The summary of

Viktor Juhász's

Ph.D. thesis entitled

The Examination of Certain Aggregated Production-Planning and Cost-Analysing Problems of Flexible Manufacturing Systems

The flexible manufacturing system unites the productivity of mass production and the flexibility of non-series machining. At the same time, planning and controlling this complex system becomes very complicated.

By the capacity-analysis based on operation types, Koltai, Farkas and Stecke (2000) developed the scheduling-independent analysis of flexible manufacturing systems. Since the analysis does not depend on which alternative route the parts are manufactured, the aggregated planning of the production is possible without defining the detailed production schedule. In this thesis I show that by mathematically expressing the bounds of capacity analysis based on operation types differently, the model's algorithmic property improves.

The identification of redundant operation-type sets simplifies the use of the model. If we reduce the number of constraints, we can not only solve a bigger model, but also the sensitivity analysis of the model gets simpler, thus relevant data are available for making decisions. The operation-type analysis can also help determine the ideal tooling of machines. For a certain machining demand apart, from the bounds of the available tooling, we can also define the most suitable machine tooling to meet the requirements of the management priorities. My model shows the degree of ideal capacity over- and under-utilization as well as the ideal machine tooling.

Flexible manufacturing systems contain high-price machinery. Due to the complexity of the system, calculating the exact costs of the materialized production requires sophisticated cost-calculation methods. Products made by flexible manufacturing systems can be produced in different ways, therefore the computed product costs will depend on the manufacturing route, and the estimated costs will couple with a considerable uncertainty. To help this problem, I developed a cost-allocation procedure.

The analysis of my thesis makes the design of flexible production systems more stable both in the field of capacity analysis and the calculation of the production costs.

Viktor Juhász

The Examination of Certain Aggregated Production-Planning and Cost-Analysing
Problems of Flexible Manufacturing Systems

The flexible manufacturing system unites the productivity of mass production and the flexibility of non-series machining. By the capacity-analysis based on operation types, Koltai, Farkas and Stecke (2000) developed the scheduling-independent analysis of flexible manufacturing systems. In the thesis I present that the identification of redundant operation-type sets simplifies the use of the model. If we reduce the number of constraints, we can not only solve a bigger model, but also the sensitivity analysis of the model gets simpler. Products made by flexible manufacturing systems can be produced in different ways, therefore the computed product costs will depend on the manufacturing route, and the estimated costs will couple with a considerable uncertainty. To help this problem, I developed a cost-allocation procedure.