~~**What is claimed is:**~~

CLAIMS

1. A method for improving a factory back~~-~~-end~~,~~ comprising~~,~~:

~~-~~receiving factory data comprising identification of a bottleneck family comprising at least one semiconductor processing machine of the bottleneck family, and at least one of processing speed, factory route, and conversion information of the at least one semiconductor processing machine;

receiving production targets comprising a time period comprising at least one week, and a quantity of semiconductor product to be produced on the at least one semiconductor processing machine;

running a first mathematical ~~programing~~programming model ~~applied to factory data and production targets~~ comprising one of a mixed integer programming model, a mixed integer quadratic programming model, and a linear programming model, that ~~produces a~~ takes the factory data and the production targets as input, to produce a first solution, and processing the first solution to produce a bottleneck loading plan ~~for~~defining components of the production targets to be produced by the at least one semiconductor processing machine of the ~~factory's~~ bottleneck ~~machine families~~family during the time period;

running a second mathematical programing model comprising a mixed integer programming model to model semiconductor products processed, applied to the bottleneck loading plan, that produces a second solution comprising a conversion time for a semiconductor processing machine and a quantity of steps in a production flow to be processed before conversion, and processing the second solution to produce a conversion schedule for the at least one machine of the bottleneck machine families;

~~-~~creating a lot schedule for the factory identifying a start time and a finish time for at the least one semiconductor processing machine for each lot processed on the semiconductor processing machine for the time period, and indicating an amount of product to process on the at least one semiconductor processing machine of the bottleneck family for the time period, by running a simulation that follows the conversion schedule; and

~~publishing the lot schedule.~~

processing the lot schedule with a dispatch system coupled to the at least one semiconductor processing machine to automatically produce semiconductor products in accordance with the lot schedule.

2. The method of claim 1, wherein the bottleneck loading plan identifies when machine conversions are to be processed.

3. The method of claim 1, wherein the conversion schedule ~~identifies the time for each conversion and what quantity of each step of a factory process is to be processed before each conversion.~~

~~4. The method of claim 1, wherein the conversion schedule~~ distributes conversions evenly through a selected time period.

~~5~~4. The method of claim 1, wherein the lot schedule includes at least an identification of each machine in the factory and corresponding start time and finish time for each lot for each time period.

~~6.~~ 5. The method of claim 1, wherein the second mathematical programing model further models equipment groups or individual pieces of equipment and models quantity of products processed.

~~7~~6. The method of claim 1, wherein the conversion schedule includes quantity of product processed for each machine of the bottleneck machine families for a specified time period and time spent in each conversion for the specified time period.

~~87. A system for improving a factory back end, the system comprising:~~

~~at least one processor; and~~

~~a memory containing a program that, when executed by the at least one processor, performs operations comprising:~~

~~running a first mathematical programing model applied to factory data and production targets that produces a first solution and processing the first solution to produce a bottleneck loading plan for at least one machine of the factory's bottleneck machine families;~~

~~running a second mathematical programing model applied to the bottleneck loading plan that produces a second solution and processing the second solution to produce a conversion schedule for the at least one machine of the bottleneck machine families;~~

~~creating a lot schedule for the factory by running a simulation that follows the conversion schedule; and~~

~~publishing the lot schedule.~~

~~9. The system of claim 8, wherein the bottleneck loading plan identifies when machine conversions are to be processed.~~

~~10. The system of claim 8, wherein the conversion schedule identifies the time for each conversion and what quantity of each step of a factory process is to be processed before each conversion.~~

~~12. The system of claim 8, wherein the conversion schedule distributes conversions evenly through a selected time period.~~

~~13. The system of claim 8, wherein the lot schedule includes at least an identification of each machine in the factory and corresponding start time and finish time for each lot for each time period.~~

~~14. The system of claim 8, wherein the second mathematical programing model further models equipment groups or individual pieces of equipment and models quantity of products processed.~~

