OUR AMBITION

SOX as the leading Safety & Security Engineering Workbench

BOM / FMEDA SEMICONDUCTOR ANALYSIS

ENCO COMPANY INFORMATION

EnCo:	Founded 2008
Headquater:	Munich / Site in Bremen
Reseller:	Japan, South Korea, China and North USA
Products:	SOX / C-SOX (Cloud Based SOX, first modules available in Q3 2019)
Support activities:	Consulting, Training, Training on the job (e.g. pilot projects and SOX migration)
Strategic Partner:	TWT Engineering, *(ITK Engineering)*
Quality:	A-Spice level 1 and ISO 26262 tool qualification in cooperation with Bosch

SOX – THE SAFETY & SECURITY ENGINEERING WORKBENCH

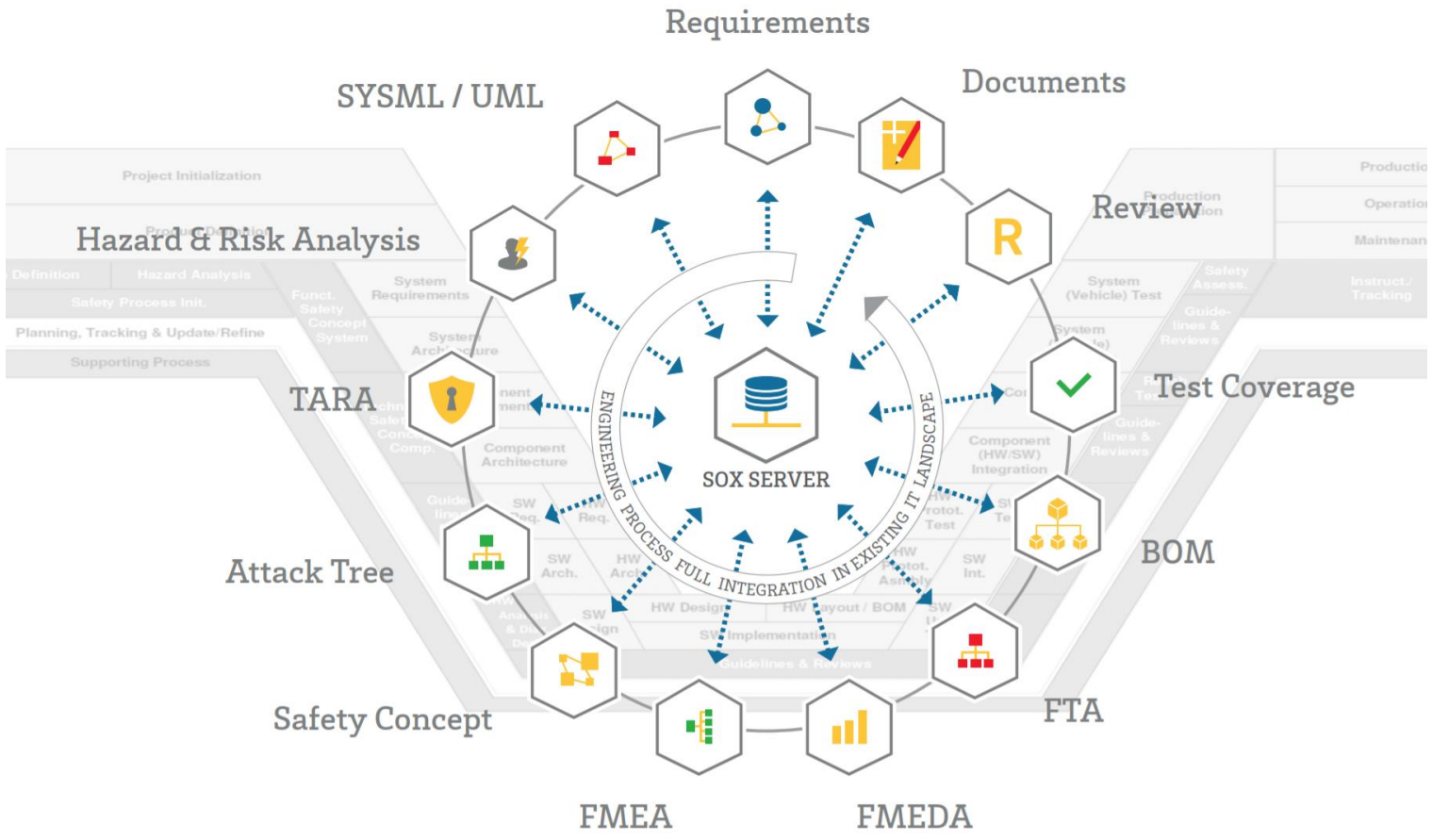
SYSTEM-ORIENTED & COLLABORATIVE ENGINEERING

CENTRAL COMPANY DATA STORAGE & KNOWLEDGE DATABASE

SAFETY METHODS EMBEDDED INTO YOUR ENGINEERING

