



# BEARINGS



## ROUGH CUT CAPACITY PLANNING AND SIMULATIVE SCHEDULING PROJECT

In this issue of the ORS Newsletter, we would like to inform you about the Rough Cut Capacity Planning (RCCP) and Simulative Scheduling Project, done in cooperation with Bilkent University (BU) Senior Industrial Engineering (IE) students.

Every year, as a part of the Production Systems Design Course, Senior IE students of Bilkent University do projects at various manufacturing and service sector companies. The aim of these projects is to find a solution for a specific problem, or to provide improvement in a particular area. ORS Bearings has been sponsoring various successful projects for 4 years now.



Figure 1. – Demand Forecasting System  
(2001-2002 academic year project)

In the 2001-2002 academic year, a “Demand Forecasting System” was prepared by IE students. By using sales data of past 60 months and statistical methods, this system was rendered capable of sales forecasting. Thus, the macro and micro sales plans

preparation process has been improved to a great extent.

As the next step of the production planning process improvement studies, scheduling of annual production plan by various algorithms was specified as the project subject for the 2002-2003 academic year. Research for this project started in October 2002. This system will provide answers to the following questions:

- Is the current capacity sufficient to carry out the given production plan?
- What is the required capacity to carry out the given production plan?
- How are the production schedule and current capacity affected by the investment?
- Can a new sales order be accepted in terms of capacity availability constraint? If yes, when can it be delivered?
- How does the production schedule change, if there is priority among the sales orders?

Turning shop in the Forging-Turning department of the ORS factory was selected as the pilot area with 35 production lines/machines and 300 different products. Following the research for the algorithm, algorithms appropriate for the Flow Type Production Systems were selected.

Production scheduling program (Java-based) including 12 choices was prepared by the project group.

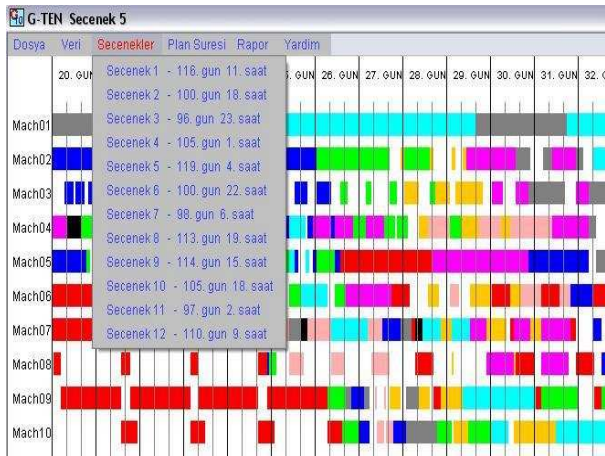


Figure 2. – Production Schedule  
(based on choice 5)

Above is shown an example for the production schedule prepared by the software, according to one out of 12 possible choices. Schedules according to the other 11 choices are also available as output. Thus, depending on the situation, it is possible to make a choice according to different criteria.

Graphical interface of the schedule makes it easy to evaluate and change the schedule itself. Using the software, it is also possible to get different reports. One of the most important reports is the Capacity Usage Report prepared according to the selected choice. This report indicates the capacity usage percentages of each production line and machine. Owing to this report, it is easier to make a capacity plan and to determine new investment requirement(s).

### Kapasite Kullanimi

	Mach01	Mach02	Mach03	Mach04	Mach05	Mach06	Mach07	Mach08	Mach09	Mach10
Calisma Suresi	1540	1670	1508	1811	1561	1746	1594	1660	1763	1781
Vardiya	3	3	3	3	3	3	3	3	3	3
Kapasite Kullanimi	81%	88%	79%	95%	82%	92%	84%	97%	93%	94%

Figure 3. – Capacity Usage Report

After the evaluation of these reports, the main data (master production schedule, lot sizes, routing, work calendar, cycle times etc.) can be imported to Microsoft Excel. After modification(s), it may be easily exported back to the program. Hence, the consequences of the modifications can be seen in a short time. Also, it is possible to get realistic answers for some “what-if” questions such as: adding a new production line, removing some of the machines from the system, adding a new sales order, changing a route or adding an alternative machine for a defined operation.

The production schedule based real production plan can be formed in approximately 10 minutes. **The makespan of the annual production plan was reduced by 8%** with the optimal loading of machines.

Simulative Scheduling project was a great success in the Project Competition 2003, which was organized for the first time by Bilkent University Industrial Engineering Department. **This project was ranked 1<sup>st</sup> among 16 projects**, and was praised by several company managers and academic staff from different universities.

We would like to use this opportunity to congratulate the project group and thank everyone who has contributed to this project.

## ORS BEARINGS

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