T-SYSTEMS INTERNATIONAL: AN INTERNATIONAL SCHEDULING AND DISTRIBUTION OPTIMIZATION APPLICATION

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ABSTRACT

This paper presents an industry example of the utilization of an Excel-based optimization model for T-Systems International, a San Diego based firm, as it tried to plan its production and distribution activities on a global basis to meet its total worldwide customer demand. The model, though simple in its structure, helped the company to achieve its objectives for reviewing its policies on a timely basis leading to higher utilization of its assets. Based on the template provided, T-Systems was be able to run its machines in a manner that would maximize production during regular hours when labor rates are lower while overtime usage is minimized to meet the forecasted demand.

INTRODUCTION

T-Systems International, a San Diego based company, wanted to develop a tool to improve its world wide production and distribution of its tape products, which it produces in three countries and sells to 63 target markets globally. The overall objective was to have a simple desk top decision support system that would optimize production and shipping planning down to the machine level for each individual product at each production facility. Complicating the decision process were many factors that have to be taken into considerations such as machine production capacities, capacity constraints at each facilities, production cost, transportation cost, and international tariffs, which would be different depending the country of origin and or destination.

BACKGROUND

Founded in 1977, T-Systems International has been providing T-Tape irrigation systems to growers worldwide for almost 30 years. During this time, T-Tape has become the standard for drip irrigation products. The company and its main production facility are headquartered in San Diego, California, USA. Two other production facilities are located in Australia and France. The production facility in San Diego serves the North and South American markets, the Australian facility serves the Asian-Pacific region, and the French facility serves Europe, the Middle East, and Africa. With employees around the world, T-Systems and its extensive dealer and distributor partner network, helps farmers with crops of all types and sizes achieve business results by delivering the right irrigation treatment for their crops' specific needs.

The company's T-Tape, introduced to the agricultural industry in 1979, is the standard for drip irrigation products. A newer version, introduced in 1991, uses larger diameter tubing, allowing runs up to 1/4 mile in length. In 1994, a technological breakthrough resulted in the introduction of T-Tape TSX®. This product is made with an advanced manufacturing process which results in a thinner wall product with strength comparable to a much thicker drip tape. T-Tape TSX offers savings on installation cost and

improves uniformity without hindering strength. In 1997, the company introduced T-Tape TSX2® as a premium product. It was designed to create increased uniformity of water distribution from one end of the row to the other, while reducing the drip tape's susceptibility to plugging.

The production process includes two major steps: film production and tape production. These two steps have different production procedures and must be well coordinated.

FILM PRODUCTION

Film produced at a facility is used as an input to meet the production schedule of the tape. If film line production at a particular facility is not capable of meeting the demand for tape production at that facility, film will be imported from another facility, provided there is excess production capacity at the other facility. The satisfaction of this demand is the over-riding factor guiding film production. The demand for film production is based on the forecast determined by the company.

TAPE PRODUCTION

The demand for tape production is based on the forecast from the company. If a particular product cannot be produced at a facility to meet its demand forecast, it can be shipped from another facility if that facility has excess production capacity. There might be delays in the arrival of a product due to the time required for shipping. One operator per machine is required.

SHIPPING PLAN

The company does not currently manage its own shipping operations internally. Instead, it utilizes a third-party shipping manager that offers a one-bill option after being given the dates, locations, and quantities of a given shipment. The main objective of the shipping plan is to identify the source facility for a particular destination while minimizing the shipping cost, tariff and production cost at the source facility.

METHODOLOGY FOR OBTAINING TARIFF INFORMATION

It is important to obtain the latest tariff information and be able to update that on a periodic basis. Two sources that one often is directed to are www.ecustoms.com and www.tariff.net which, by in large, are of little use. However, the website www.bitd.org allows the user to pick the import country of interest and enter a keyword search. In this case, the beginning of the harmonized code for T-Tape, which is 3917, was used to conduct the search. This search yielded the import tariff data for this product in downloadable format. One drawback to this site is that not all import countries had information available.

The World Trade Organization (WTO) has a comprehensive country list with web links to each of the country's customs and border protection information. However, not all the countries or regions that T-Systems does, or plans to do business with, were listed on this weblink. One significant problem with this resource is that few of the countries listed have information available in English and even those that were possible to translate were rather cumbersome since each country's website had to be navigated separately with its own distinct layouts. The most useful website in this regard is from the commercial shipper, FedEx, where one can find the various tariffs. This site can be accessed at www.WorldTariff.com, and requires payment of $7 per search.

CONCLUSIONS AND RECOMMENDATIONS

T-Systems International illustrates a classic capacity optimization and distribution problem. By creating a template for the company, the company was able to readily revise the production and shipping plans in a near optimal fashion. This effort also served the students in learning about the limitations of spreadsheet modeling. However, because of the capability of Premium Solver, which the company was willing to pay, they were able to enjoy substantial amount of cost savings on a global basis.