A Wafer-Fab Scheduling Application
Model Documentation

File Name: WaferFab.doe

- ***Arrivals:*** New lots arrive according to a Poisson process with mean interarrival time of 4 hours.

- ***Process Modules:*** The model has five process modules: one for photolithography (Photo) and four for the other operations that are aggregated into four steps (Step 1, 2, 3, 4).

  - Each entity is processed according to the sequence
    Step 1 → Photo → Step 2 → Photo → Step 3 → Photo → Step 4.
    In order to implement this sequence, we use an attribute *Step*. This attribute specifies the next *Step* in the process and is used by the second Decide module after the Photolithography server to route entities to their next processing Step. For new entities, the *Step* attribute is set equal to zero. Furthermore, each time an entity completes processing at a particular Step station, the *Step* attribute is increased by 1 using an Assign module.

  - The *Step* attribute is also used by the Photo server to assign priorities to incoming wafers according to the specified policy. To implement the Last Buffer First policy, first click on the Queue module from the Basic Process template. Then in the row for *Photo Process.Queue*, change the Type to *Highest Attribute Value* and specify the Attribute Name to be *Step*. For the First Buffer First policy, specify the Type to *Lowest Attribute Value* and the Attribute Name to be *Step*. For the Due Date policy, which assigns higher priorities to jobs with the closest deadlines, specify Type to *Lowest Attribute Value* and the Attribute Name to be *Due Date*.

- ***Inspection sites:*** After each pass through Photo, there is
  - a 20 % chance that the wafer needs to be reworked (i.e., sent back to the photolitographer to repeat the last layer),
  - a 10% chance that it must be scrapped and thus restarted from scratch, and
  - a 70% chance that it will continue.

  This logic is implemented using the first Decide module after the Photolithography server.

- ***Outputs:*** There are three main outputs: (1) average cycle time, (2) how late jobs are when they are late, and (3) proportion of jobs that are late.
  - In order to collect the necessary data, we assign two attributes to each wafer: *Arrive Time* and *Due Date*. Both of these are specified in the Assign module right after the Create module at the beginning: *Arrive Time* is *TNOW*, and *Due Date* is *TNOW + TRIA(50, 10, 250).*

  - After a wafer finishes processing at Step 4, it visits a sequence of three Record modules where the following tallies are recorded: *Cycle Time* (Time Interval: *Arrive Time*), *Late* (Expression: (*MX(TNOW–Due Date,0)*), and *Tardy* (Expression: *(TNOW>Due Date)*).

  - The model is simulated for a single replication with a run length of 200,000 hours and a warm-up period of 20,000 hours.