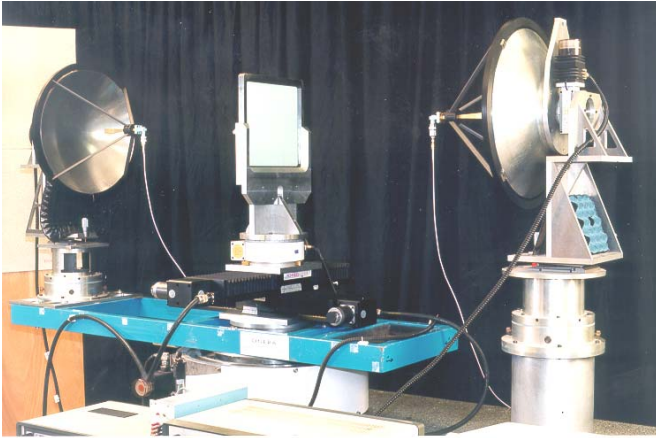


Agilent VEE Pro characterize materials at ONERA in Electromagnetism and Radar Department (DEMR)



BACCARAT bench

The Company: ONERA Electromagnetism and Radar department (DEMR) is located in France on two sites: One in Palaiseau, near Paris and the other one in Toulouse. DEMR conducts research to help both industry and the French arms-procurement agency DGA to improve current EM-based systems and define future systems. Primary applications include radar, stealth, electromagnetic compatibility (EMC), electronic warfare (EW) and telecommunications.

The BACCARAT benches: DEMR Department owns 3 benches BACCARAT (**B**anc **A**utomatique de **C**aractérisation de **C**omposants **A**éronautiques en **R**eflexion, **A**bsorption et **T**ransmission in French language). The objective of these benches is measurement of Reflection (R) and Transmission (T) coefficients of planar materials as functions of frequency, incidence, incident wave polarization (-90° with $+90^\circ$) in co-polarization and cross polarization. The results of measurement allow the calculation of complex values of permittivity and permeability for homogeneous materials, from transparent materials to absorbing materials. Measurements can be carried out in 3 frequency bands:

- 6 to 28.5 GHz
- 28.5 to 60 GHz
- 90 to 100 GHz

Instrumentation: Each BACCARAT bench is composed with a vector network analyzer Agilent 8720 or Wiltron 360, a couple of antennas (one for emission and one for reception), positioners (antennas position and orientation) and translators (displacement of the sample in horizontal plane). All

The project

Characterize EM Absorption & Reflexion of Space-Defense material with automated bench

The solution : *Various positions of DUT sample and antennas, acquisition of transmission and reflection measurements as well as calculation of material characteristics are conducted with an Agilent VeePro application.*

MatLab scripts called from VEE Pro as well as interactivity with MS/Excel via Active X are widely used in the application, dramatically reducing the development time of analysis and reporting modules.

instruments, positioners and translators are controlled through GPIB bus.

The application: The application software developed with Agilent VeePro, controls the positioners and translators, then configures the vectorial network analyzer over GPIB.

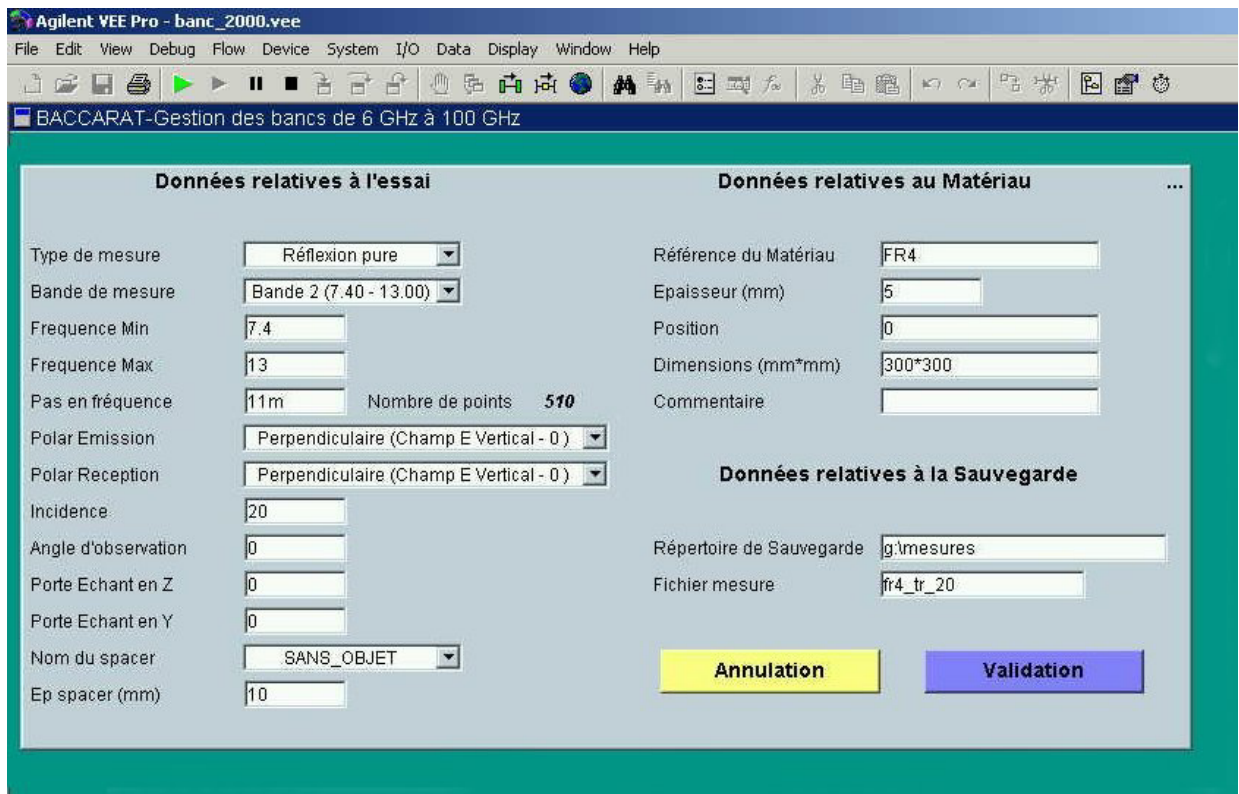
Reflection and transmission measurements for given antennas and sample positions are transferred from analyzer to PC. Then, VeePro modules calculate permittivity and permeability of material under test.

