

# I4 – Design and Implementation of Daily Operator Assignment Schedule

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## Background

Intertek, located in San Antonio, TX, provides fuel and lubricant testing services for the automotive industry. Within the facility, there are over 65 engine stands and 31 test types that require samples and 5 that require blowbys. Before each shift change, a supervisor will walk around the facility and construct an operator's schedule based on the current engine status and upcoming tests. Operators are responsible for recording critical test readings, taking oil samples and completing blowby measurements within a certain duration at a specified time.



Figure 1 - Intertek Engine Stands

## Problem Statement

Taking the oil sample and conducting a blowby at the appropriate time is critical for quality testing. If the assignment is not completed at the predetermined time interval, the oil is considered scrap. Intertek currently uses a Kanban board and tribal knowledge to assign an operator to an engine stand. With the current scheduling method, operators are often assigned to multiple engines with overlapping tasks; which can lead to missed critical test readings consequently invalidating the test. Figure 2 illustrates the current scheduling methodology. Figure 3 shows the layout of all engine stands and an example of assignment overlap within a 15-minute interval.

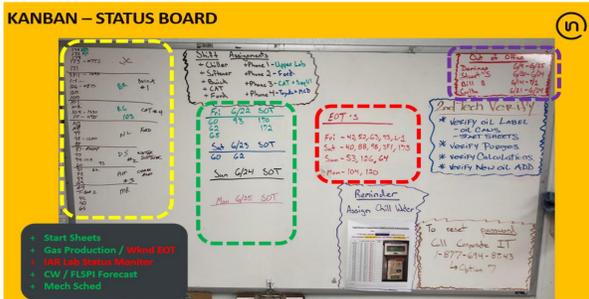


Figure 2 - Intertek Current Scheduling System



Figure 3 - Intertek Facility Layout

## Objectives

- Main Objective:** Create an application to clearly identify overlapping work assignments
- Import data for all engine stands from Lab Status
  - Compile scheduled tasks for each engine stand
  - Incorporate ongoing and upcoming tests
  - Display engine stand, test type and assignment timetable
  - Simple to manage and update

## Deliverable

The scheduling application identifies the time to complete each sample and blowby along with any overlapping assignments within a ten-hour shift duration. The application imports the current status of each engine from Intertek's database, Lab Status. With the current status, the time until the next assignment is determined and identified. After the application identifies the time until next assignment for each engine stand into a directed cell, the number of overlapping assignments that occur within a fifteen-minute time interval is known. For clarity, the program highlights upcoming assignments according to the assignment type as well as highlight any tests that are currently running. By clearly identifying these overlapping occurrences, operators can mitigate the risk of missing a scheduled event. The scheduling application (Figure 4) utilizes a color-coded system to assist the user in visually recognizing upcoming sample times, blowby times, running engines, and overlapping assignments.

Figure 4 - Intertek Scheduling Application Output

## Risk Analysis

**Process Failure Modes and Effects Analysis**  
**Project:** TX-ST Intertek Scheduler - Engine Lab  
**Problem:** Risk Mitigation on Critical Engine Lab Operation Tasks  
**Prepared By:** TX-ST Senior Design Team  
**Date:** 11/27/2018

Process Step	Potential Failure Mode	Potential Failure Effects	S E V	Potential Causes	O C C	Current Controls	D E T	R P N
Time dependent critical tasks for Engine Operators such as Oil Samples, Blowby Measurements, Flushes, etc.	Task not completed within the specified time window	Invalidated customer test due to running outside test procedure. Intertek absorbs all associated test costs on customer behalf	5	Overlapping time dependent tasks	4	Engine Count Form - manually completed prior to each shift to estimate time of critical tasks then equally assign engines to operators	3	60
				Employee Oversight / Prioritization	2	Prioritization of daily tasks is part of onboarding training program	2	20
				Insufficient employee coverage	1	Shift schedules are balanced to maintain coverage across all test types	1	5

Figure 5 - Intertek PFMEA

## Methodology

The scheduling application was developed through Excel VBA. The application will read from a text file exported from Lab Status and reference the predefined time to complete an assignment. The txt file is set to update every 5 minutes. The schedule is formatted according to the time at which it is generated. With the data from Lab Status and the predefined time to complete an assignment, the time until the next assignment is determined and scheduled. With the Lab Status input as a reference, the scheduling application can accurately identify when to complete an assignment for each test. Once the assignment times are determined, the number of overlapping assignments within a 15-minute time interval are identified and highlighted. The scheduling application will eliminate missed assignments by clearly identifying overlapping assignments and the precise time to complete them. This resource will ultimately reduce human error and optimize operator assignments.

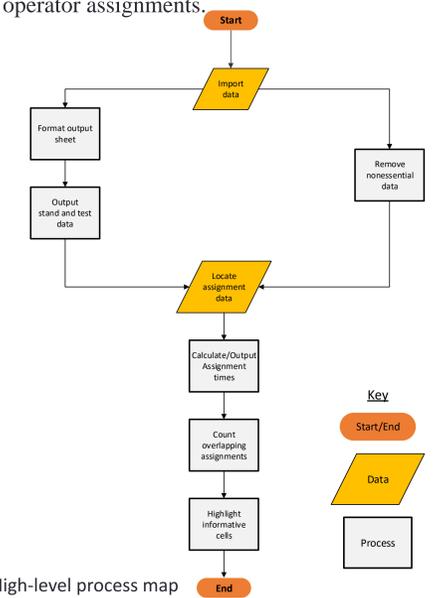


Figure 6 - High-level process map

## Summary

The scheduling application is a visual aid that identifies upcoming events. This scheduling application will reduce the time and motion spent generating each shift schedule; thus, minimizing the risk of miscommunication between each shift change. Missed assignments and defects will be eliminated by clearly identifying a precise time of occurrence. Through this easy to use application, user error will be minimized.

## Future Work

The application will properly generate the schedule based on only two assignment types. The program will have to be modified if there is an additional assignment type to consider. Having the txt file continuously update will reduce the risk of not properly scheduling properly. Currently, the program works by retrieving the file from a specified location. The location will need to be updated to Intertek's local network.