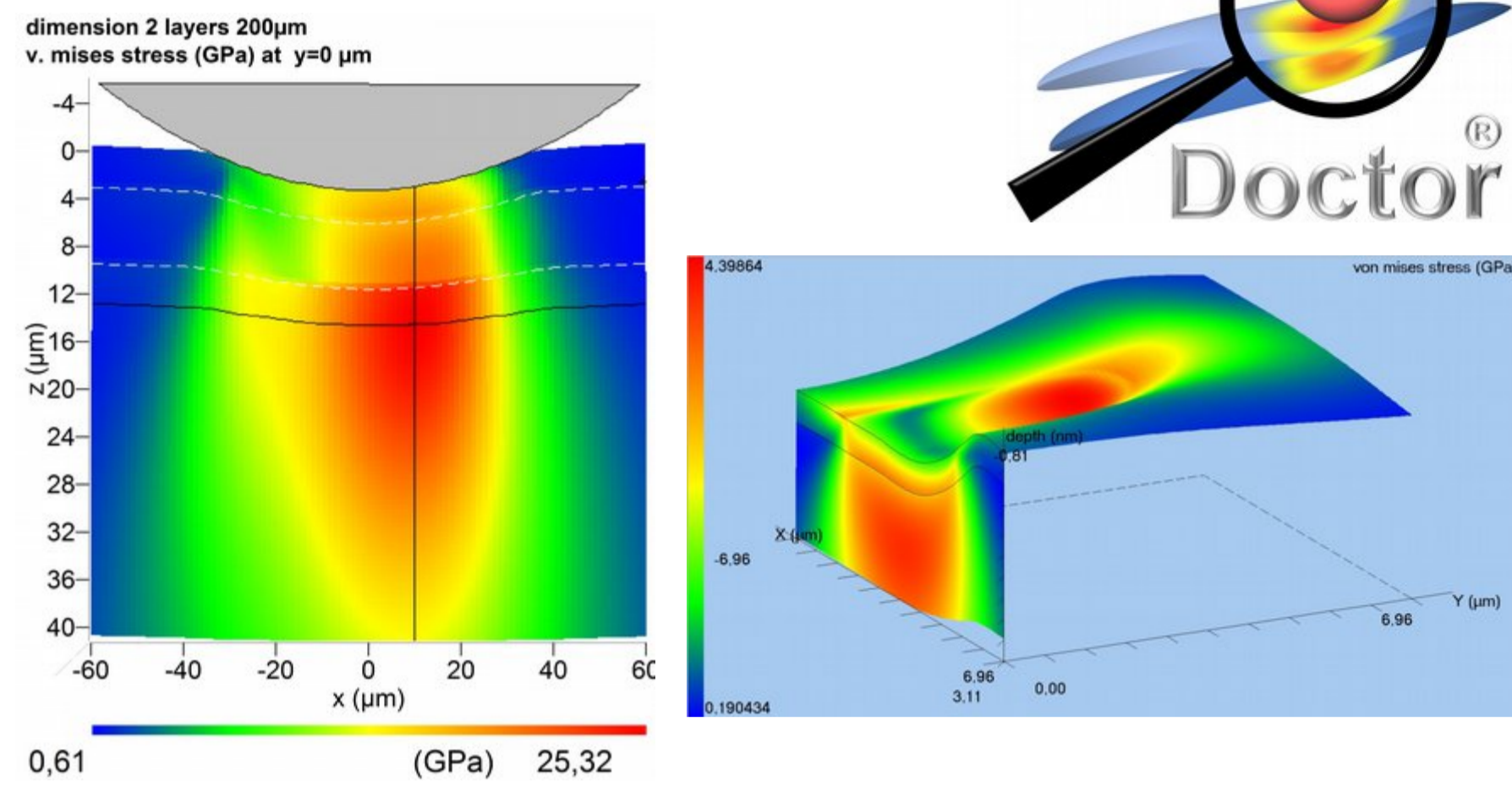
