PRESENTATION

STRUCSIM-3-Dâ

ELECTRONIC STRUCTURE FOR TEST, CALIBRATION AND MODAL SOFTWARE DEVELOPMENT

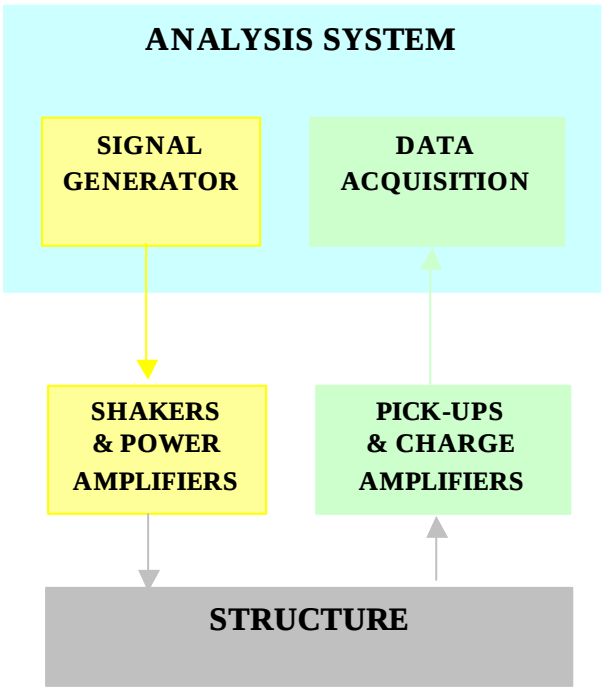
STRUCSIM-3-Dâ
INTRODUCTION

The electronic structure type STRUCSIM -3-Dâ is an analogue simulation structure including 8 inputs, 64 outputs and produces 8 natural modes.

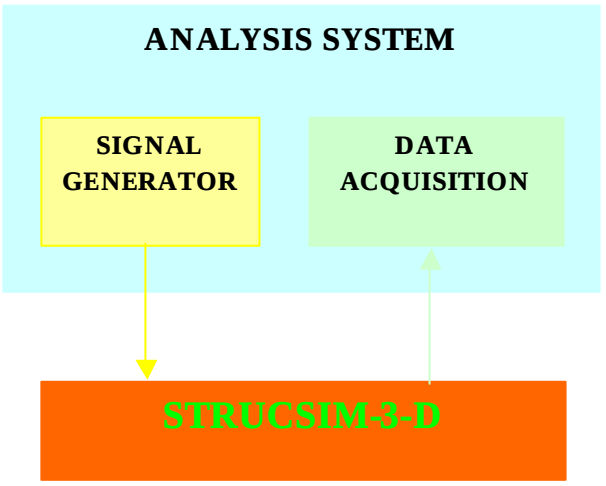
The transfer function between the output and input signals of the electronic structure can be compared with the transfer function of the excitation and measurement instrumentation of a vibration analysis equipment applied to a mechanical structure.

Based on this fact, ***STRUCSIM-3-D®*** *electronic circuits receive electric signals representing the applied forces and generate other electric signals simulating the movements. These circuits are integrated in a standard 19" 2U drawer unit for rack mounting.*

Connected to a real-time analysis system, the Electronic Structure ***STRUCSIM-3-Dâ*** *allows the adjustment in the laboratory of the modal analysis software and the comparison of the efficiency of the different analysis methods. Further updates of the modal software can be "debugged".*



Normal operating mode



With STRUCSIM-3Dâ

STRUCSIM-3-Dâ
DESCRIPTION

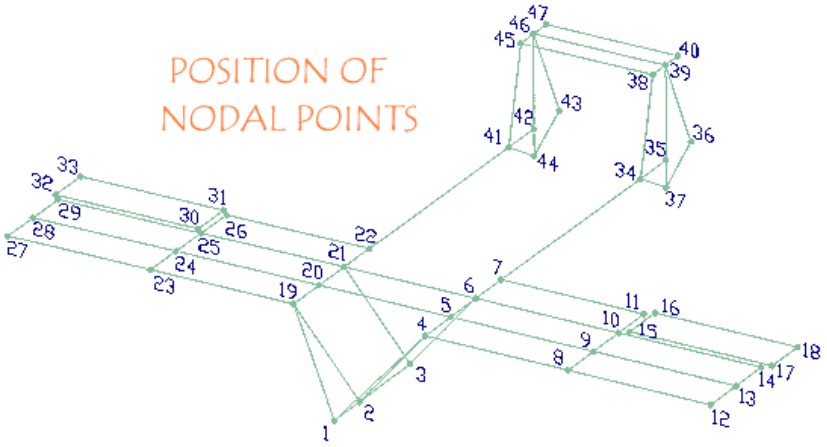
The virtual structure modal parameters are known before performing the tests. ***STRUCSIM-3-D***® *as a calibration device, has therefore been developed to provide an adapted solution for many applications:*

- ✓ *Checking the analysis equipment*
- ✓ *Test of new materials or methods*
- ✓ *Training of test engineers*

