GenISys
Advancing the Standard

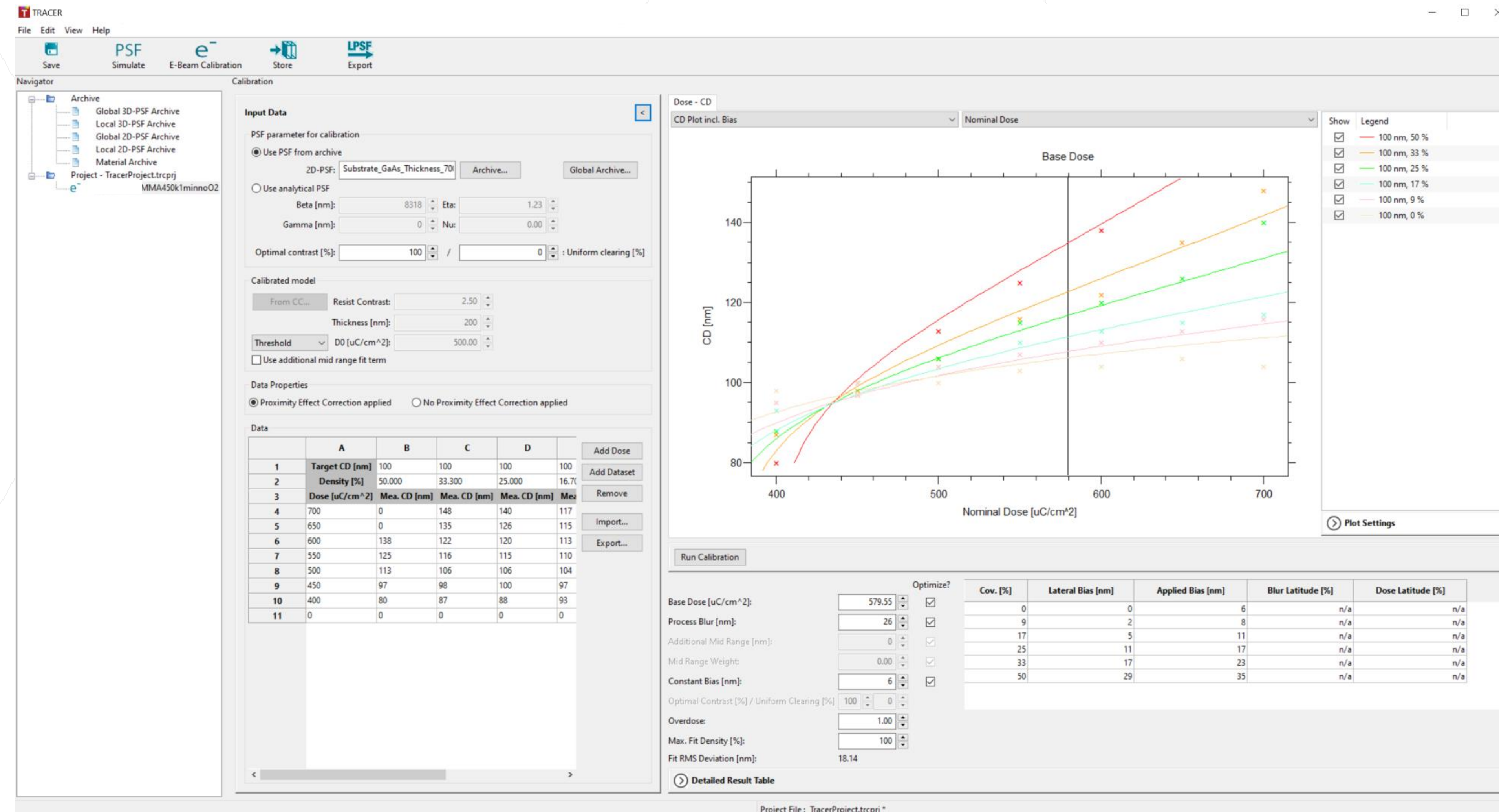
TRACER

What´s new TRACER 2.10

Rework of user interface

E-Beam Process Calibration

- Major rework of the ebeam calibration interface and workflow, to improve the overview of input data and results.
  - easier recalibration and comparing of results