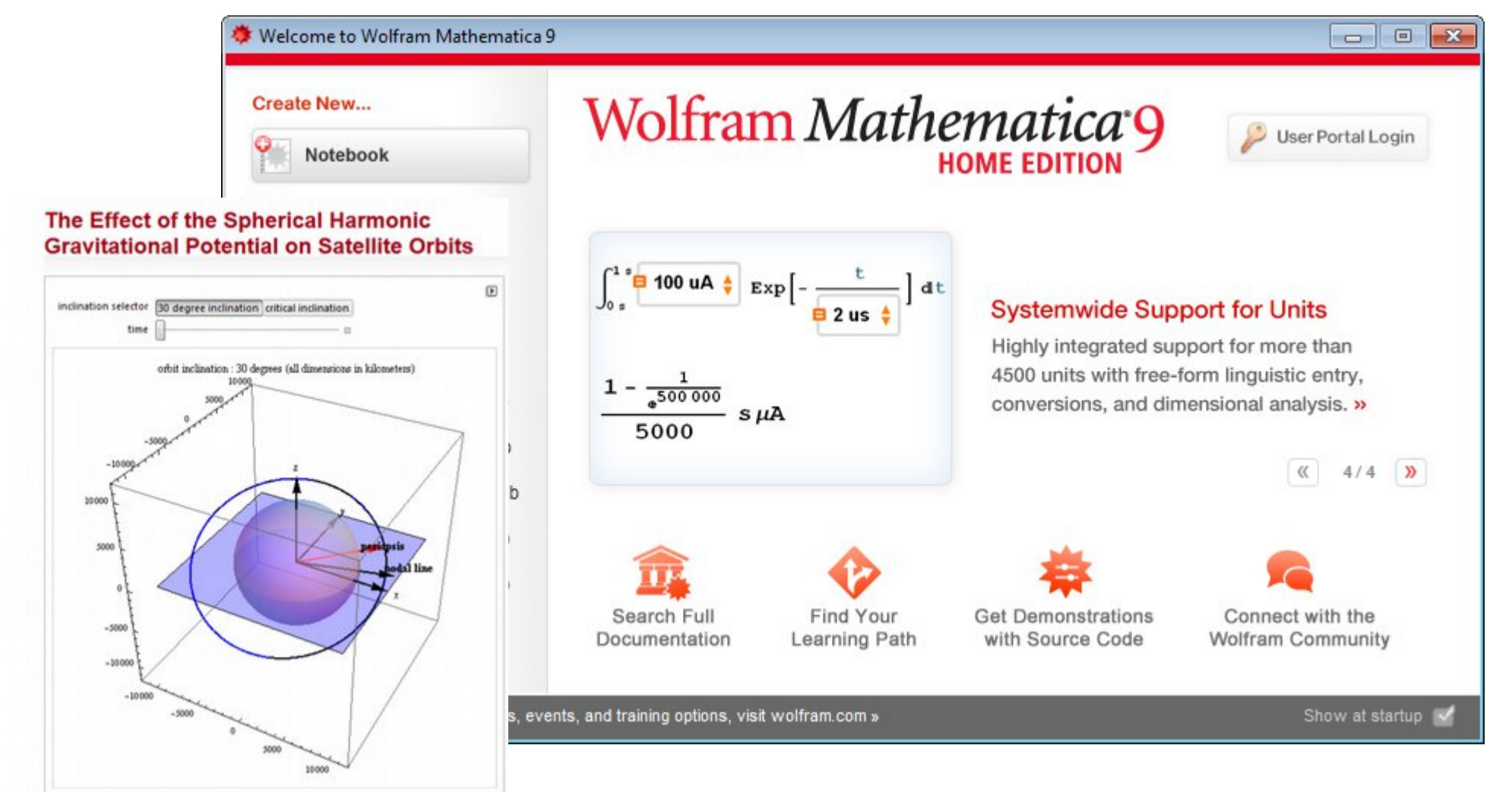