IMPROVED PROCESS AND ENGINEERING TOOLS MATURITY

LOWER COSTS BY THE REPLACEMENT OF ISLAND SOLUTIONS



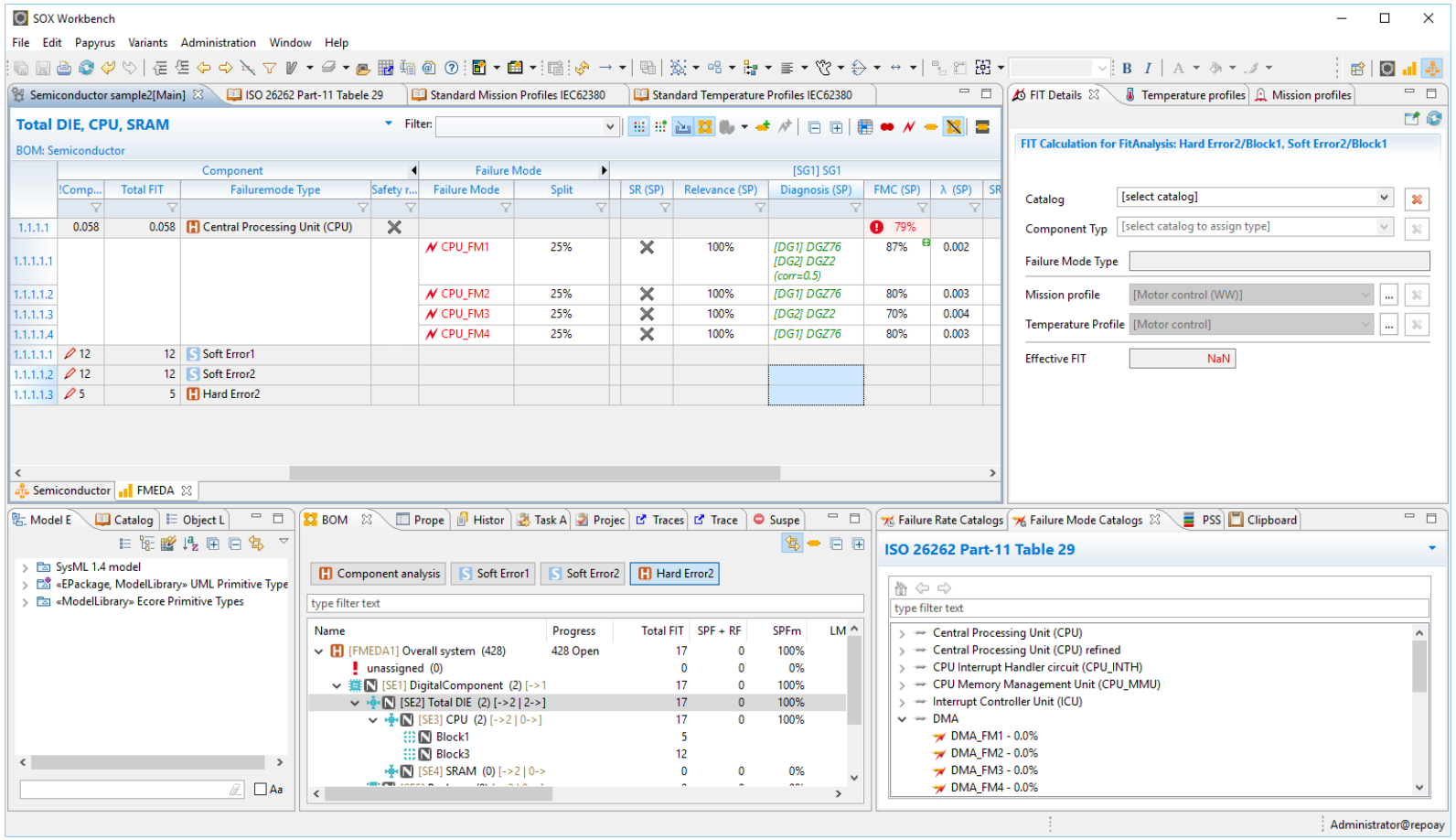
SOX FMEDA SEMICONDUCTOR ANALYSIS

The SOX workbench is an integrated tooling platform with a rich and fast UI that combines a manifold of tools for functional safety analysis.

The upcomming version of SOX 3.2 will provide a new semiconductor feature that allows modelling of semiconductors according to

- **ISO26262**
- **IEC62380**
- **SN29500**

With the possibility for a detailed analysis of failure coverage on lowest level components (Block and Pin)



SOX FMEDA SEMICONDUCTOR ANALYSIS

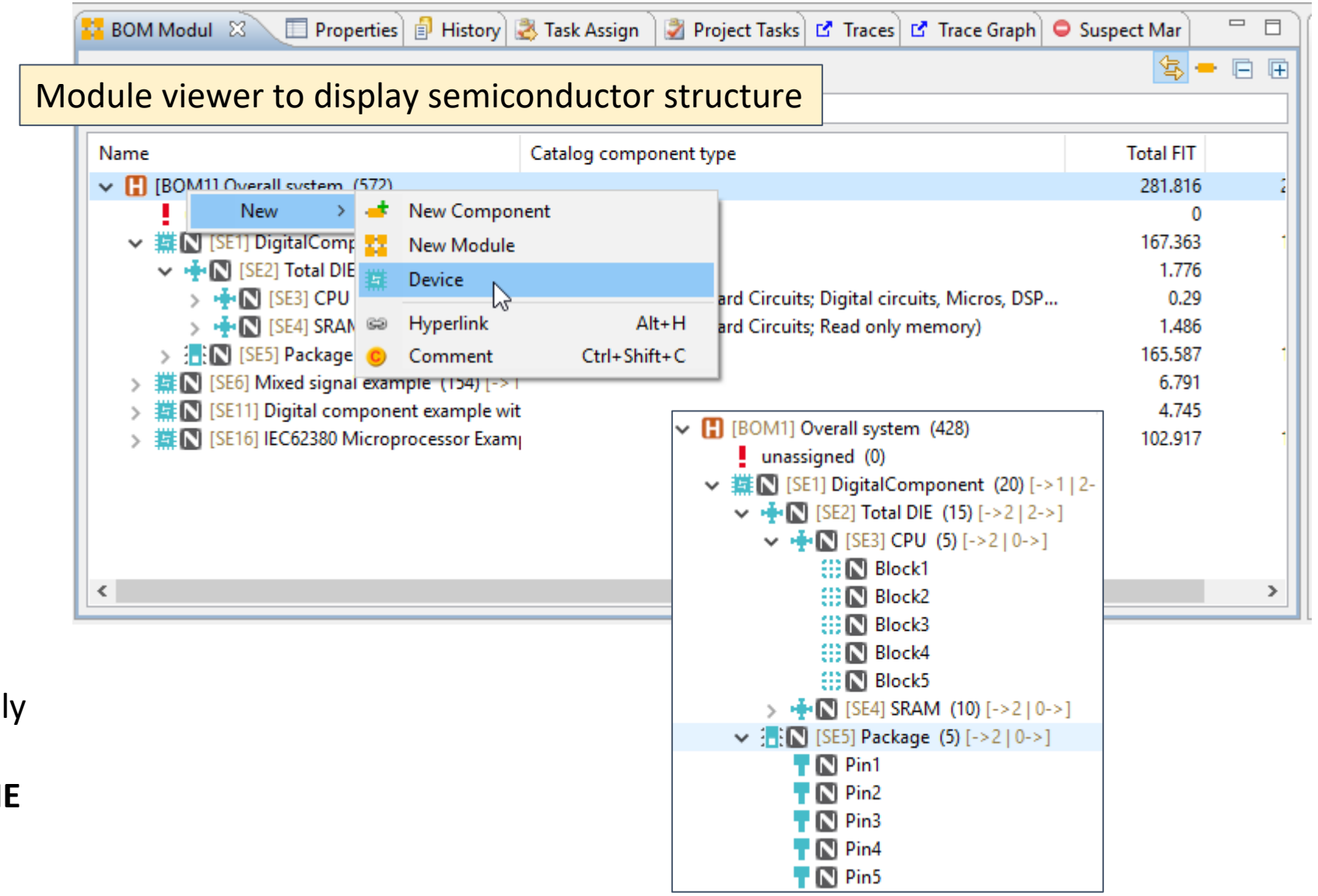
The new Semiconductor feature of SOX allows modelling of semiconductor devices with new specific module types:

