERP system. ERP only records aggregate data on stock by product; it does not have data on how the stock of a certain product is distributed by lengths for each individual bar. However, this is precisely the information that targeted cutting optimisation software requires. Therefore, the ERP connection would not yield any results.

The next idea was to connect the cutting optimisation software with the AtlasWMS warehouse management system, which has data on stock distribution. A feasibility study had shown that

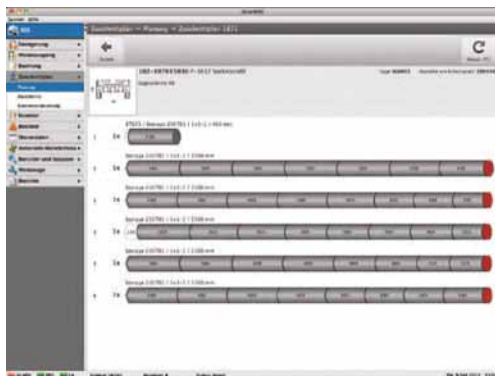*Illustration 2: Newly developed user interface for the shift manager*

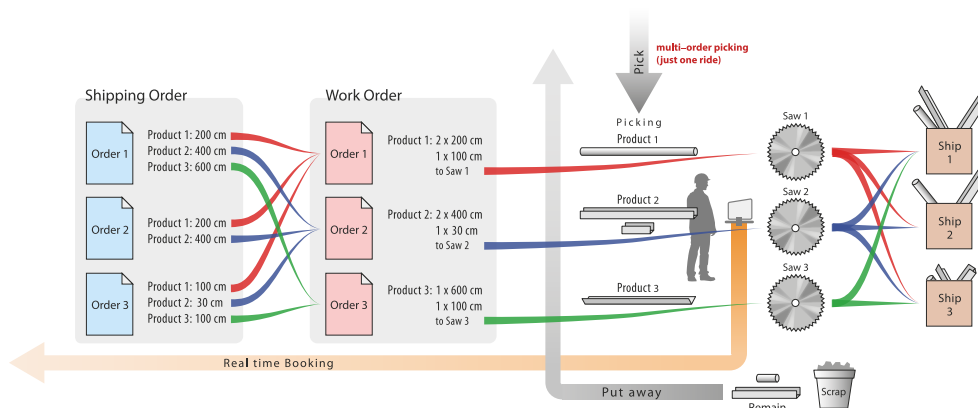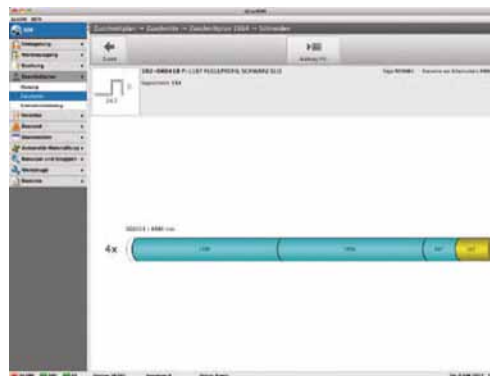
Illustration 3: User interface for the saw operator

Illustration 4: Cutting optimisation with the AtlasWMS CutITsmart system

dynamic optimisation is not possible with connection to an external software solution, as it often occurs on the saw that a worker notices a fault in the material (a scratch) that needs to be cut out. The optimisation algorithm has to be able to calculate the new optimum cut in real time, reserve the material in the warehouse and generate new transport tasks for cassettes. The customer wanted the same solution for optimised cutting to be introduced in all of the subsidiaries at the same time, including those without a WMS system.

Solution

We decided to take up this challenge to develop our own cutting optimisation algorithm and build it into AtlasWMS. The result was named AtlasWMS CutITsmart. In order to cover the subsidiaries as well, we offered our client our solution AtlasWMS Global, which makes it possible to manage any number of warehouses anywhere in the world from a central server with a single interface on ERP. Our client accepted the solutions we proposed. We searched for a comparable (i.e., competing) warehouse management system (WMS) that also provided a cutting optimisation solution but to no avail. We therefore believe that our solution represents a unique innovation.

The issue of cutting in connection with a WMS system is rather complex, particularly regarding the management of process exceptions. Therefore, we have developed an entirely new user interface based on a touch screen via which the saw operator manages all of the processes *(Illustration 2 and Illustration 3)*.

AtlasWMS can run on any computer system. In Fehraltorf, it is installed on an Oracle–Sun server and runs on the Solaris operating system, which enables the highest possible level of accessibility. The heart of the system is the Oracle 11G database. The interface with ERP M3 is made with ASCII file exchange. For servicing and maintenance, Epilog has VPN remote access to the system.

Illustration 4 presents the operation of the system. AtlasWMS CutITsmart automatically merges work orders submitted by ERP

with regard to the desired cutting date and the product. Products with the same date from different work orders are merged into a single work order for removal from storage. The system searches for optimal bar lengths for this order. Every bar is assigned a cutting plan in advance. Then Atlas WMS generates transport orders for cassettes where these bars are located and brings them one by one to the workstation with a saw. A worker saws bar by bar, or several bars at the same time (if, of course, this is in line with the work order). Every piece thus prepared is given a two–dimensional bar code that clearly identifies it later in the production process. The remaining pieces that are still useful are also given a bar code and placed back into the original cassette. On its way back to the warehouse, the cassette is automatically weighed, enabling the performance of permanent stocktaking. In the case of a discrepancy (input error, too much material removed), the cassette is marked with an inventory flag and is later sent for further stocktaking. AtlasWMS informs the person responsible for this via e-mail.

The rollout of the AtlasWMS CutITsmart system in Fehraltorf was performed last autumn. We began on a Friday afternoon by halting the old system, porting data, installing the new system and database, and running and testing the new system. On Monday, when production resumed, the new system began its practically faultless operation. In only a couple of days, we reached 99.9% system accessibility.

Following three months of operation, statistical data shows that there has been an average saving of 4% in the material used, while, of course, the percentage fluctuates slightly as a result of order structure. The first results therefore confirm that the investment has more than paid off, as it will be returned with just a few months' operation. One of the side effects of the system rollout is also the capturing of very accurate statistics on scrap per product. On the basis of this analysis, the company will be able to adapt the ordered input profile length, which will further reduce the amount of scrap.