Motivation



Combine the power of special software solutions with the generality and flexibility of Mathematica

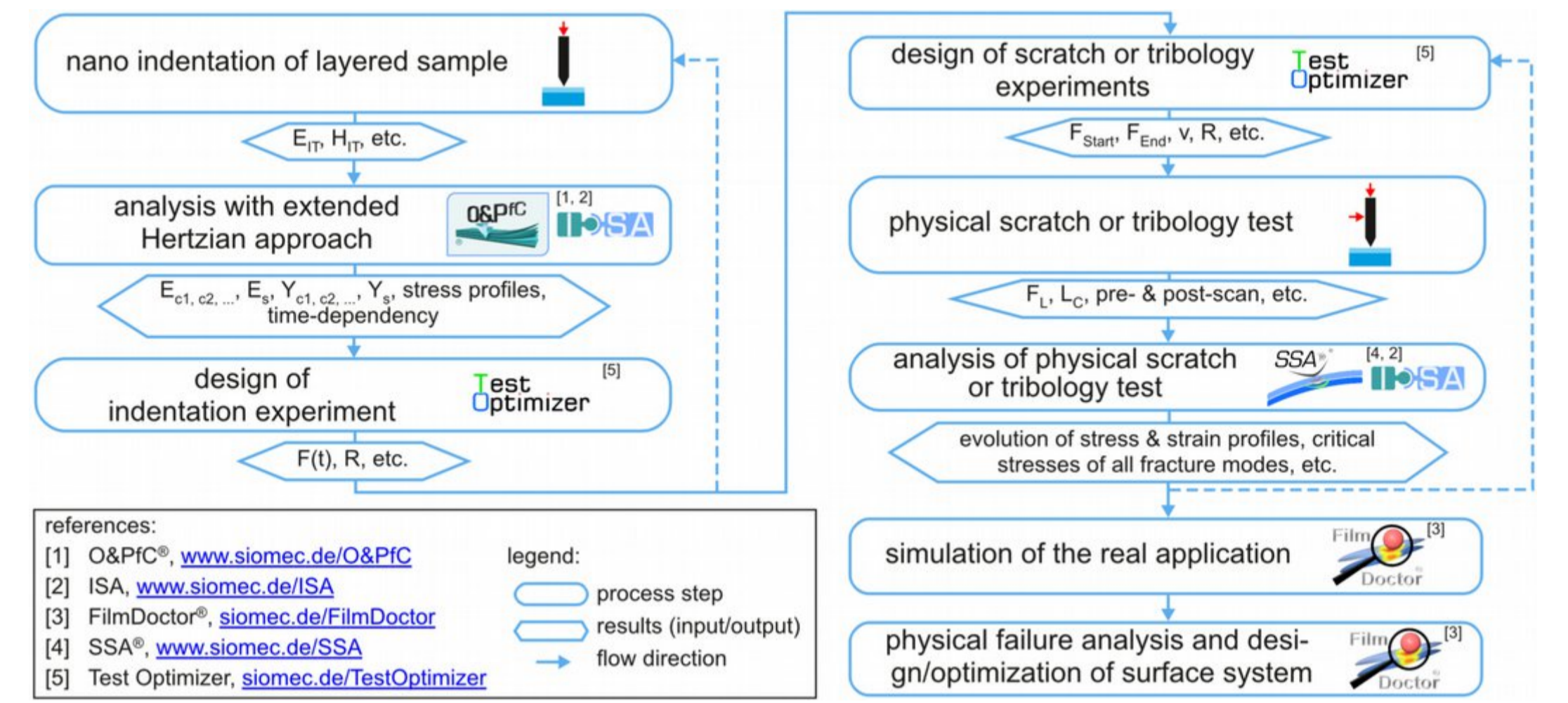


Supported by Wolfram Research & Additive

In many cases it's not a good advise to develop every needed extension into a special software package like FilmDoctor [1]. It will increase the development time and costs. So we thought about alternatives and decided to use a combination of FilmDoctor and Mathematica [4] to combine the strength of fast analytical solutions for contact mechanics with the generality, flexibility and optimisation algorithms in Mathematica. The combination was created by using the MathLink technology provided by Mathematica. To increase the quality of the models and the optimisation procedure, we need more detailed models, but unfortunately we therefore have to deal more often with non linear solutions, where this combination can help a lot.

Goal

The goal is to use the power of computers during the whole coating design and optimisation process, to save development time and costs. We call it a computer aided (CA) coating and surface design, failure analysis and test optimisation. The figure on the right side shows a typical workflow of such a CA optimisation. We named this SIO OptiCycle [2], because it's an iterative process, which leads to materials with higher application performances. All steps from the design of the experiments to the final optimisation are computer aided and use fast analytical models and software packages.

