



Beyond ERP: Optimized Production

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During the last decade a number of manufacturing companies have invested heavily in the IT infrastructure. After computerization of essentially administrative and bookkeeping chores like Payroll, Accounts, Office automation, they have ventured into core activities - manufacturing. After investing heavily both in terms of money and efforts, they are very reluctant to talk about the returns. They talk about the peripheral benefits but are silent on the core issues: is there marked improvement in their production efficiencies, meeting customer demands, on time deliveries etc? They are silent since there is not much to talk about these critical issues faced by marketing and production departments. The solutions implemented under the broad framework of Business Process Reengineering, basically fall into two main categories: heavily process oriented like JIT or material oriented like ERP/MRP. These are indeed excellent solutions except when they deal with production in the shop floors. The Master Production Schedules, which come out of these solutions, are woefully inadequate to handle the challenges posed by vagaries of day-to-day production. They make certain assumptions while preparing MPS and recommend using add-on modules to correct these assumptions. E.g. in ERP infinite capacities are assumed in MPS and MPS are to be refined by "Rough-cut capacity" planning, or resource leveling techniques. JIT assumes repetitive nature of production with finely balanced production lines, operation times which do not vary, and a stable production environment. Changes in product mix, variety etc requires considerable process reengineering. Anybody who has worked in Indian manufacturing industry will readily admit that we have a long way to go before we can create environments like Toyota or Benz factories.

Walchand Infotech has come out with a solution, which does not aim to replace these solutions; on the other hand, by handling shop floor production efficiently, it protects the investment made in BPR/ERP/MRP solutions. ExSched is a finite capacity scheduling software. It is an APS solution. (Advanced Planning and scheduling solution.) It takes off from MPS and not only satisfies capacity constraints also handles innumerable other kinds of constraints which typically occur in real life. No simplifying assumptions are made regarding production environment. It uses Discrete Event Simulation technique to simulate production environment. It uses heuristics to slice the problem space and speeds up computational calculations to handle complex production environments.



The following table compares ExSched with other solutions. The notes amplify ExSched's perspective.

Comparison of different Production optimization techniques

		JIT	MRP	TOC	ExSched
1	Chief Goal	Reduction of Wastage	Material Planning	Maximize Profits	Dynamic, Selectable by User
2	Methodology	Philosophy and Practices	Algorithms and Computation	Philosophy and Practices	Simulation and Constraints Satisfaction
3	Focus	Quality	Material planning by MPS	Bottlenecks	Customer service due-dates
4	System	Pull-System	Push-System	Push-System downstream from constraint, and Pull-system upstream the constraint	Constraints based
5	Environment Assumption	Stable	-----	Stable	Supports Dynamic Changes and Fluctuations
6	Capacity Scheduling	----	Infinite Capacity	Finite Capacity	Finite Capacity
7	Transfer batch	Focus on a batch size of 1	Set to process batch size	Optimized to maximize throughput	Variable
8	Inventory status	Reducing inventory to ZERO	Inventory can be a problem. Less is better	With no Bottlenecks no Inventory	Gives more accurate forecast of inventory requirements
9	Production pace	Determined by MPS	Determined by MPS	Driven by customer schedule	Based on optimizations, after constraint satisfaction
10	Ability to handle variations due environment, market etc	Nil. Assumes and requires stable environment	Requires reruns which consume heavy IT and other resources	-	Can handle any kind of changes. Rerun/reschedules are extremely fast



11	Implementation/ Deployment period	1-3 years excluding vendor selection (1-3 years)	1-3 years excluding vendor selection (1-3 years)	-	2-6 Months
12	Integration	Difficult, lot of efforts.	Difficult, lot of efforts.	-	Easy. Supports open standards

With reference to above mentioned points :

1. While scheduling, ExSched uses heuristics. Currently 8 rules are defined. Application of some of the rules results in particular kind of results. E.g. If user selects the shortest processing rule, machine utilization is optimized. If due-date rule is applied, delivery performance is optimized. You can apply a combination of rules in particular sequence to optimize and favor a particular kind of scenario. The eight rules and sequence of application produce more than 50,000 combinations. (ExSched has a very convenient way to specify the combination). When you combine the rules with ExSched's ability to handle a variety of constraints, you can practically define your own goal.
2. ExSched uses a particular type of simulation method known as Discrete Event Simulation. The Algorithm and Data Structure used in ExSched's implementation results in very fast schedule runs and reruns. When we ran a client's data of more than 200 jobs and 25000 operations on a Pentium PIII Machine (400 MHz) a complete schedule took less than 2 minutes.
3. One of the rules optimizes delivery performance.
5. Since in a typical manufacturing set up (other than ideal JIT setups), conditions change, ExSched is designed to handle dynamically changing environments. One of the ExSched's clients, anticipating change in demand, wanted to specify time dependent capacity constraints. It is one of standard feature of ExSched.
7. ExSched allows overriding of batch sizes suggested by MPS if needed. ExSched also allows change of batch size after a work has commenced. This would be required if for some reason (e.g. heavy rejection, lack of requisite material or customer amending order) batch size changes.
8. After a scheduling run, user gets standard or custom reports, which forecast when inventory would be required. If the user pegs material requirement at the operation/task level instead of Job/Shop Order level, he gets more accurate forecast of material requirement. This will be particularly useful for jobs with long cycle times.
12. ExSched supports industry standard ODBC compliant databases. Data integration is supported with the ODBC compliant databases. Most of the popular databases are ODBC compliant. If your database is not ODBC compliant, ExSched technical support can develop a custom interface for data integration.