MatLab scripts, integrated with VEE pro are used to display rich and interactive graphs of results.

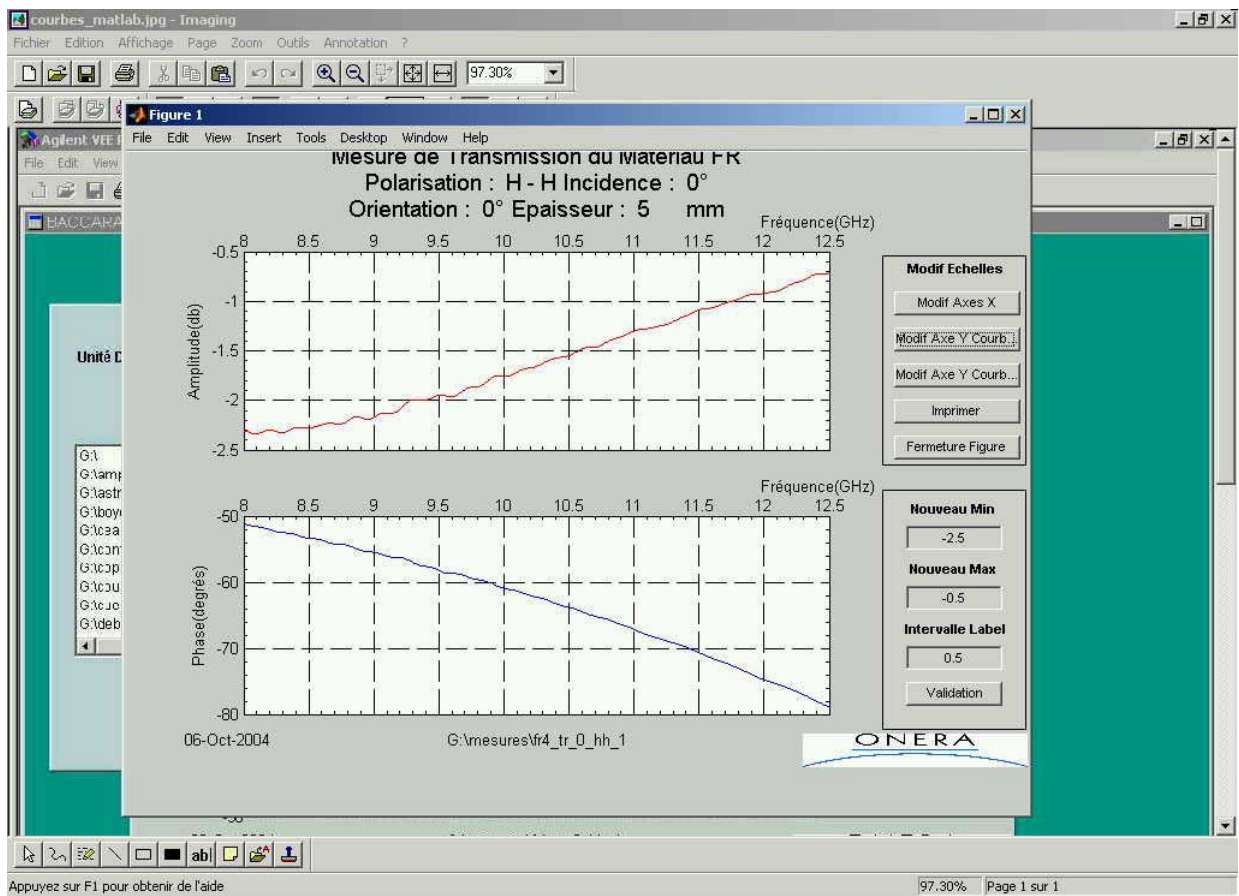
The exportation of results in a spreadsheet is made easily from the application in using VEE Pro interaction with most popular office tools (i.e.: MS/Excel, MS/Word).

Agilent VEE Pro The choice: DEMR department uses Agilent VeePro since long date. First applications were developed on HP workstations in 90's. Selection criteria to choose a development language were facility to learn and use, gain of productivity in program development and efficiency to control instruments, as well as integration of MatLab scripts, a software widely used at ONERA. Thus Agilent VeePro, answering the whole of the constraints, was the right tool.

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ONERA – VEE Pro Application - Material characterization Setup screen



ONERA – VEE Pro Application - Material characterization Results in MatLab graph object