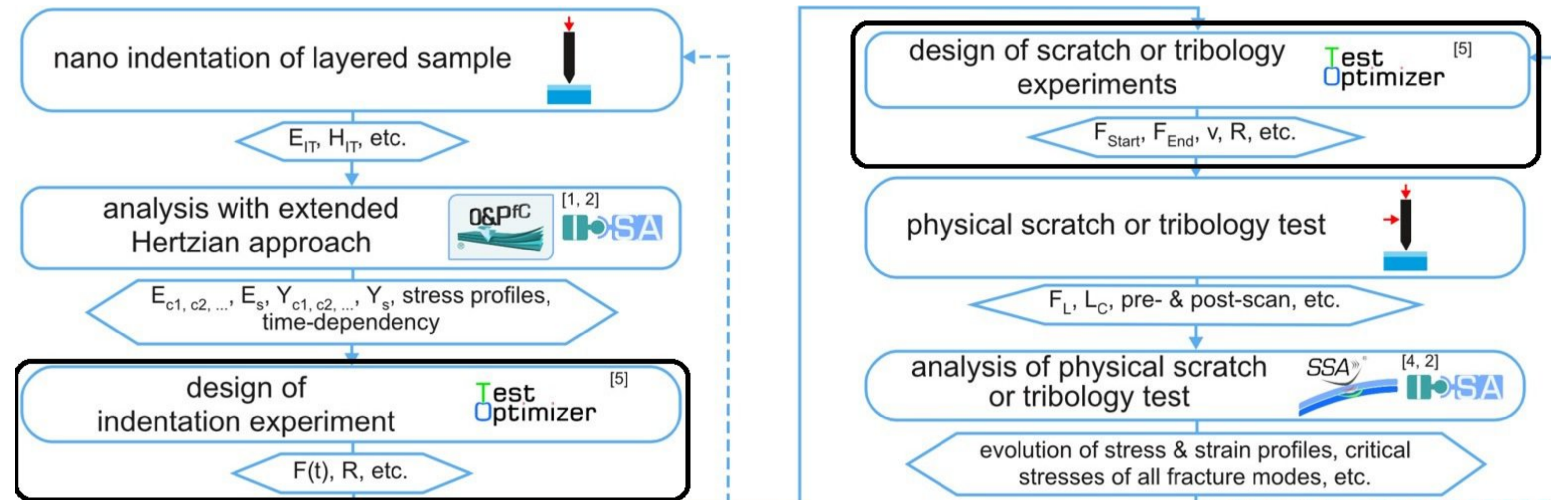


First project

Firstly we used the new software combination to design a series of contact experiments. The FilmDoctor software was called by Mathematica to calculate the contact conditions and Mathematica was used to handle all the data lists (e.g. forces, material combinations).

Surprisingly we discovered a few effects, which prevents the optimal experiment design for specific material combinations and points of interest. We found out that for complex material structures more knowledge is needed to design an optimal experiment.

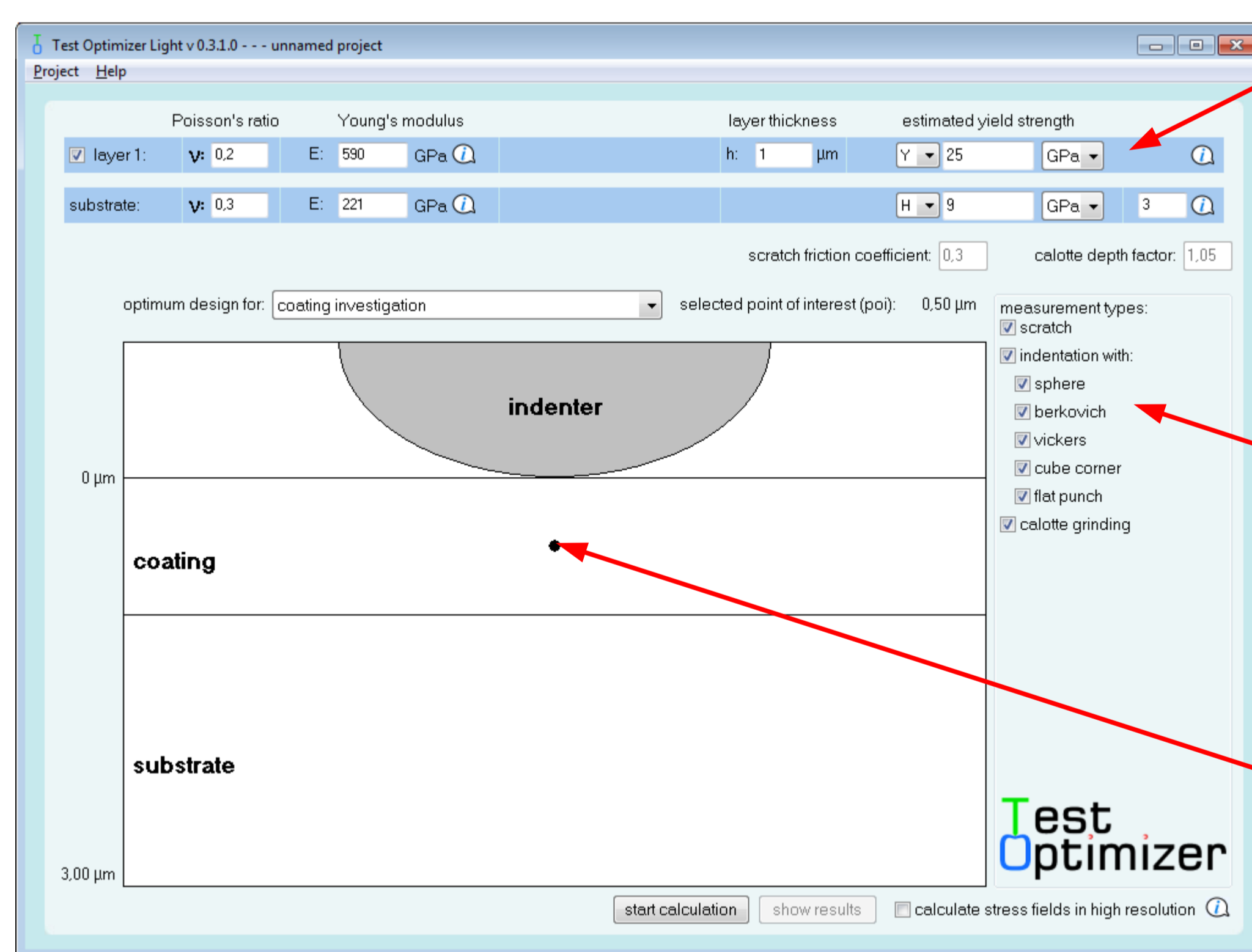
With these knowledge a new software package named TestOptimizer was developed.