- **Device**
- **DIE**
- **Package**

With the corresponding specific component types

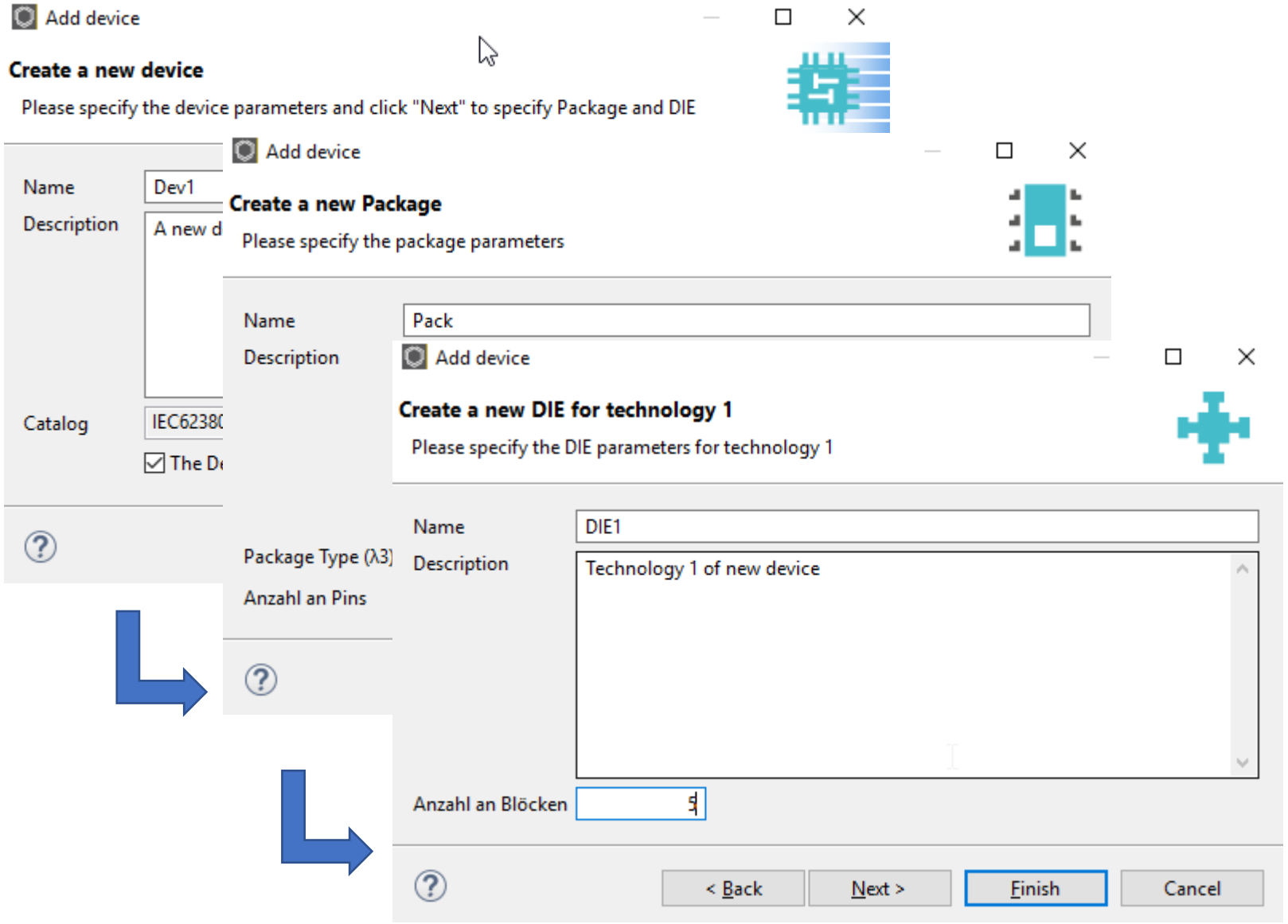
- **Block (for DIE)**
- **PIN (for Package)**

Multiple DIE technologies can easily be handled by the **stacked DIE** concept, that introduces a **total DIE** module to encapsulate all λ_{DIE} calculations.



SOX FMEDA SEMICONDUCTOR ANALYSIS

The simple **device wizard** of SOX guides you through the creation process of a semiconductor device. Collecting all relevant data to build up the complete device structure.

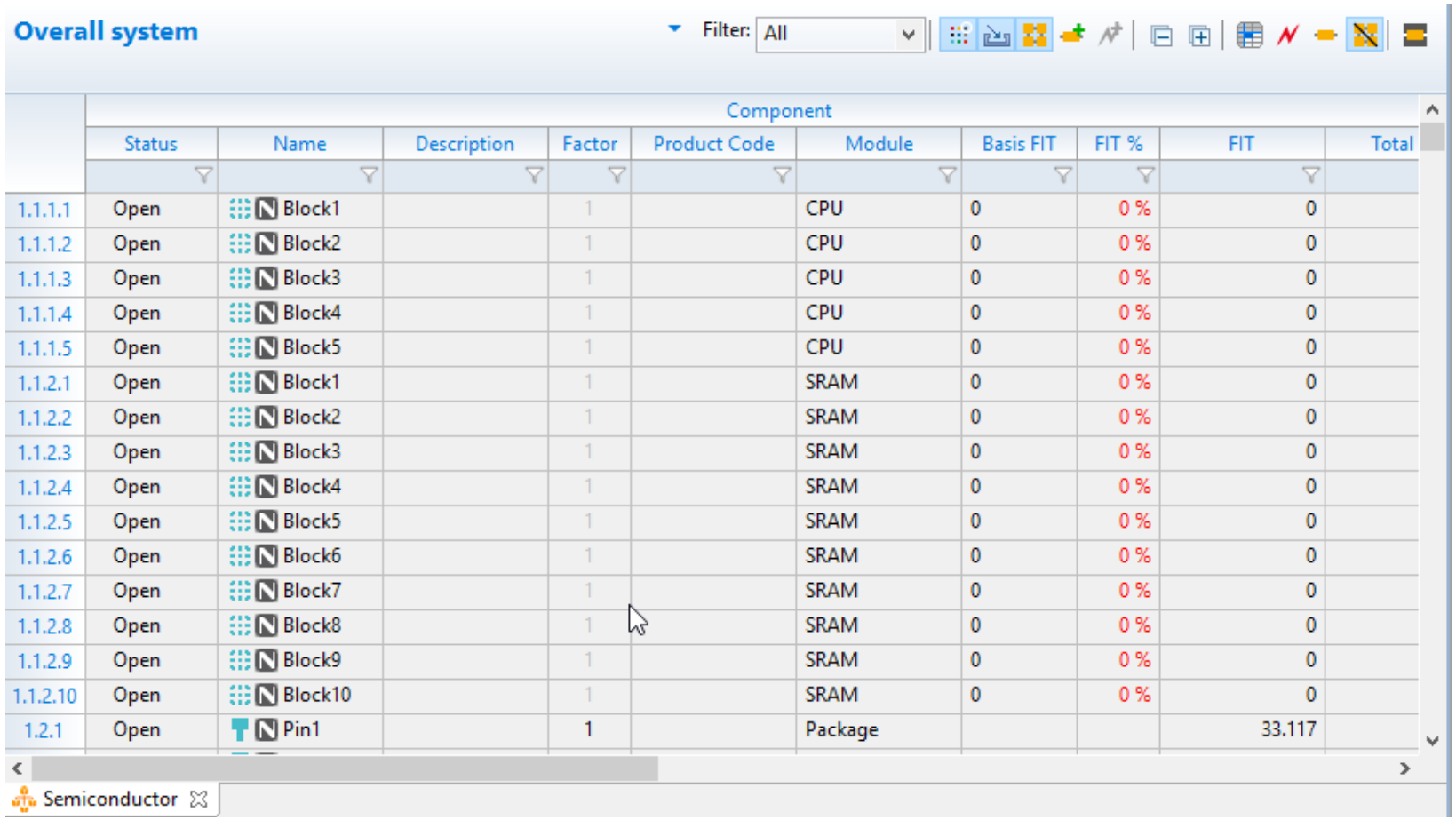


SOX FMEDA SEMICONDUCTOR ANALYSIS

After the creation of the device structure, the powerfull SOX BOM/FMEDA grid gives access to all detailed data and provides sophisticated features to ease the work of capturing new data and giving an overview of existing data.