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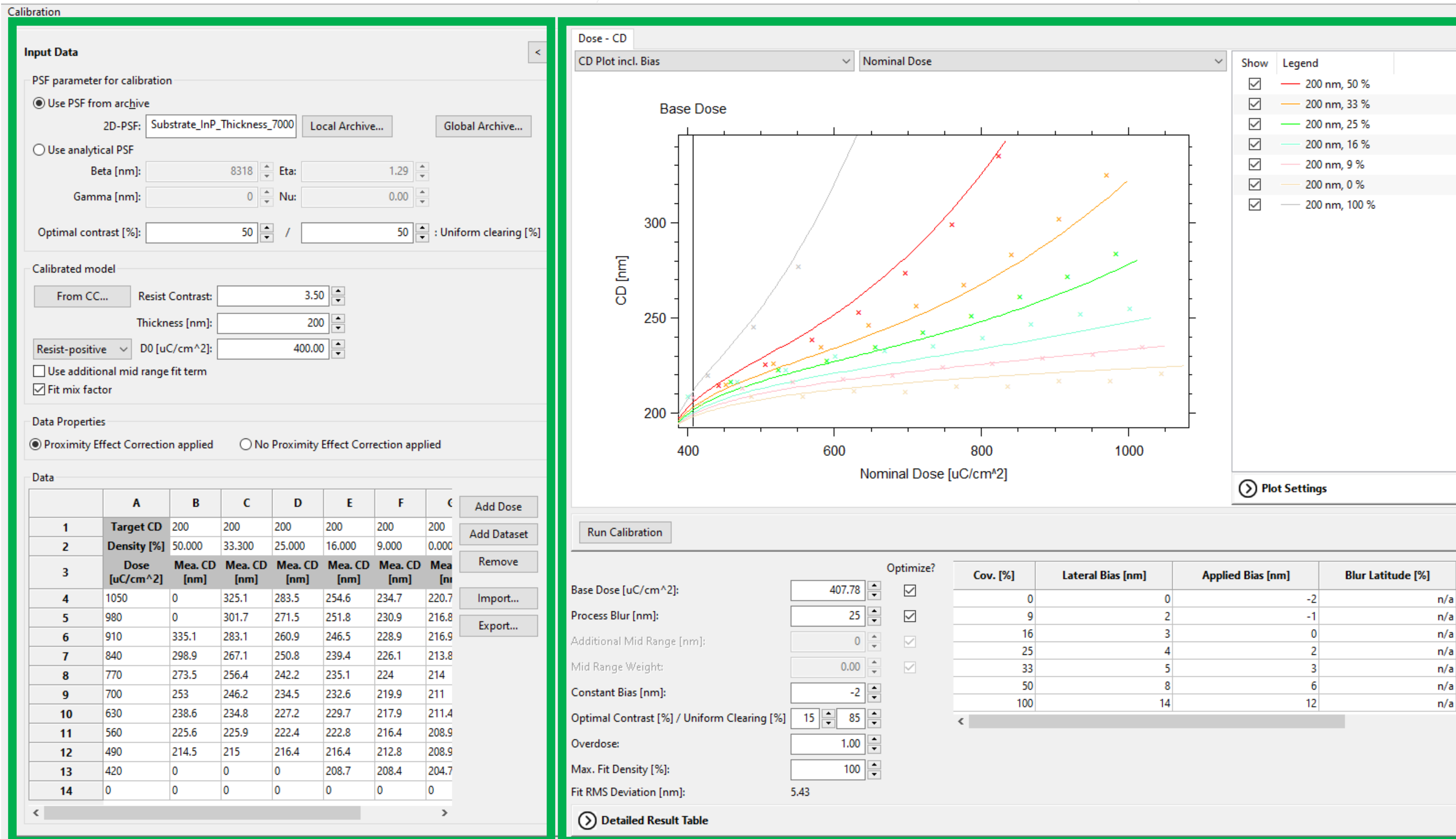
E-Beam Process Calibration



