

## MAESTRO — Life Cycle Management

Framatome's MAESTRO integrated software tool helps you to manage your steam generator (SG) life cycle by precisely modeling tube deposit progression, allowing you to plan mitigation strategies and maintenance routines with an engineering approach that provides cost savings and maximum benefits.

### Challenge

Steam generator life cycle management strategies are dependent on a selected combination of various scenarios and mitigation strategies, ranging anywhere from 1-15 years in planning horizon, each of which uniquely address SG tube deposit progression, to prevent SG tube plugging, heat transfer ineffectiveness, SG pressure loss, and ultimately, a reduction in power production. Plant operators need comprehensive strategies that protect component investment through optimized life cycle management, restoring or maintaining a high level of efficiency.

### Solution

#### Proven Tools for Steam Generator Maintenance

MAESTRO is our patented integrated software tool designed to model the steam generator through a unique engineering approach that includes secondary side deposit mapping. MAESTRO maps, inventories and analyzes deposits, using the results to determine deposit loading trends, helping you establish mitigation methods and maintenance schedules. Deposit mapping can provide further benefits to these plans.



### Customer benefits

- Provides a scientific approach serving as the basis for optimal maintenance strategies to protect SG investment
- Uses plant thermal performance data, tube degradation, chemistry, power considerations and various other plant data in the analysis
- Incorporates typical SG maintenance and remediation strategies as part of case analysis
- Supplies a net present value economic approach that minimizes customer investment while maximizing gains
- Identifies most advantageous times to perform mitigation and maintenance activities
- Assists in addressing customer budget and schedule considerations

# MAESTRO Analysis

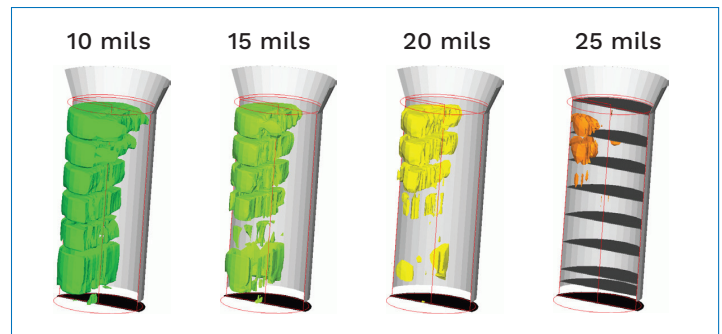
The MAESTRO software evaluates competing strategies individually, as compared to a baseline, to identify optimum strategies in terms of net present value.

## Evaluation Process

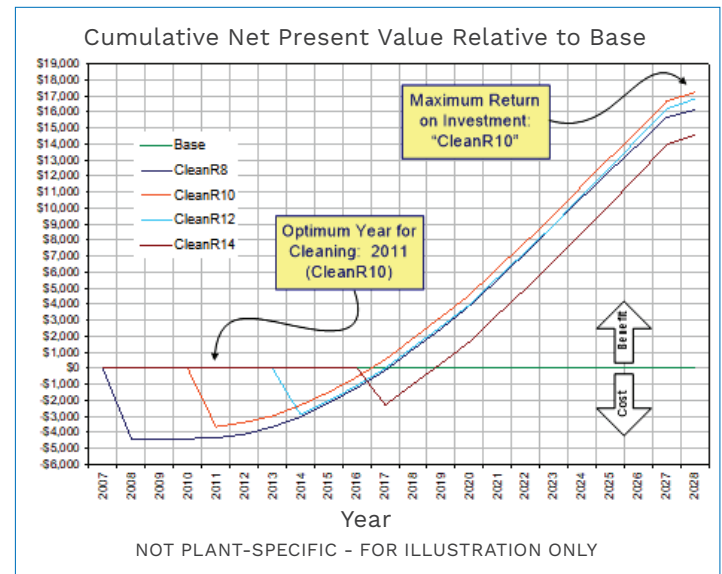
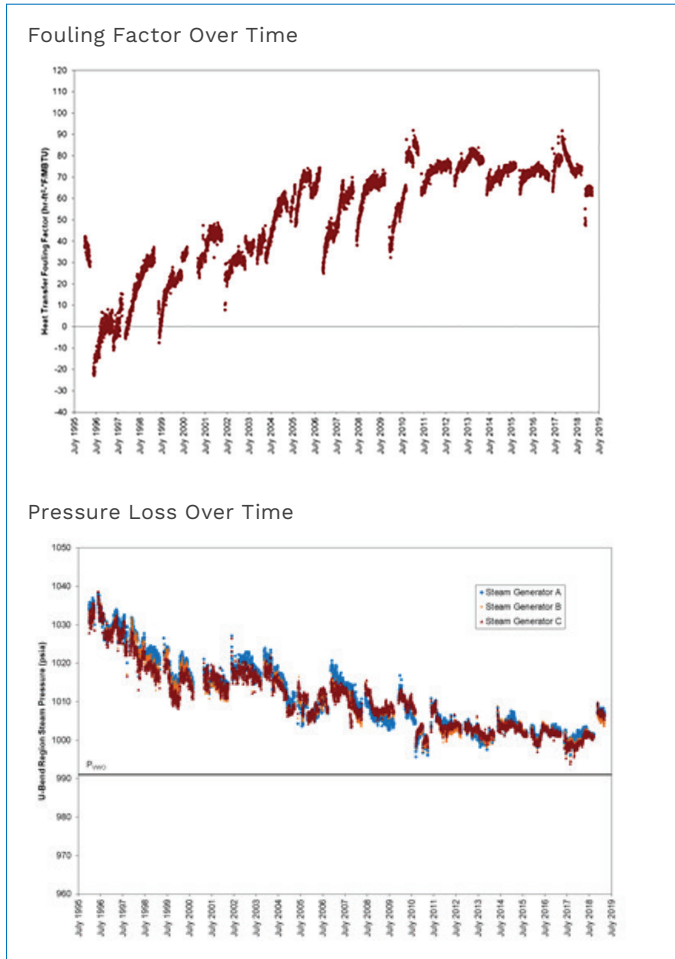
- O&M activities are grouped and run through MAESTRO
- Multiple strategies are comparatively evaluated over a defined time span based on key metrics directly developed from and focused on customer deposit management program goals
- Heat transfer characteristics, deposit inventory, steam pressure, power production, outage duration, radiation exposure, tube degradation, chemistry data, operating range water level and comparative costs are all factored into a MAESTRO analysis
- Includes tube support plate flow blockage monitoring
- Tracks heat transfer and water level resistance to fouling
- Considers steam pressure evaluation and fouling factor
- MAESTRO results are based on time spans defined by the customer

# Deposit Mapping

- Patented secondary side deposit mapping is a diagnostic method for tracking progression of deposit inventory
- It is the only method that consistently tracks the distribution and trends of SG deposits throughout the tube bundle
- Noninvasive technique for imaging deposit accumulation uses bobbin coil or array coil data
- Facilitates flow blockage monitoring
- Collects heat transfer correlation and wide-range water level resistance data relative to bundle effects
- Provides visual results
- Aids engineering in fouling determination and projection



Tube Freespan Deposits



Simplistic MAESTRO output example for chemical cleaning showing the best time to implement to maximize the investment

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