# CATS SmartMRC

## Fast and comprehensive mask rule check

## Overview

CATS™ SmartMRC offers industry's highest performance solution for mask rule check (MRC) and pattern matching. Combined with a comprehensive set of checks SmartMRC significantly improves data verification efficiency for the most complex designs at advanced technology nodes.

## Accurate and Exhaustive Verification Required to Meet Mask Quality and Cost Targets

Faster time to market and cost effective mask manufacturing requires thorough and accurate verification of data prior to committing masks to fabrication. The number checks and the overall size of data over which these checks are made has increased exponentially at advanced technology nodes. To accomplish data verification in a timely manner to meet manufacturing turn-around time, a fast MRC solution is needed.

## CATS SmartMRC Delivers:

### Unmatched Verification performance

Supported by scalable distributed processing (DP) architecture and industry's fastest MRC engine SmartMRC delivers the highest throughput. It is now possible to process hundreds of GBytes of data in a few hours using modern compute clusters. This enables early stage MRC at fabs and final stage MRC at mask shops (Figure 1).
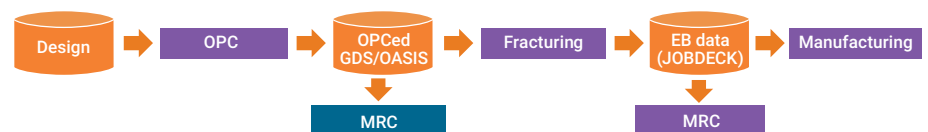


Figure 1: Early stage MRC for fabs, final stage MRC for mask shops

## Comprehensive set of rule checks

SmartMRC offers a comprehensive set of checks and a flexible command language which enables users to quickly develop flows to identify errors and marginalities that are likely to have adverse effects on mask manufacturing. Figure 2 illustrates some of the checks which can be performed.
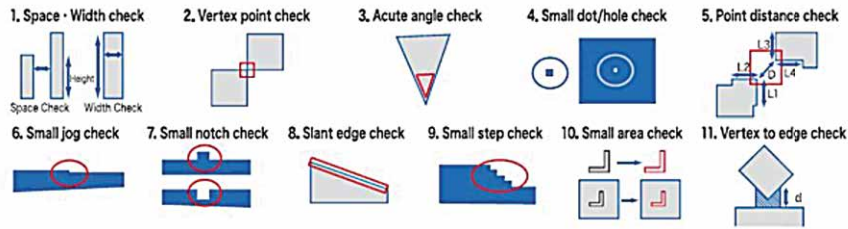


Figure 2: SmartMRC functions

In addition, SmartMRC enables users to develop flows for the following applications in Figure 3:
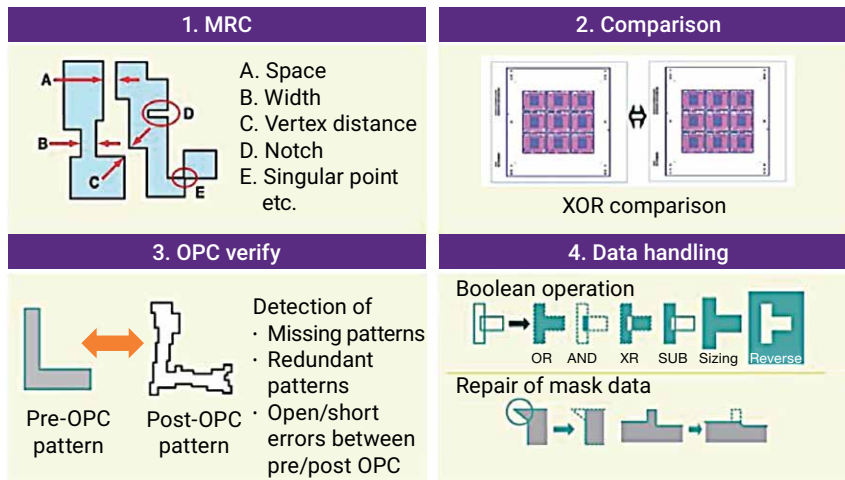


Figure 3: Applications of SmartMRC

## Pattern matching

The high performance pattern matching engine in SmartMRC quickly identifies patterns of interest in a given data set. SmartMRC supports both, exact, and fuzzy pattern match. Using SmartMRC's pattern matching capability users can develop mask metrology flows for automated placement of CD metrology marks. SmartMRC can also be used for developing repair flows for mask data where suspect patterns can be identified and repaired prior to mask manufacturing. Pattern matching can also be used to build a library of patterns to classify MRC errors as seen in Figure 4.
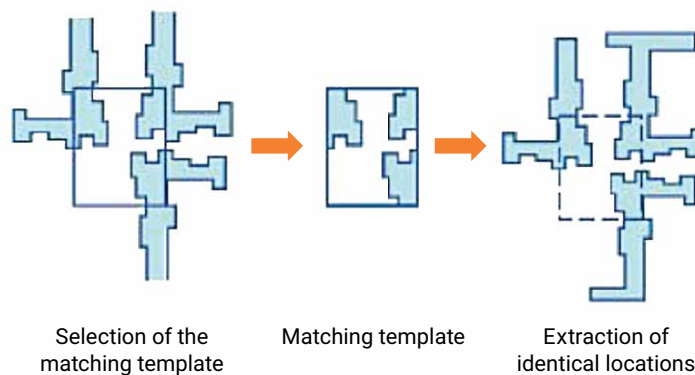


Selection of the matching template   Matching template   Extraction of identical locations

Figure 4: Illustration of SmartMRC pattern matching function

# GUI support for SmartMRC

SmartMRC is fully supported by CATS graphical user interface. This offers an easy-to-use browser for reviewing MRC errors. It also enables creation, editing and viewing of templates required for setting up pattern matching. The resulting matched patterns which can also be viewed in the GUI (Figure 5).
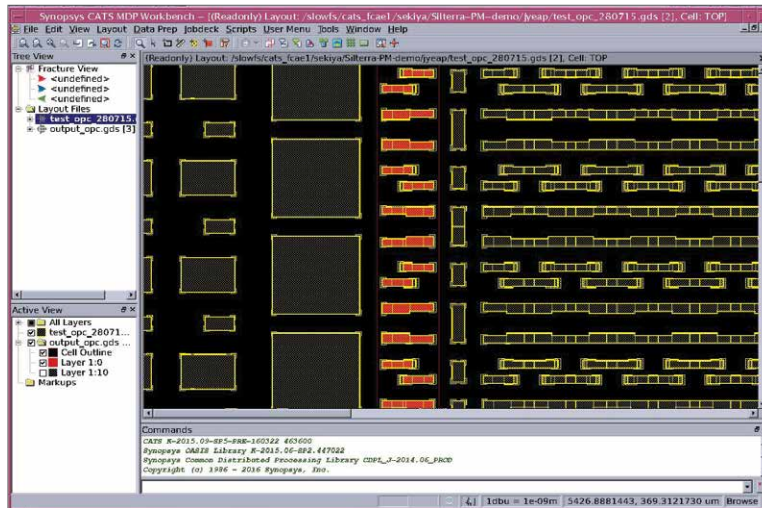


Figure 5: CATS GUI for SmartMRC

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