	A	B	C	D	E	F	G
1	Target CD	200	200	200	200	200	200
2	Density [%]	50.000	33.300	25.000	16.000	9.000	0.000
3	Dose [uC/cm^2]	Mea. CD [nm]	Mea. CD [nm]	Mea. CD [nm]	Mea. CD [nm]	Mea. CD [nm]	Mea [nı
4	1050	0	325.1	283.5	254.6	234.7	220.7
5	980	0	301.7	271.5	251.8	230.9	216.8
6	910	335.1	283.1	260.9	246.5	228.9	216.9
7	840	298.9	267.1	250.8	239.4	226.1	213.8
8	770	273.5	256.4	242.2	235.1	224	214
9	700	253	246.2	234.5	232.6	219.9	211
10	630	238.6	234.8	227.2	229.7	217.9	211.4
11	560	225.6	225.9	222.4	222.8	216.4	208.9
12	490	214.5	215	216.4	216.4	212.8	208.9
13	420	0	0	0	208.7	208.4	204.7
14	0	0	0	0	0	0	0

Cov. [%]	Lateral Bias [nm]	Applied Bias [nm]	Blur Latitude [%]
0	0	-2	n/a
9	2	-1	n/a
16	3	0	n/a
25	4	2	n/a
33	5	3	n/a
50	8	6	n/a
100	14	12	n/a

- The input data and calibration result are shown side by side.

E-Beam Process Calibration

Calibration

Input Data

PSF parameter for calibration

(•) Use PSF from archive

2D-PSF: Substrate_InP_Thickness_7000 | Local Archive... | Global Archive...

( ) Use analytical PSF

Beta [nm]: 8318 | Eta: 1.29

Gamma [nm]: 0 | Nu: 0.00

Optimal contrast [%]: 50 / 50 : Uniform clearing [%]

Calibrated model

From CC... | Resist Contrast: 3.50

Thickness [nm]: 200

Resist-positive | D0 [uC/cm^2]: 400.00

[ ] Use additional mid range fit term

[x] Fit mix factor

Data Properties

(•) Proximity Effect Correction applied ( ) No Proximity Effect Correction applied

Data

	A	B	C	D	E	F	G
1	Target CD	200	200	200	200	200	200
2	Density [%]	50.000	33.300	25.000	16.000	9.000	0.000
3	Dose [uC/cm^2]	Mea. CD [nm]	Mea. CD [nm]	Mea. CD [nm]	Mea. CD [nm]	Mea. CD [nm]	Mea [nı
4	1050	0	325.1	283.5	254.6	234.7	220.7
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9	700	253	246.2	234.5	232.6	219.9	211
10	630	238.6	234.8	227.2	229.7	217.9	211.4
11	560	225.6	225.9	222.4	222.8	216.4	208.9
12	490	214.5	215	216.4	216.4	212.8	208.9
13	420	0	0	0	208.7	208.4	204.7
14	0	0	0	0	0	0	0

Add Dose | Add Dataset | Remove | Import... | Export...

PSF parameters

Experimental data: CD measurements for varied doses and pattern densities

E-Beam Process Calibration

- During model definition,
  - both positive and negative resists are supported.
  - the mid-range term can be activated for a better fit when the mid-range effect is non-negligible.
- The selection in data properties allows
  - calibrations on measurements made on exposure data with or without PEC.