~~15~~. A non-transitory computer-readable medium containing computer program code that, when executed by a processor, ~~performs operations~~cause the processor to perform a method for improving a factory back end, the ~~operation~~method comprising:

receiving factory data comprising identification of a bottleneck family comprising at least one semiconductor processing machine of the bottleneck family, and at least one of processing speed, factory route, and conversion information of the at least one semiconductor processing machine;

receiving production targets comprising a time period comprising at least one week and a quantity of semiconductor product to be produced on the at least one semiconductor processing machine;

running a first mathematical ~~programing~~programming model ~~applied to factory data and production targets~~ comprising one of a mixed integer programming model, a mixed integer quadratic programming model, and a linear programming model, that

~~produces a~~ takes the factory data and the production targets as input, to produce a first solution, and processing the first solution to produce a bottleneck loading plan ~~for~~defining components of the production targets to be produced by the at least one semiconductor processing machine of the ~~factory's~~ bottleneck ~~machine families~~family during the time period;

running a second mathematical programing model comprising a mixed integer programming model to model semiconductor products processed, applied to the bottleneck loading plan, that produces a second solution comprising a conversion time for a semiconductor processing machine and a quantity of steps in a production flow to be processed before conversion, and processing the second solution to produce a conversion schedule for the at least one machine of the bottleneck machine families;

creating a lot schedule for the factory identifying a start time and a finish time for at least one semiconductor processing machine for each lot processed on the semiconductor processing machine for the time period, and indicating an amount of product to process on the at least one semiconductor processing machine of the bottleneck family for the time period by running a simulation that follows the conversion schedule; and

processing the lot schedule with a dispatch system coupled to the at least one semiconductor processing machine to automatically produce semiconductor products in accordance with the lot schedule.

8. The non-transitory computer-readable medium of claim 7, wherein the bottleneck loading plan identifies when machine conversions are to be processed.

9. The non-transitory computer-readable medium of claim 7, wherein the conversion schedule distributes conversions evenly through a selected time period.

10. The non-transitory computer-readable medium of claim 7, wherein the lot schedule includes at least an identification of each machine in the factory and corresponding start time and finish time for each lot for each time period.

11. The non-transitory computer-readable medium of claim 7, wherein the second mathematical programing model further models equipment groups or individual pieces of equipment and models quantity of products processed.

12. The non-transitory computer-readable medium of claim 7, wherein the conversion schedule includes quantity of product processed for each machine of the bottleneck machine families for a specified time period and time spent in each conversion for the specified time period.

13. A system for improving a factory back end, the system comprising:

at least one processor; and

a memory containing a program that, when executed by the at least one processor, cause the system to:

receive factory data comprising identification of a bottleneck family comprising at least one semiconductor processing machine of the bottleneck family, and at least one of processing speed, factory route, and conversion information of the at least one semiconductor processing machine;

receive production targets comprising a time period comprising at least one week and a quantity of semiconductor product to be produced on the at least one semiconductor processing machine;

run a first mathematical programming model comprising one of a mixed integer programming model, a mixed integer quadratic programming model, and a linear programming model, that takes the factory data and the production targets as input, to produce a first solution, and processing the first solution to produce a bottleneck loading plan defining components of the production targets to be produced by the at least one semiconductor processing machine of the bottleneck family during the time period;

run a second mathematical programing model comprising a mixed integer programming model to model semiconductor products processed, applied to the bottleneck loading plan, that produces a second solution comprising a conversion time for a semiconductor processing machine and a quantity of steps in a production flow to

be processed before conversion, and processing the second solution to produce a conversion schedule for the at least one machine of the bottleneck machine families;

create a lot schedule for the factory identifying a start time and a finish time for at least one semiconductor processing machine for each lot processed on the semiconductor processing machine for the time period, and indicating an amount of product to process on the at least one semiconductor processing machine of the bottleneck family for the time period by running a simulation that follows the conversion schedule; and

process the lot schedule with a dispatch system coupled to the at least one semiconductor processing machine to automatically produce semiconductor products in accordance with the lot schedule.

14.~~publishing the lot schedule.~~

The system of claim 13, wherein the bottleneck loading plan identifies when machine conversions are to be processed.

15. The system of claim 13, wherein the conversion schedule distributes conversions evenly through a selected time period.

16. The system of claim 13, wherein the lot schedule includes at least an identification of each machine in the factory and corresponding start time and finish time for each lot for each time period.

17. The system of claim 13, wherein the second mathematical programing model further models equipment groups or individual pieces of equipment and models quantity of products processed.