

Expert System based Dynamic Scheduling for Electroplating Process

Background :

Kalyani Brakes Ltd. (KBX), a company engaged in manufacturing braking systems for automobile industry.

A braking system consist of number of components which needs to be electro plated. To serve this purpose KBX has a single line flow plating plant which has 30 different tanks having different chemicals and two transporters which transfers flybars (A bar containing components to be plated from one tank to another. Entire plating process issued to be controlled by a programmable logic controller (PLC) with fixed sequence of executions.

With growing business needs, KBX found it difficult to work with conventional PLC based rigid control system because

1. Variety of components to be plated have increased which calls for flexible scheduling.
2. Since different components have different plating requirements that is to have a component mix to be plated, it calls for recipe based architecture in which various timing and sequence related parameters can be modified for individual component for example spring needs less current density where as caliper unit need high current density, spring component required process in acidic tank say tank no 9 where caliper component does not, spring required Yellow pasivation where as caliper required green pasivation.
3. To have recipe based system with existing system, the operator has to undergo lot of system level training which is not feasible as these are illiterate operator.
4. With growing business need, the productivity of the plating shop becomes the bottle neck in entire production process due to rigid control system.

To overcome the difficulties – iASYS has offered an expert system based on open technologies. The offered system was based on constraint based dynamic scheduling. To cater for product mix – it uses recipe based schedule execution.

The offered system was having following distinct advantages.

1. **Very user friendly** – That user simply have to select the recipe of the product to be plated and press start button.
2. User can create the constraints on the fly and dynamic scheduling logic automatically takes care of timing optimization of the entire operation.
3. The dynamic scheduling model works in real time that is the timing optimization logic work in real time it work on the principle of critical path and priority band decision making system.
4. In case of power failure or shift changing etc. user can continue the last status.

With the new system KBX achieved.

1. Saved investment which they would have to the plating process productivity.
2. Constraint quality of final plated product. That is then rejection rate has gone down dramatically.
3. They could implement flexible scheduling for components to be plated. Earlier it used to be such that only same type of component need to be plated in a batch. That is they could achieve tree component mix.
4. Throughput of the plating plant has increased by 25 %.
5. The process is completely automated this also results into reducing human error & less human interaction.
6. Facility to shift from auto mode to manual mode & vise versa during the process running.
7. Hooter alarm for safety purpose in any abnormal conditions that will avoid accidents & prevents whole unit from any damages.
8. Create batch wise shift report .