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# From Classical $E_r$ and H to Real Property Profiles with Ordinary Indentation Data - A FilmDoctor® Application

Full story at www.siomec.de/pub.

## 1st Example: 55nm DLC-coating - courtesy Dr. U. Hangen, Hysitron

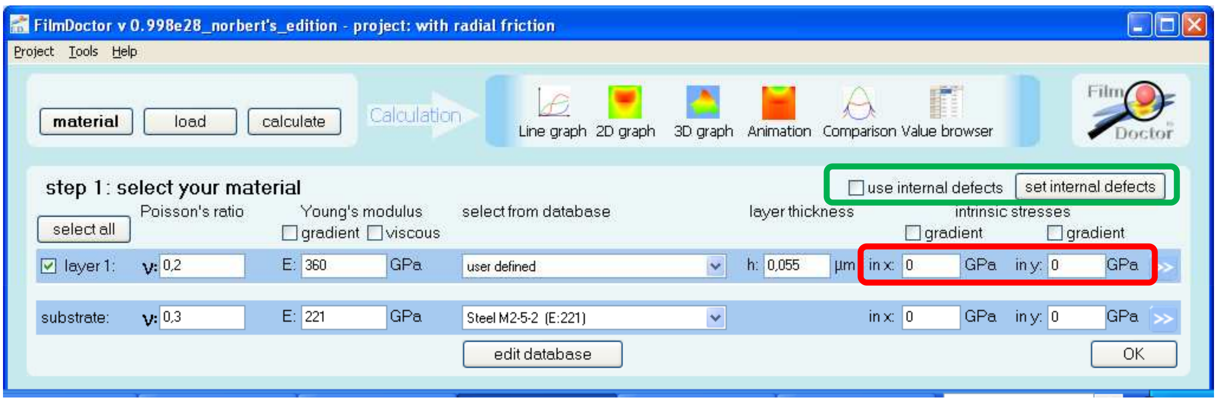


**Fig. 1:** **Defining your material structure. Also possible: Simulating the intrinsic stresses correctly by the means of analytical interface defects. Next step is to load a series of indents with different maximum loads or just a so called CSM-indent data set.**

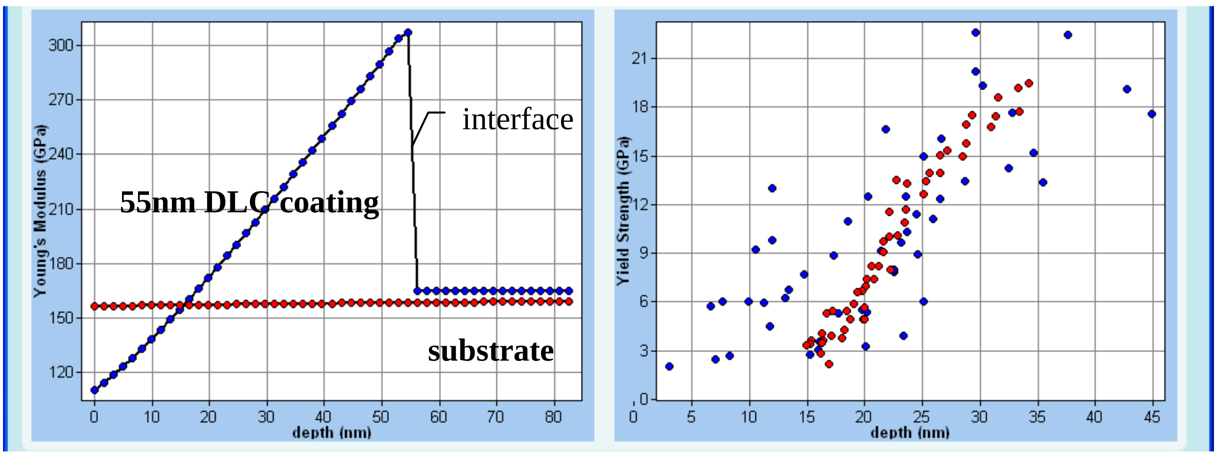


**Fig. 2:** **After the evaluation of the correct coating Young's modulus and Yield strength for each indent, the software fits the Young's modulus profile as function of depth (left) and also the Yield strength as function of depth. Due to the extreme thin coating and the scattering of indent data, only a relatively broad range can be given for the Yield strength of the coating. Subsequent smoothening might help to obtain better results even for such very thin coating structures. The red dots are giving the equivalent – and incorrect – classical "monolithic half space" results.**

*[2nd] Example: High-load-indentation experiments on 1.15mm Al-alloy on steel → rim profiling - <u>courtesy Dr. E. Reimann, Zwick</u>*