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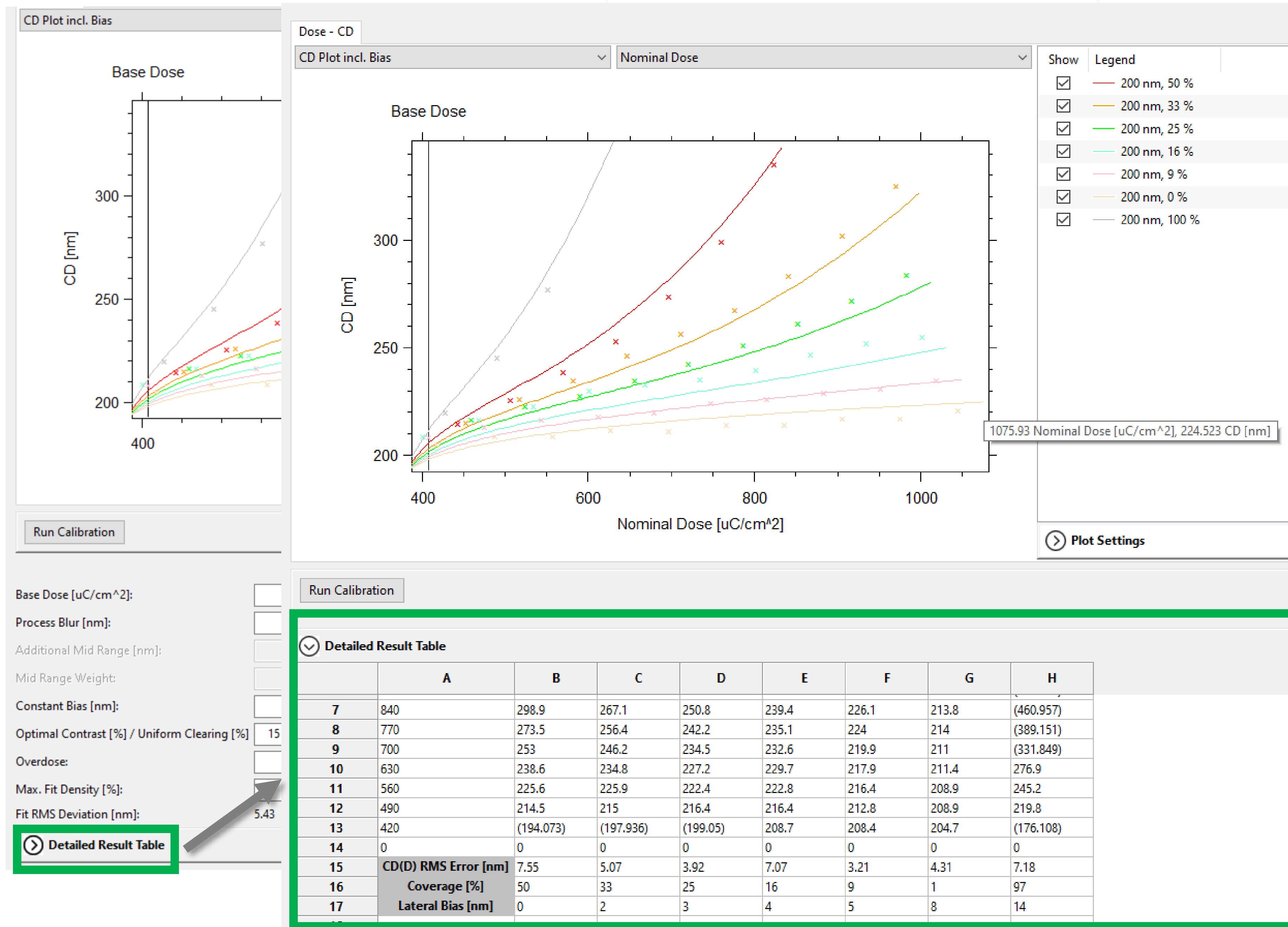
E-Beam Process Calibration



	A	B	C	D	E	F	G	H
7	840	298.9	267.1	250.8	239.4	226.1	213.8	(460.957)
8	770	273.5	256.4	242.2	235.1	224	214	(389.151)
9	700	253	246.2	234.5	232.6	219.9	211	(331.849)
10	630	238.6	234.8	227.2	229.7	217.9	211.4	276.9
11	560	225.6	225.9	222.4	222.8	216.4	208.9	245.2
12	490	214.5	215	216.4	216.4	212.8	208.9	219.8
13	420	(194.073)	(197.936)	(199.05)	208.7	208.4	204.7	(176.108)
14	0	0	0	0	0	0	0	0
15	CD(D) RMS Error [nm]	7.55	5.07	3.92	7.07	3.21	4.31	7.18
16	Coverage [%]	50	33	25	16	9	1	97
17	Lateral Bias [nm]	0	2	3	4	5	8	14

- After clicking on the arrow, the detailed result are shown.