Features include:

- **Powerfull regular expression filters for columns**
- **Inline editing support**
- **D&D support for assignemt of component types and failure modes**
- **Type filtering**
- **Coloring to indicate diagnostic coverages**
- **Freeze functionality**
- **Search**
- **….**



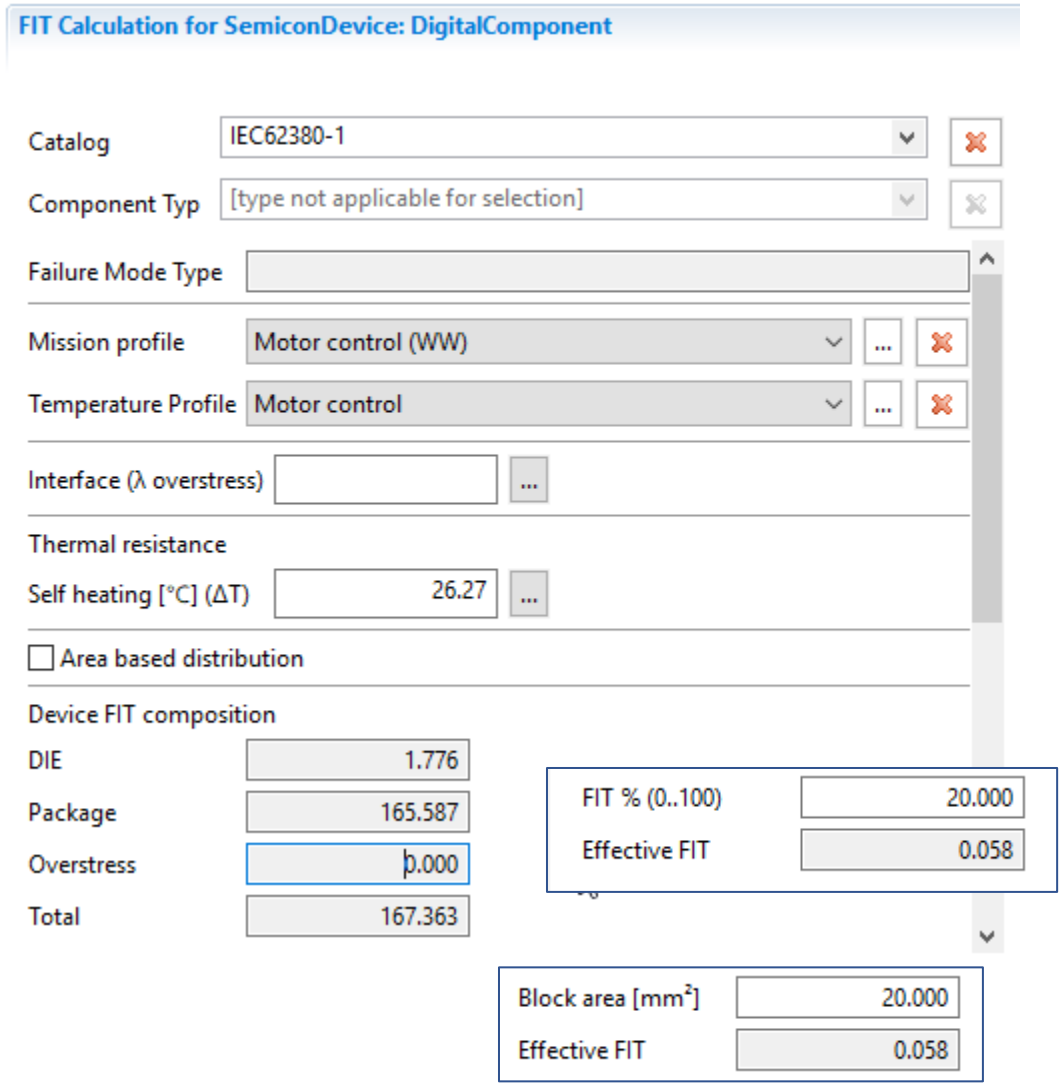
SOX SEMICONDUCTOR RELIABILITY ENHANCEMENTS

Calculation of failure rates for semiconductor is performed in a top-down approach which determines fit rates on package and DIE level using the mathematics defined in **ISO26262** together with **IEC62380** or **SN29500**.

Relevant data for fit calculation is captured in a clear and concise UI that re-calculates fit values directly on parameter changes.

Calculated $\boldsymbol{\lambda_{DIE}}$ is distributed to lower level **blocks** by either specifying a **percentage** value for each block or alternatively by specifying a **block size**.

Calculated $\boldsymbol{\lambda_{DIE}}$ is uniformely distributed to all **pins** of the package.



SOX SEMICONDUCTOR RELIABILITY ENHANCEMENTS

SOX Semicon provides detailed information on **intermediate calculation results** on all levels of the calculation.

Calculation details

Total DIE FIT

FIT_{DIE}	1.7759501124132444
calculation scheme	SUM_LAMBDA2

CPU

FIT_{DIE}	0.29032849157128116
ignore τ_{off}	false
λ_1	3.4E-6
λ_2	1.7
a	10.0
de-rating	0.16874322409499942
base failure rate	1.7205342207271765

SRAM

FIT_{DIE}	1.4856216208419633
ignore τ_{off}	false
λ_1	1.7E-7
λ_2	8.8
a	10.0
de-rating	0.16874322409499942
base failure rate	8.80403719206873