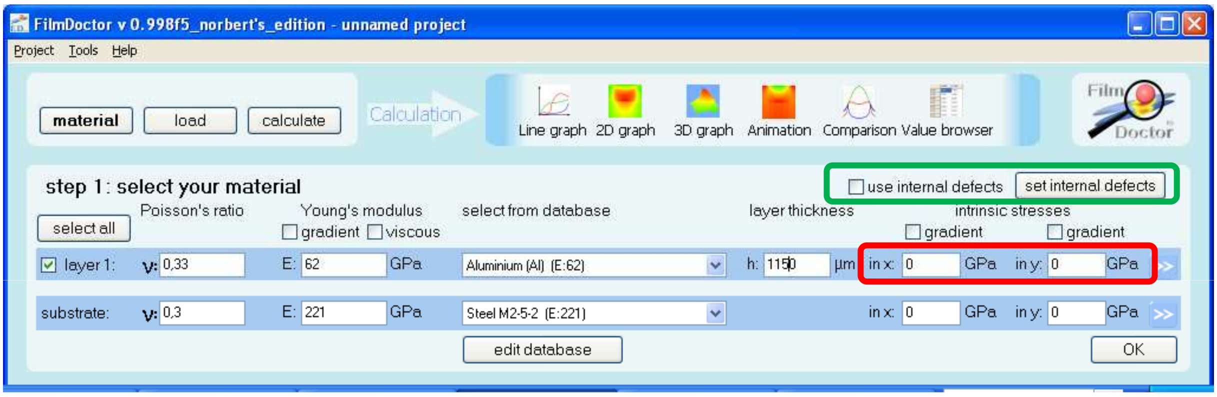


**Fig. 1:** Defining your material structure. Also possible: Simulating the intrinsic stresses correctly by the means of analytical interface defects. Next step is to load a series of indents with different maximum loads or just a so called multi-indent data set.

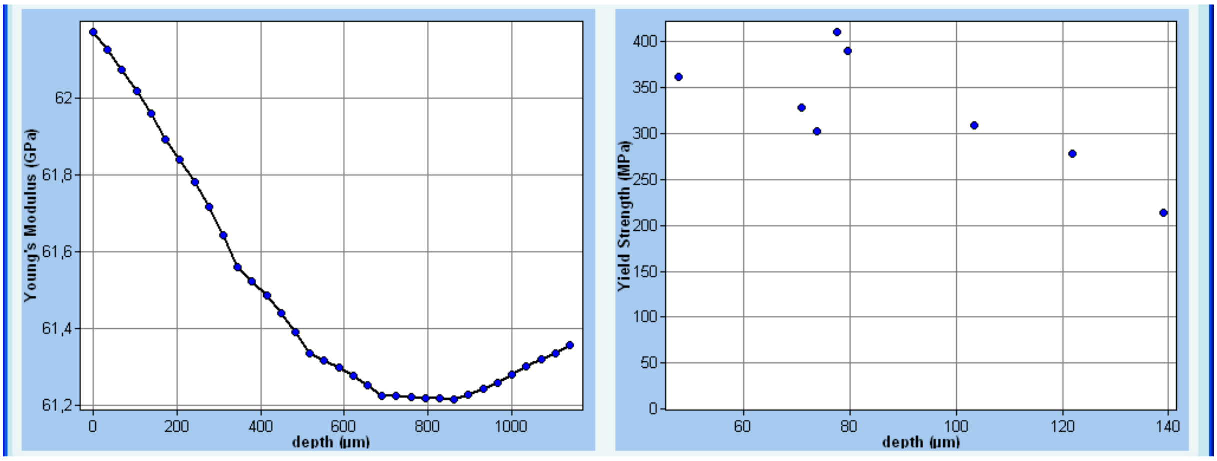


**Fig. 2:** After the evaluation of the correct coating Young's modulus and Yield strength for each indent, the software fits the Young's modulus profile as function of depth (left) and also the Yield strength as function of depth. Elongation degree of the Al-layer was 0.

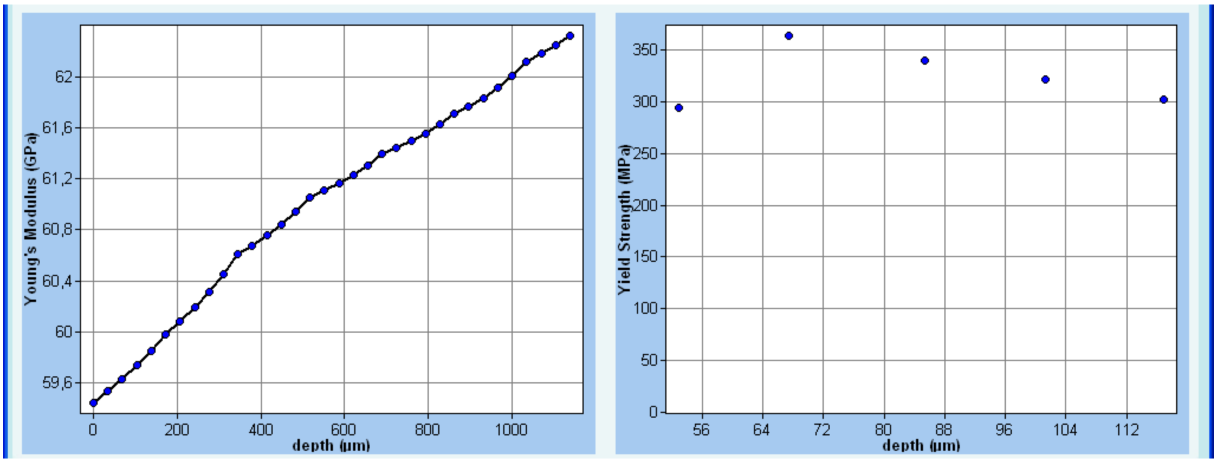


**Fig. 3:** Results as shown in Fig. 2, but this time the Elongation degree of the Al-layer was 5,0.