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Enabling Electronic Design

NxStats – QoR Analysis Software for Fractured Photomask Data

NxStats is unique and efficient analysis software to analyze the quality of the Fractured Photomask data generated by Mask Data Preparation Software.

OPC and RET techniques employed in sub-32nm node demand extremely complex fracturing algorithms to generate fractured photomask data targeted for mask manufacturing equipment. The quality of the fractured data has a huge impact on the quality and yield of manufactured photomask as well as the mask writing time.

NxStats analyzes the mask data for various parameters such as number of figures, shot count, sliver count, long sliver count, total sliver perimeter, CD violations etc. enabling MDP engineer to comprehensively and objectively analyze the quality of the fractured data. NxStats uses distributed computing environment and makes use of advanced algorithms while analyzing the quality of the mask data. The results of NxStats are written in a CSV file along with the external sliver and CD violations highlighted in a layout (GDSII/OASIS) file.

NxStats supports all major industry standard Mask file formats. NxStats is based on SoftJin's widely deployed Nirmaan Polygonal Data Processing Platform with the industry's fastest data import and export capabilities.

Key Benefits

Analysis of Quality of Fractured data

- Unique Tool to analyze and compare the results of any fracturing software without any favor to any particular fracturing tool
- Reports the shot count, sliver count, long sliver count etc
- Reports the number of rectangles, triangles, and X, Y trapezoids
- Highlights external sliver and CD violations in a layout file
- Analysis based on multiple parameters simultaneously

Excellent throughput

- Leverages distributed computing as well as multi-core infrastructure
- Unlimited data handling capacity

Key Product Features

Results of NxStats

NxStats reports the following statistics regarding the quality of the Fractured Mask Data

- Shot count
- Figure count
- Number of slivers, long slivers and sliver shots
- Total sliver perimeter
- Total perimeter of the shapes and shots
- Total figure area, shot area and total sliver shot area
- Number of Horizontal and Vertical CD line-Splits along with these splits highlighted in a layout file
- Total external sliver count along with the external sliver violations highlighted in a layout file
- Size and the type of geometries found in the input file
- Number of rectangles, triangles, X-Trapezoids and Y-Trapezoids
- Number of rectangular and triangular slivers
- Number of slivers in 4 bins. Slivers are classified in 4 bins based on their size and the number of slivers in each bin is reported.

Distributed computing support

- Efficient use of distributed processing and multi-core architecture for better throughput
- Intelligent partitioning and distribution of data across multiple cores and multiple CPUs
- Customizable attributes in the user parameter file enabling user to control the distributed environment

Large Data Handling

- Unlimited data handling capacity, capable of handling files of any size
- Efficient and versatile geometric engine to support all-angle as well as positive and reverse tone data

User Interface

- TCL based user scripting interface enables easy customization, configuration and integration
- As part of SoftJin's NxMDP tool-suite, NxStats has close integration with other tools including NxFracture (for fracturing the layout data to mask data), NxCompare (for layout / mask data equivalence check and other Boolean / geometrical operations), and NxMRC (mask rule checker)
- Integrated with Jedat's Hotscope viewer (A high performance layout and mask data viewer)

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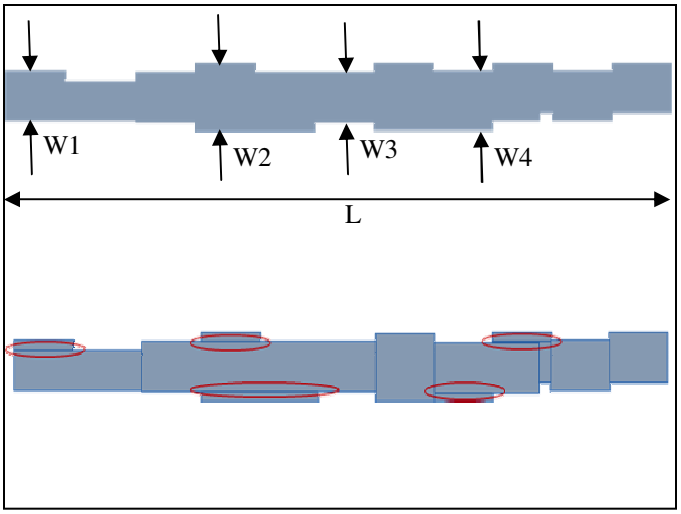
- **Advanced operations on Input data**
  - Scaling, Rotation, Translation, Mirroring and Tone Reversal options on the input data
  - Full chip, Window-specific, Cell-specific, and Layer specific options to filter out the input data for analysis

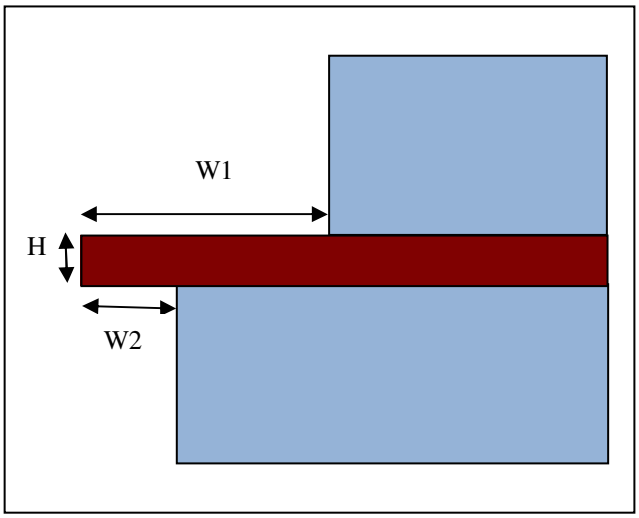
- **Supported Mask data formats**
  - **Input mask formats** – JEOL 52(V3.1), VSB-11, VSB-12, and OASIS.MASK

- **Backed by SoftJin's customized software development and integration services to meet specific needs and customizations for Equipment vendors and end-customers**



Identification of CD line splits in NxStats

Input*: MinWidth, MaxWidth, MinLength*
For all Wi: (*MinWidth* < Wi < *MaxWidth*) && (L > *MinLength*)



Computation of External Slivers in NxStats

If H < SliverThreshold and if W1 or W2 (any of the external edges) > ShorelineSliverThreshold, then the sliver is reported as an external sliver.

About SoftJin

SoftJin Technologies develops Innovative and Customized Automation software for Electronic Design and Manufacturing. SoftJin offers several Software Products that address the challenges associated with IC Manufacturing at advanced process nodes including Post Layout Analysis, Optimizations and Mask Data Preparation. SoftJin's software products also serve as embedded components, Analysis and productivity enhancement tools for Lithography and Inspection equipments. See more details at www.softjin.com

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