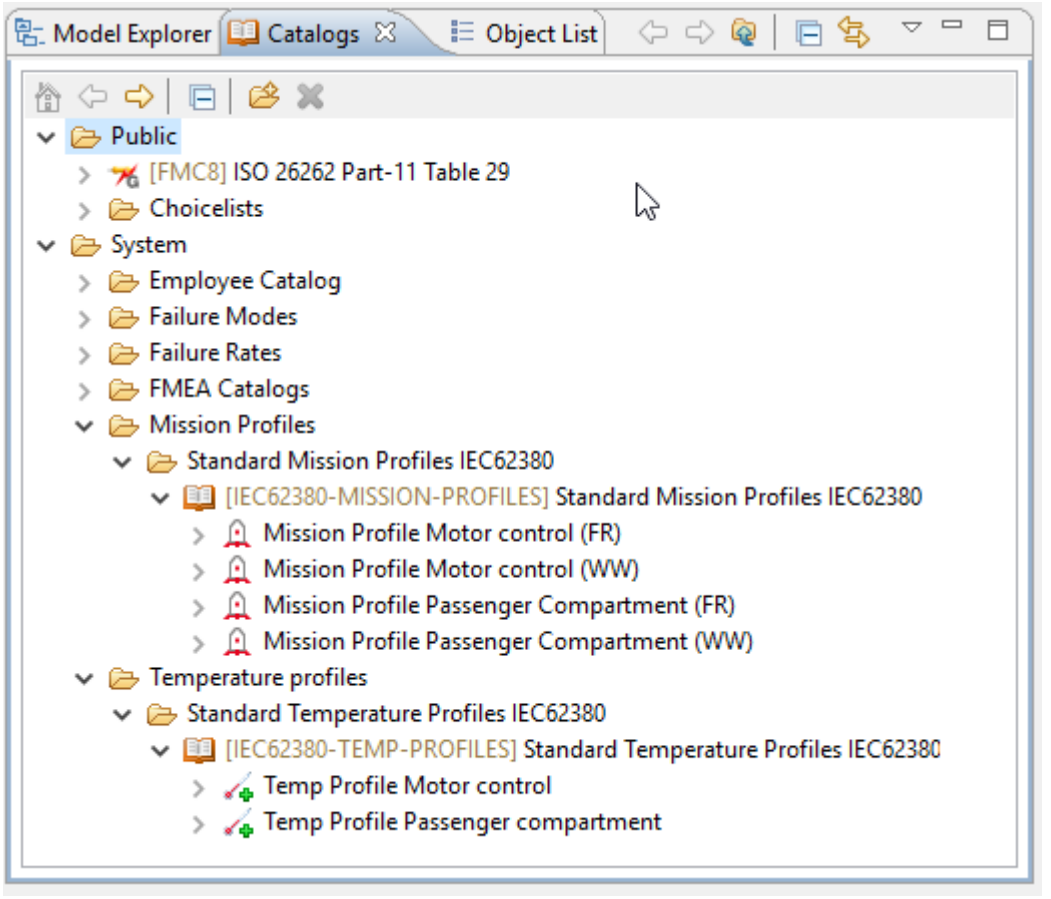
SOX SEMICONDUCTOR RELIABILITY ENHANCEMENTS

The powerfull catalog concept of SOX now also encompasses **mission profile** and **temperature profile** catalogs.

Standard **mission profiles** and **temperature profiles** as defined by **IEC62380** are already available.

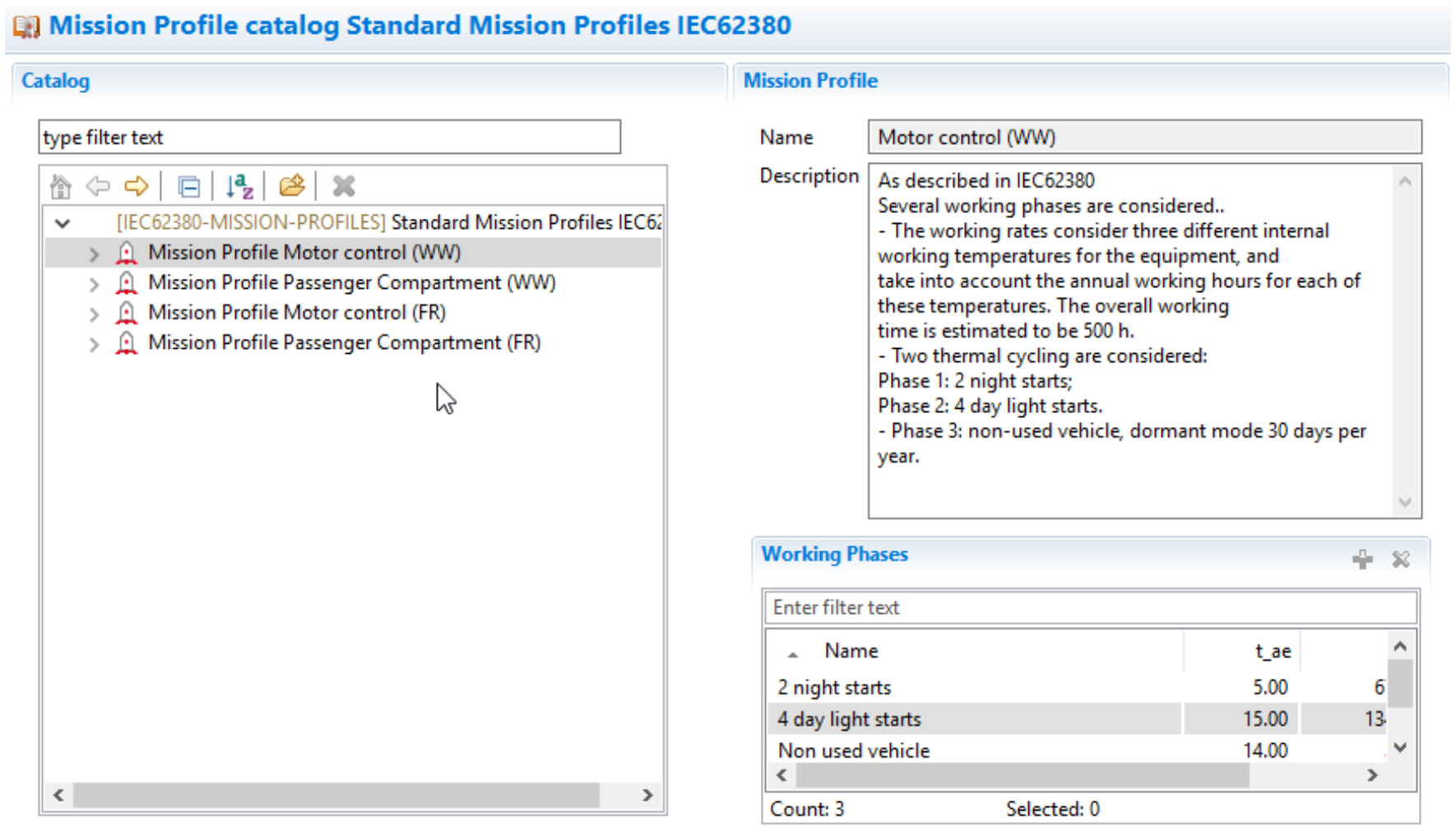
Company specific profiles can easily be added using **public catalogs**.

In conjuction with SOX server these profiles can be provided to any engineer working with SOX. Due to SOX sophisticated client/server technology and **relational database** backend all data is available for each engineer at **real time**.



