



The Process of Scheduling Field Maintenance

The work process

The process of scheduling work order jobs is part of a larger process that includes generating work requests, scoping work requests and converting them to work orders, getting parts and equipment, assigning the jobs to crews at a specific time, permitting, and carrying out the work.

How scheduling fits in

Formally, the scheduling process begins when a job is marked with status “Ready to Schedule” and ends when a scheduler has assigned the job to specific crew(s) on specific day(s).

Other activities carried out by schedulers

Schedulers carry out a number of activities that lie outside the formal scheduling process, including these:

- schedulers review work requests and assign them to “scopers” who scope the activities
- in some cases, especially with simple work requests, a scheduler may pull a job through and schedule it without passing it through the scoping process, because it was pre-scoped or well described (as in the case of a belt job).
- schedulers spend a good deal of time assessing the quality of data and making appropriate changes
- schedulers read the free text comments in the work orders and, based on their experience, decide whether the scoping is reasonable and what crews will be required to carry out the work (that is, schedulers get information from free text that is critical for deciding how to schedule work)
- schedulers may meet daily with representatives of the maintenance crews, in order to communicate and coordinate the maintenance process
- schedulers may participate in special projects

There is a difference, then, between what the schedulers do when they are scheduling, and the other things that they do for a sizable part of their work day. In this document we focus primarily on the scheduling activity itself.

Two different types of scheduling

There are two different scheduling activities carried out by the schedulers. One is proactive and one is reactive.

The proactive activity is the building of a multi-hour schedule for each time period. This activity may begin on one day and consume much of the next day. It produces a schedule that is operational through the following time period.

The reactive activity is the scheduling of break-in work requests that relate to equipment breakdown, leaks, and other unexpected events. These requests may need to be handled rapidly, and impact the multi-hour schedule. In addition, unexpected events may cause crews to become idle, and the schedulers need to assign tasks when a crew’s originally scheduled jobs cannot be carried out.

Usually, the schedulers appear to spend more time in reactive activities than in building the weekly schedule.



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Computerized assistance for both types of activities is welcomed by schedulers, but such assistance must yield a net benefit for them in terms of efficiency and ease of use.

2

For the regular creation of a multi-hour schedule, schedulers say that it is of value to them to have an initial version of the schedule that they can then edit, if that initial version is reasonable, satisfies scheduling constraints, and satisfies the goals of the scheduling process.

For assistance in handling break-ins and events that invalidate the planned schedule, schedulers say that it is of value to them to have a tool that tells them, for a crew, which currently unscheduled activities that crew could carry out, so that they can choose the activity from a list. They also say that it is of value to them to have a tool that tells them, for a task, which crews are capable of carrying out that task. (The schedulers say that they currently spend a good deal of time getting this information from multiple sources.)

Detailed scheduling

In the scheduling work process, there are actually two levels of scheduling.

What we have described above is the initial scheduling process, in which activities are assigned by schedulers to crews on particular days. A more detailed level of scheduling involves dispatchers and schedulers who determine at what time in the day work crews will work on what activities. There are a number of constraints that must be taken into account when dispatching crews to sites that may not be considered when the regular schedule for a work crew is created. For example:

- Some activities require two crews on site at the same time. Dispatchers make sure that the crews appear at the same time.
- Some activities cannot be carried out for some or all of the day, owing to safety considerations. The dispatchers plan the day's activities with these constraints in mind.
- Some crews may be able to work overtime to finish a task on the day that they start it, and some may not. The dispatchers may need to ask the crews whether they can work overtime and gain approval for them to do so in order to schedule a job completion.
- Some crews cannot work at a site at the same time, owing to safety considerations.
- Some jobs create a safety exclusion zone around them, and other crews cannot work inside that zone.
- Some tasks cannot be begun before another task is completed. Some tasks require anchors, for example, and if the site for one of these tasks does not have an anchor, then the activities at that site may need to be delayed and a new task and crew added to create an anchor at the site.
- Break-in activities are often scheduled as soon as possible, causing the delay of previously-scheduled activities.

We develop ways to support the initial level of scheduling, in which jobs are assigned to crews on particular days. In support of the detailed scheduling, we build a simulator that will give a rough idea of how a daily schedule will be translated into a detailed schedule. From there we can provide an Optimizer that can suggest the most optimal schedule given the current constraint, risks, and uncertainties.