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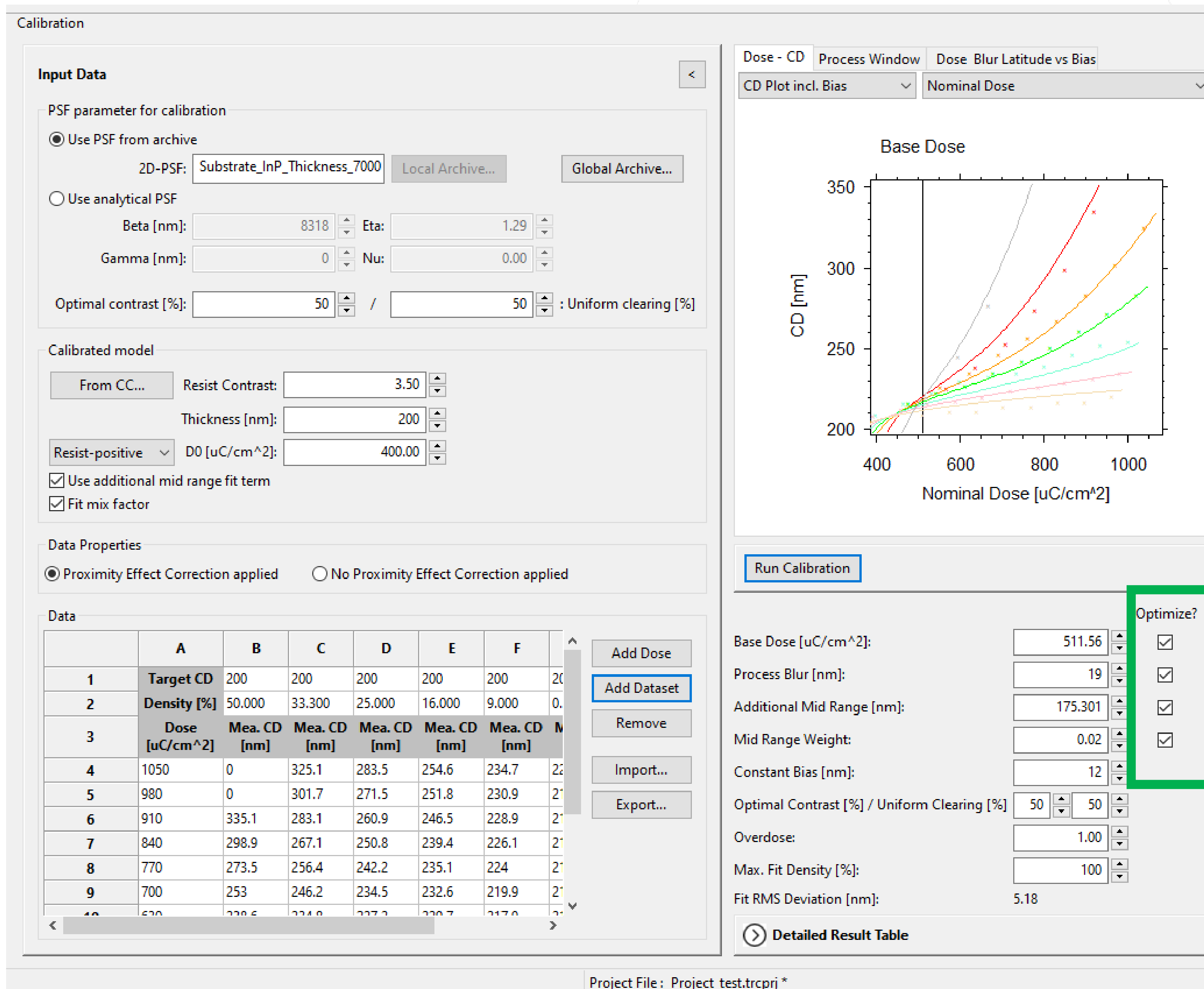
E-Beam Process Calibration



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1	Target CD	200	200	200	200	200
2	Density [%]	50.000	33.300	25.000	16.000	9.000
3	Dose [uC/cm^2]	Mea. CD [nm]	Mea. CD [nm]	Mea. CD [nm]	Mea. CD [nm]	Mea. CD [nm]
4	1050	0	325.1	283.5	254.6	234.7
5	980	0	301.7	271.5	251.8	230.9
6	910	335.1	283.1	260.9	246.5	228.9
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8	770	273.5	256.4	242.2	235.1	224
9	700	253	246.2	234.5	232.6	219.9

Only the checked parameters are optimized.