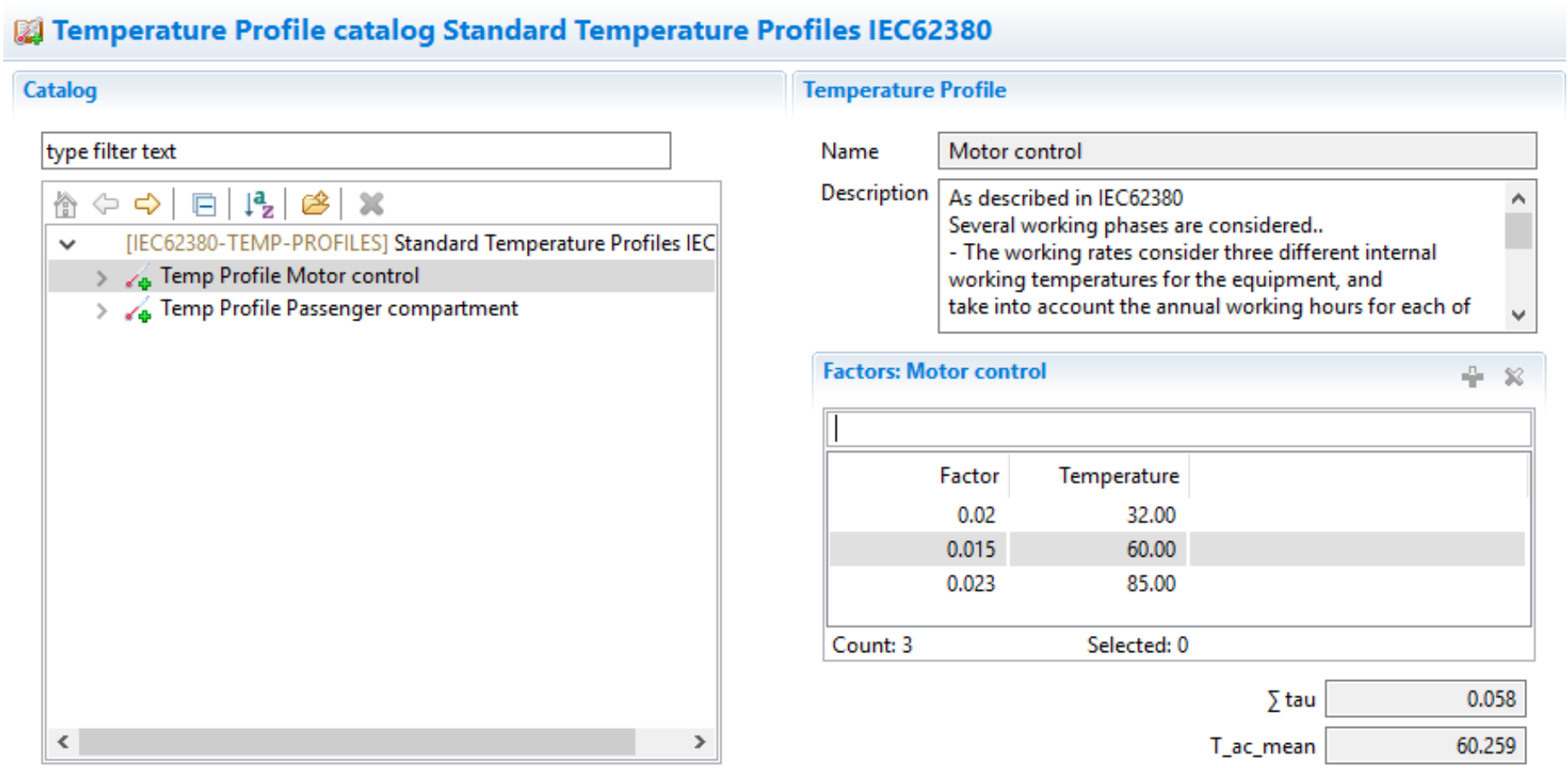
SOX SEMICONDUCTOR RELIABILITY ENHANCEMENTS

The new SOX mission profile editor for company specific mission profiles.



SOX SEMICONDUCTOR RELIABILITY ENHANCEMENTS

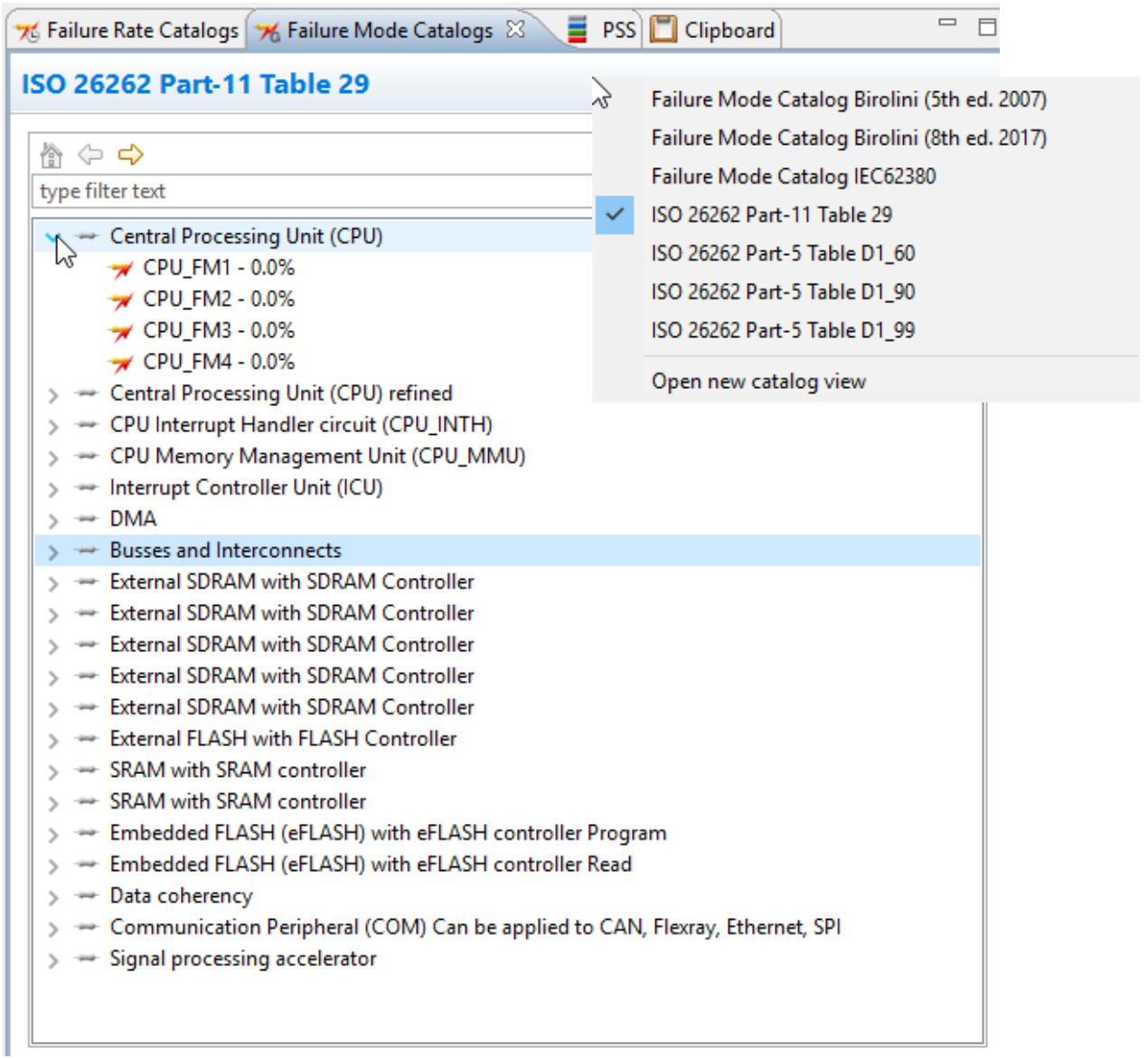
The new SOX temperature profile editor for company specific Temperature profiles.