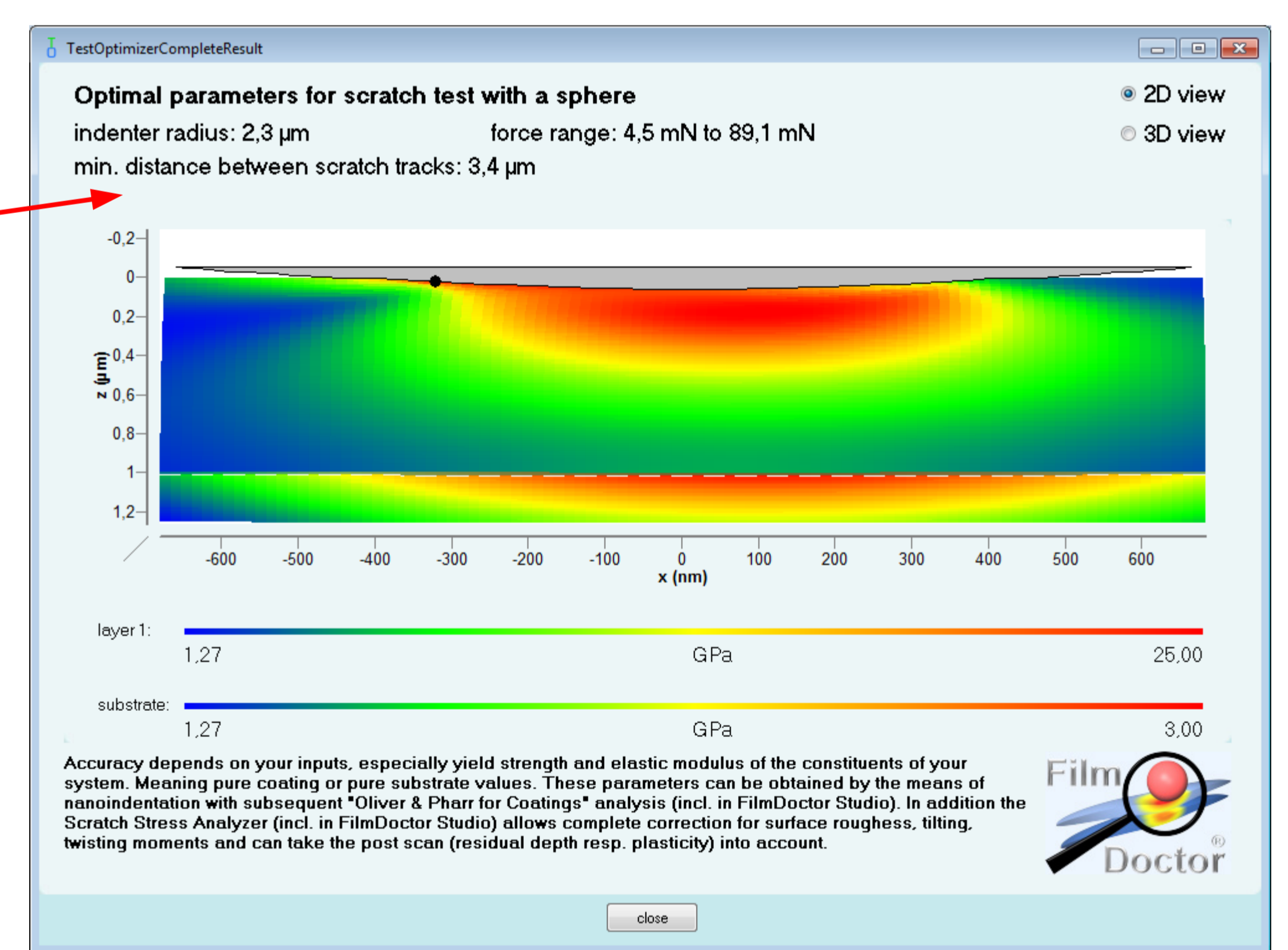
TestOptimizer

As a result of the information collected during the work with Mathematica SIO developed a small and easy to use software package named TestOptimizer [3], which calculates the optimum indenter and load parameter for different contact experiments.

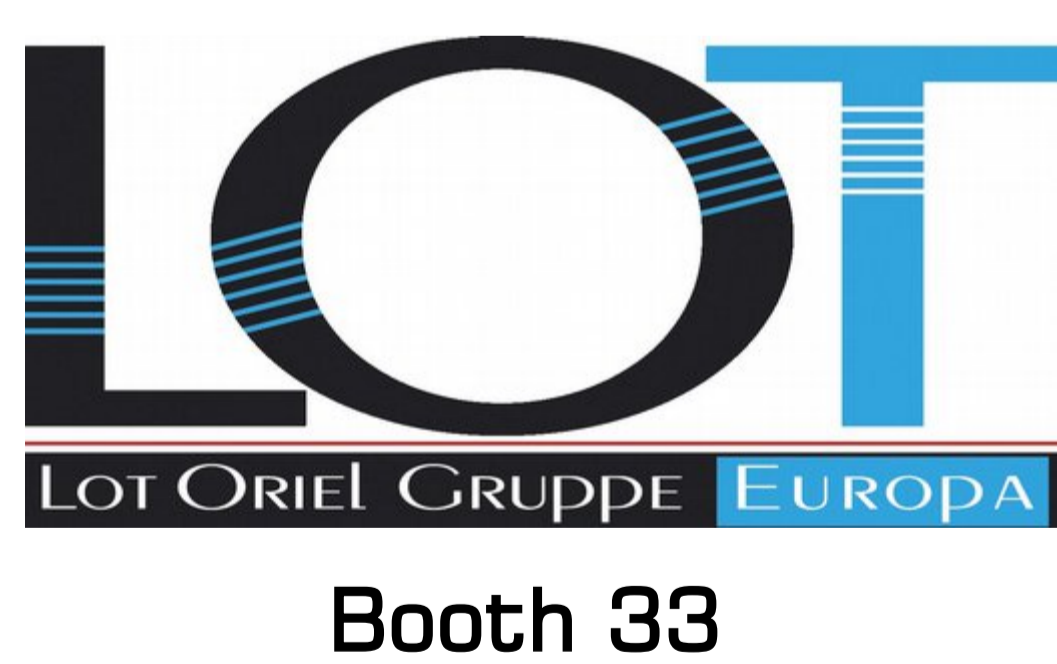
More details:
Poster PO4031
Thursday session



material definition
get optimum experimental parameters
select experiment types to be designed
define design goal according to your point of interest (POI)



More information at this PSE



Talk of Dr. Schwarzer: OR1801
Room Richard-Strauss, Thursday 09:55-10:15
„Endlessly Touchable? The Next Generation of Tribological Surface and Coating Optimization“

Benefits

- ✓ Get locally resolved mechanical parameters
- ✓ Dimension tests to save time and costs
- ✓ Optimize your materials faster

References

- [1] FilmDoctor - www.siomec.de/FilmDoctor
- [2] SIO OptiCycle - www.siomec.de/OptiCycle
- [3] TestOptimizer - www.siomec.de/TestOptimizer
- [4] Mathematica - www.wolfram.com/Mathematica

