Value Stream Simulation

Your host today

Ralph Bauknecht
Technical Sales Consultant
Presales
Stuttgart
ralph.bauknecht@siemens.com
Hands-On Workshop

Value Stream Simulation

The session will be conducted in **Plant Simulation Version 12.0.6**, with the actual **VSM library Version 12.0.17**.

Keep your software and models/libraries up to date!

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“Value Stream Mapping” – What is it?

The Value stream defines the main flow of products through the factory:
- The production flow starting with the raw material to the customer
- Comprehensive recording and illustration of all production processes
- Concentration on value adding processes

Value Stream

Supplier | Production | Customer
Why VSM in Plant Simulation?

- In simulation it is possible to examine dynamic effects that cannot be seen in the static, paper-based map of the value stream.
- Simulation extends the classical value stream. The time component is key to evaluate dynamic fluctuations in the production, caused by lot sizes, setup, variants, or failures.
- Dynamic simulation in Tecnomatix Plant Simulation allows for reduction of work in process (WIP) and therefore capital lockup, validation of the robustness of the production, and ensure that fluctuations in the production do not affect the ability to deliver.

Introducing the Value Stream Mapping Library

Ease-of-use through reusing standardized symbols

Modeling with Drag&Drop and UI guided parameterization of process chains

Added Values
  - Digital approach
  - Dynamic evaluations based on real discrete event simulation
  - Easy evaluation of optimized scenarios
Evaluation Results

- Resource usage
- Buffer usage
- Value added vs. non-value added operations
- Throughput times
- Analysis of different production scenarios
- What-if-scenarios
- Testing of strategies and Kanban settings
- Product tracing along the value stream
- ...

Modeling Prep

- Start Plant Simulation
- Create a new model
- In the Class Library Manager deselect all except:
  - Basic Objects - Models – Frame

This makes it more convenient to work with the VSM library, and it ensures that you do not mix up VSM and standard simulation objects.
Modeling Layout

Model the value stream according to this picture:
(the PPS object is inserted automatically with the first VSM object)
Mind the direction of the connectors!

Modeling Data

These are the parameters for the value stream objects as they will appear in the setting tables:

- **Customer**
  - Product table: DesignTable - 10 - 1:00:00:00 - 10
  - Transportation time: 30:00
- **TransportExternal**
  - Product table: DesignTable - DesignTable - 1 - 1 - 50:00 - 1
- **Process Warehouse_Out**
  - Product table: DesignTable - DesignTable - 1 - 1 - 50:00 - 1
- **Inventory Warehouse**
  - Product table: DesignTable - 20
- **AssyProcess Table_Assembly**
  - Product table: DesignTable - 10 - 1:20:00 - 10
    - BOM table: Plate - 1
    - Leg - 4
- **Inventory Plate_Store**
  - Product table: Plate - 10
- **Inventory Leg_Store**
  - Product table: Leg - 40

- **Process Plate_Prod**
  - Product table: Plate - Raw_Plate - 1 - 5 - 1:10:00 - 5
- **Process Leg_Prod**
  - Product table: Leg - Raw_Leg - 1 - 20 - 30:00 - 4
- **Inventory Entry_Store**
  - Product table: Raw_Plate - 30
    - Raw_Leg - 50
- **Process Goods_In**
  - Product table: Raw_Plate - 1 - 10 - 5:00 - 10
    - Raw_Leg - 1 - 40 - 3:00 - 40
- **TransportExternal**
  - Transportation time: 30:00
- **Supplier**
  - Product table: Raw_Plate - 10 - 5:00:00
    - Raw_Leg - 40 - 5:00:00
Exercise
Simulation and Evaluation

Set EventController to 30 days. Run the simulation.

Look into the Customer – Statistics.

The products (statistics of all products) have a throughput time between order and delivery up to 4 days 21 hours.

More than 7% of the orders (order fulfilment: only the last delivered part of the orders count) have delivery times higher.

We want to optimize this!

Exercise
More Evaluation

Insert the UtilizationAndStock object to see if we have a capacity problem.

Open the Plotter of the Warehouse (statistics tab) to see if we have always finished goods available.

Insert the StockPlotter object. Activate the contents of Warehouse, Leg_Store and Plate_Store by doubleclicking the entries in the right table. Activate the StockPlotter.

Reset and run the simulation. Check for availability of material.
Exercise
Even more Evaluation

Where does that peak come from?
Simulate to 11:02:00:00. Open the orders list of the Table_Assy:

Why is there an order for 20 parts / 2 lots? Look into the order protocol of the customer:

This is the first order of 11 parts that cannot be fulfilled with leftovers of preceding 9-part orders (lot size of assembly is 10!).

Scenarios

Before you make changes: make a copy!

Duplicate your value stream model to create a new scenario for evaluation of changes. In this way you can always go back to your original to create other scenarios. You can duplicate a scenario for further changes, too.
### Exercise Scenario 1

Solution proposal:  
Change the lot size + transfer quantity in Table Assy to 4.  
Simulate again and check Customer statistics: all orders are below 4 days!

### Exercise Scenario 2

Solution proposal:  
Change initial stock in Warehouse to 15.  
Simulate again and check Customer statistics: we are now at 2 days 7,5 hours max!  
82,14% of orders are below 2 days 7 hours:
Contact

Ralph Bauknecht
Technical Sales Consultant
Siemens Industry Software GmbH
Digital Factory Division
Product Lifecycle Management
Global Sales & Services
Weissacher Straße 11, Gebäude Grün, 3.OG West
D-70499 Stuttgart
Tel: +49 (0) 7453 - 9562832
Fax: +49 (0) 7453 - 9562833
Mobil: +49 (0) 160 - 90 45 04 58
ralph.bauknecht@siemens.com
www.siemens.com/plm