SOX SEMICONDUCTOR FMEDA ENHANCEMENTS

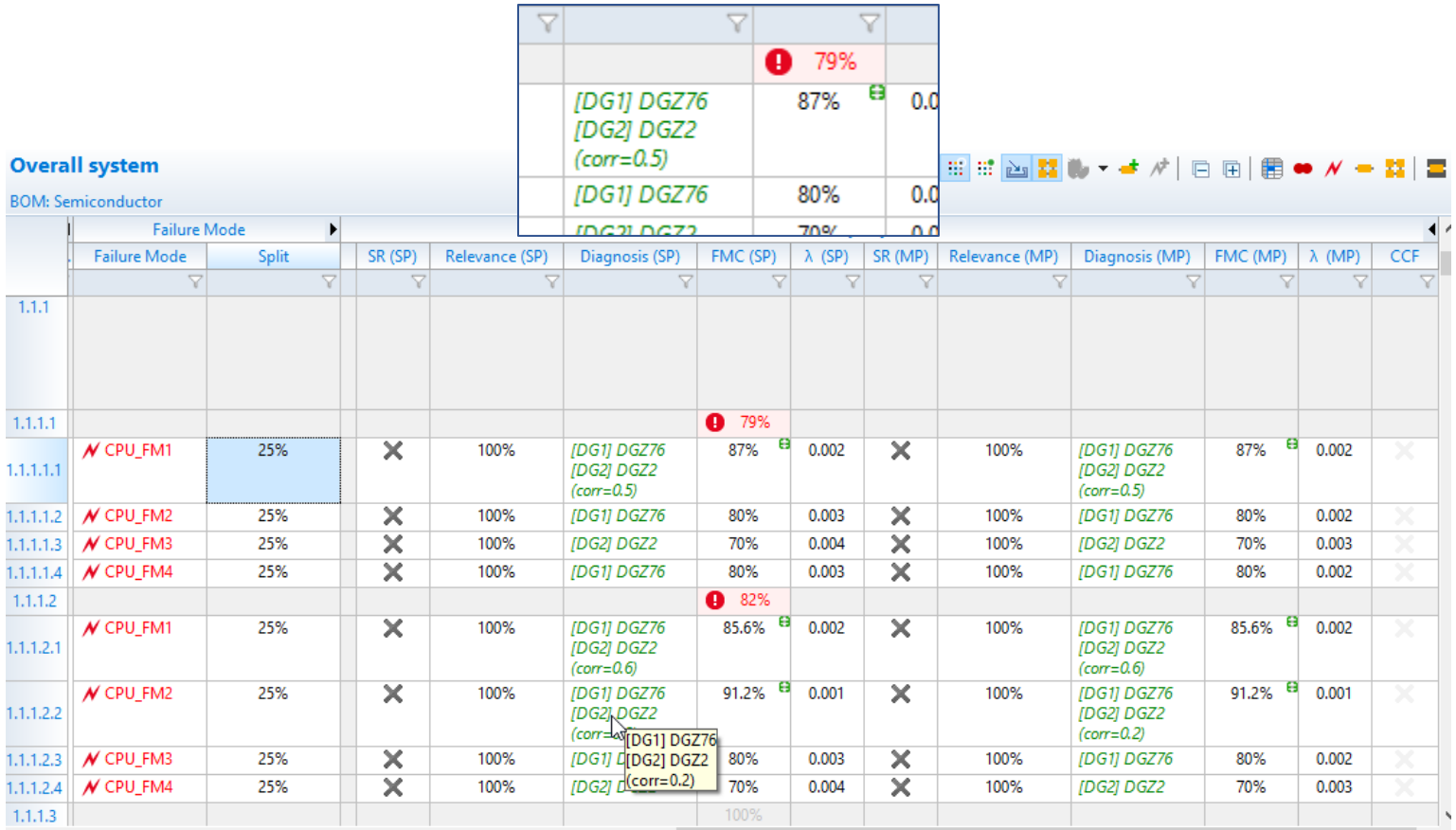
SOX now provides relevant failure modes catalogs of **ISO26262 Part 5** and **Part 11**. The failure mode definitions can be assigned to components by simple **D&D** operations.

Customer specific catalogs can be added and provided to all engineers just like the mission and temperature profile catalogs.



SOX SEMICONDUCTOR FMEDA ENHANCEMENTS

SOX now supports correlation of diagnostics. A correlation factor can be specified for each occurence of two or more diagostics at failure mode level.