New functionalities

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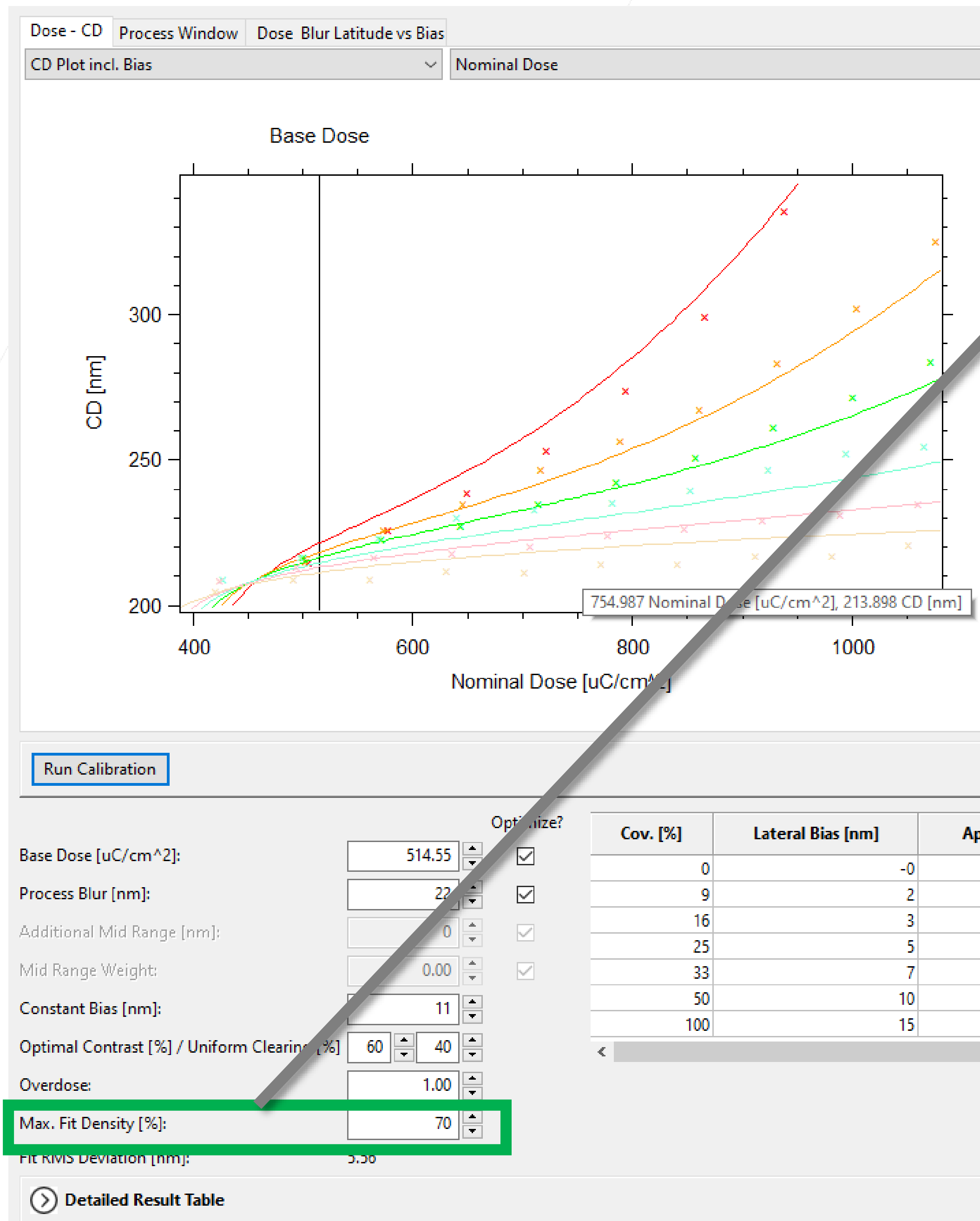
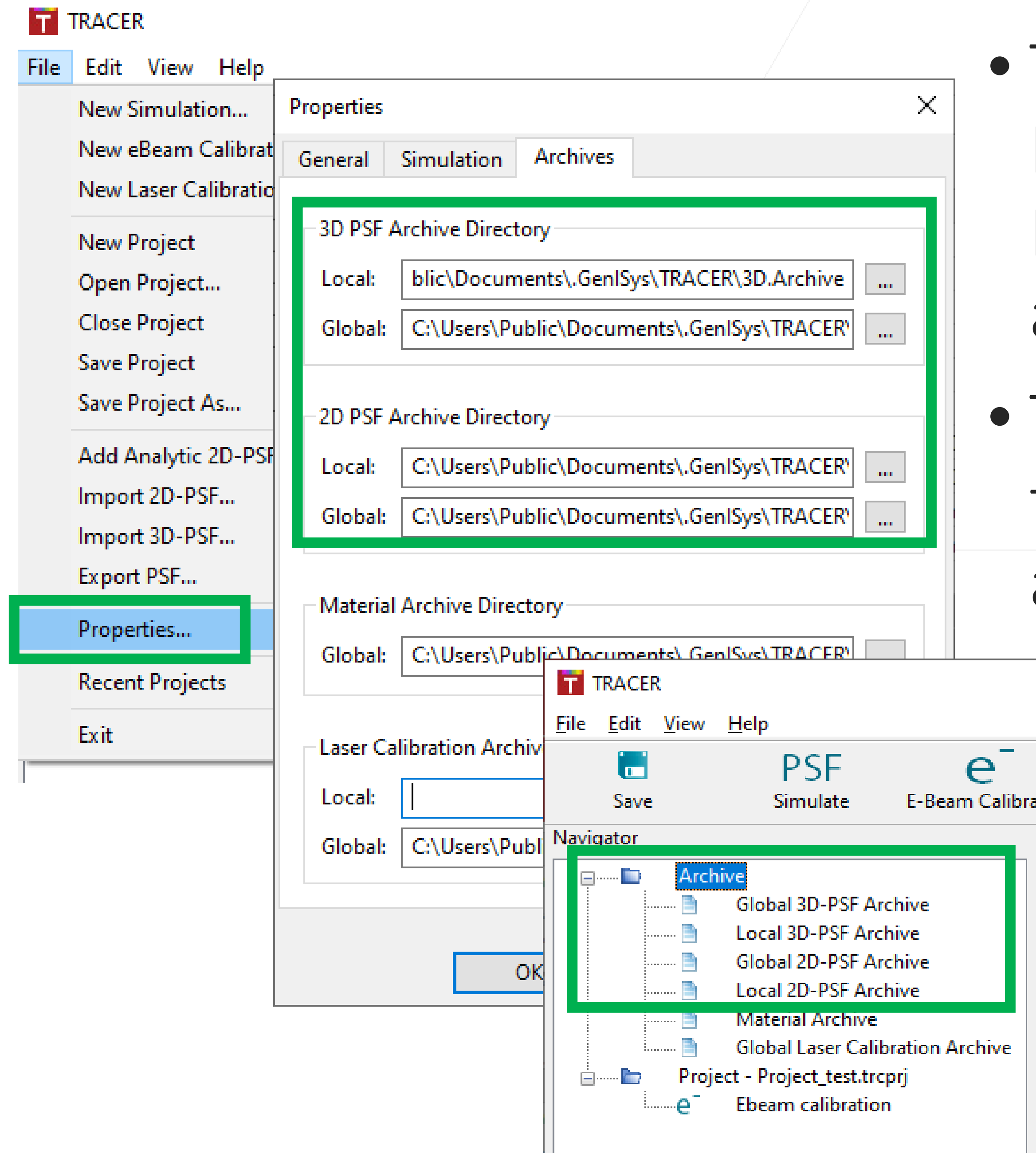
E-Beam Process Calibration



- The maximum correction density for fitting can now be set using an additional input field.
  - This allows an improved calibration for sparse layouts

Global and Local PSF Archive



- TRACER now supports storing PSFs to both Local or Global archives, for both 2D and 3D PSFs. When storing to an archive, the user is asked which archive should be used.
- The archive locations must be matched to those used by BEAMER, so that PSFs stored in archives are available in BEAMER's modules.
  - If the archive locations are defined using the program's Properties dialog, the locations for 3D and 2D PSF Local and Global archives must be defined as shown at left.
  - If the archive locations are defined using system Environment Variables, these will need to updated; see the release notes for further details.

Thank You!

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