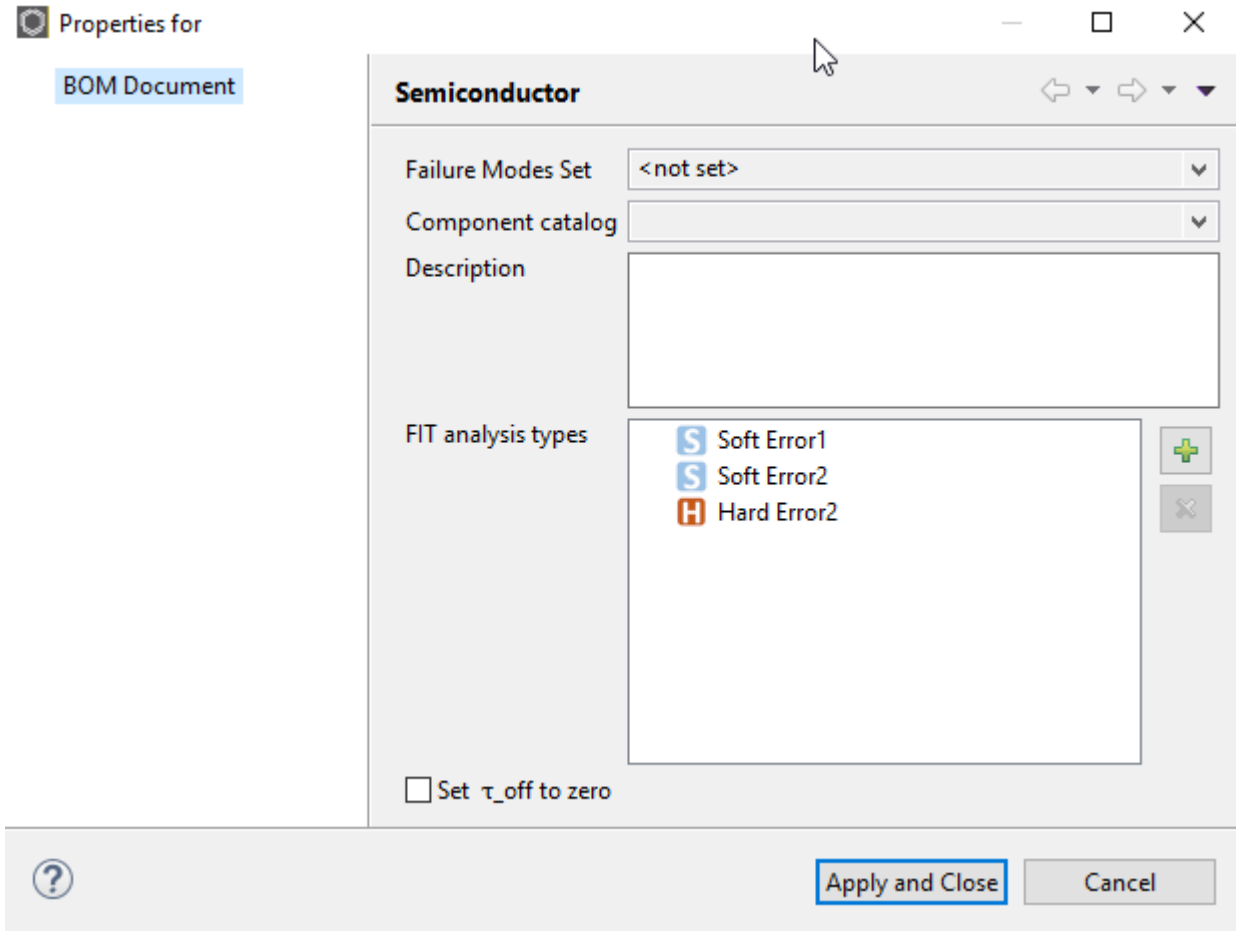


SOX SEMICONDUCTOR FMEDA ENHANCEMENTS

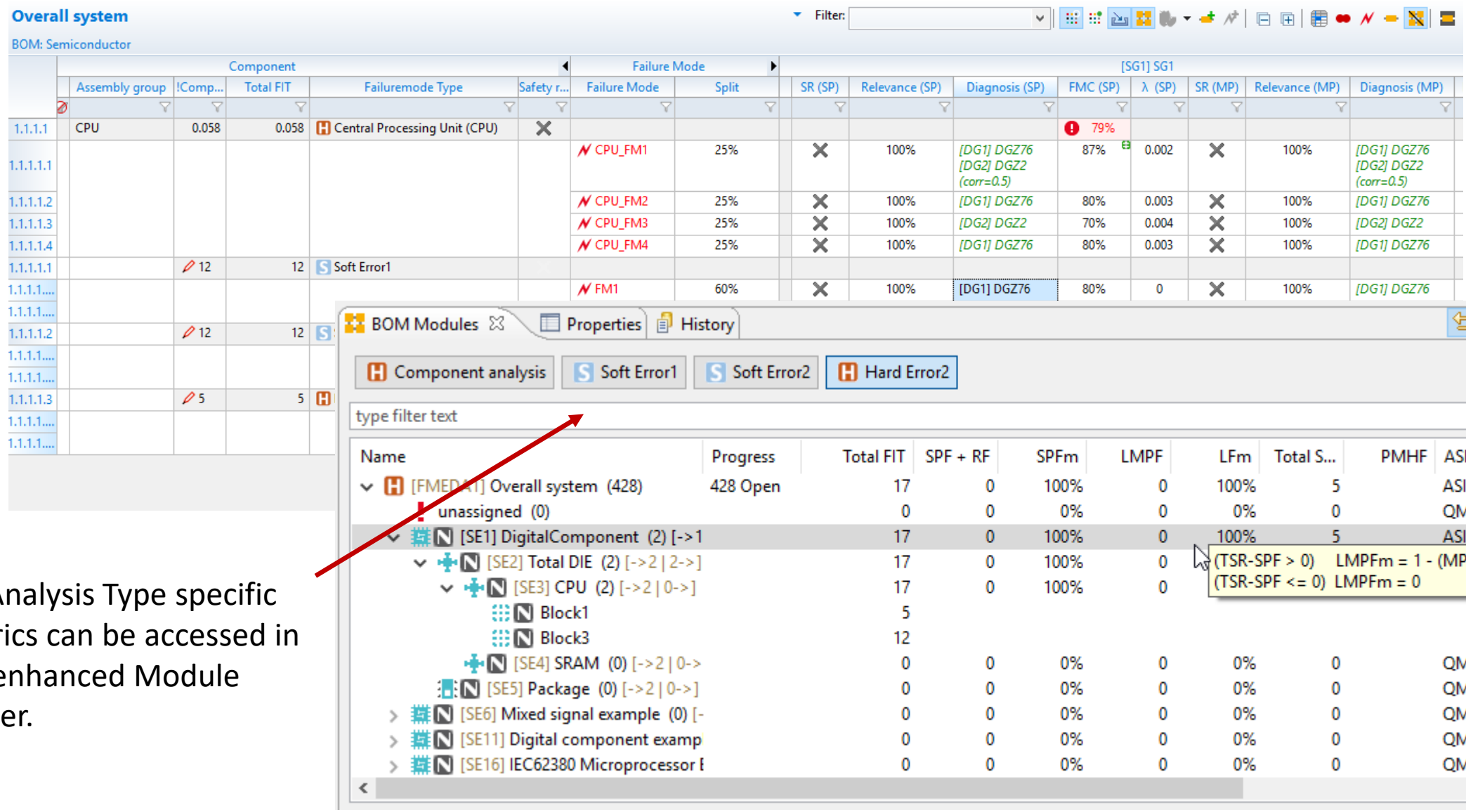
In order to cover Soft Errors on semiconductor devices SOX now introduces the concept of **FIT Analysis Type**. One or more **Fit Analysis Types** can be added to a SOX BOM document. Each **FIT Analysis Type** can be assigned to any Component or Module.

For each assigned **FIT Analysis Type** the engineer can manually capture FIT data or even use **IEC62380** or **SN29500** calculations to calculate FIT values according to the respective calculation scheme.

An assigned **FIT Analysis Type** behaves similar to the default component FIT analysis. It gives the possibility to model **failure modes** and **diagnostic coverage** and provides FIT Analysis Type **specific metrics**.



SOX SEMICONDUCTOR FMEDA ENHANCEMENTS



FIT Analysis Type specific metrics can be accessed in the enhanced Module viewer.

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