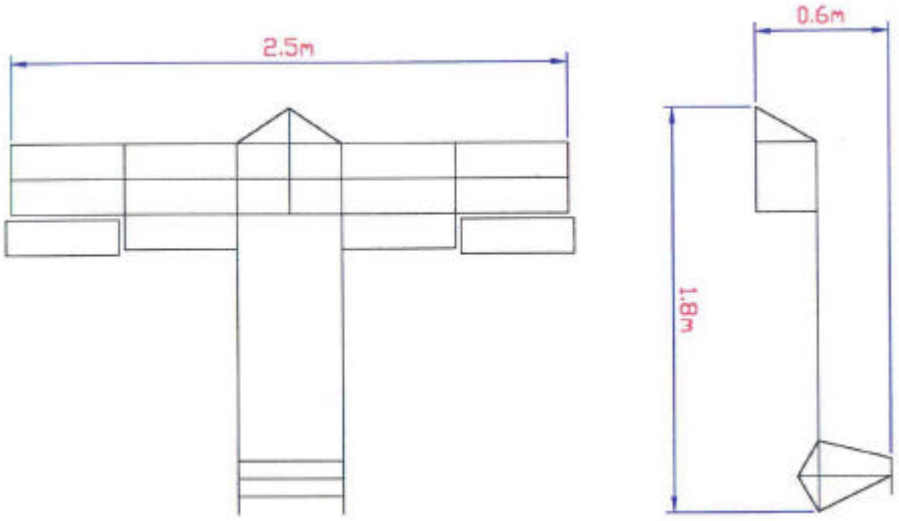
In addition, **STRUCSIM-3-D**® *for an easy integration in the test facility, includes eight BNC in its front panel for the excitation signals input. Output signals are available on the rear side, from Sub-D 25 point connectors. An ELCO connector adaptor is available to ensure the compatibility with the earlier delivered PRIN 80 / PRIN 85* ***PRODERA****'s modal analysis systems.*

STRUCSIM-3-D® rear view

STRUCSIM-3-Dâ
VIRTUAL STRUCTURE



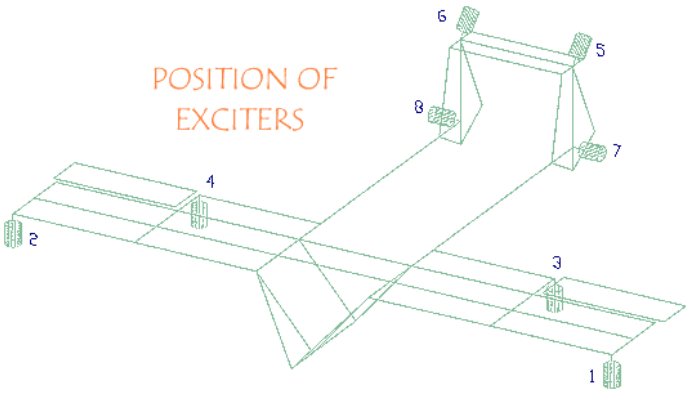
The simulated structure is a glider aircraft. The 47 nodal points defining this structure in the space are supposed to represent the networking of a decomposition in finite elements. Movement pick-ups and vibration shakers are located on these nodal points. At the user's choice, the movements can be measured either in displacement, velocity or acceleration.



STRUCSIM-3-Dâ
VIRTUAL EQUIPMENT

To carry out the tests, the glider model described previously is equipped with 8 shakers and 64 movement pick-ups that can be, at the user's choice, either accelerometers, velocity or displacement pick-ups.

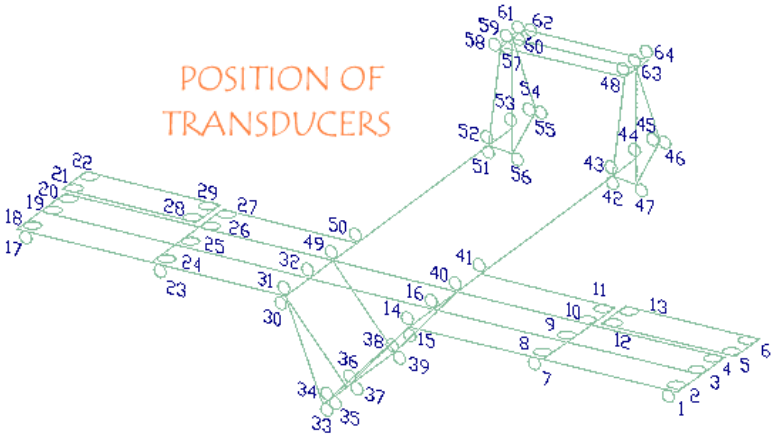
Shakers are placed all around the structure, in order to perform an optimum appropriation of the different vibration modes.



Two types of shakers are present:

- *100 N shakers on the wings*
- *20 N shakers in the rear*

Each of the pick-ups, located on the nodal points, measures the movement from the point where it is located, in one of the X, Y or Z directions in space. There can be three pick-ups (triaxial measurement), two pick-ups (biaxial measurement) or only one pick-up on the same nodal point.



The sensitivity of the pick-ups is the same for all the pick-ups of the same type:

Displacement pick-ups: 5 V/cm

Velocity pick-ups: 10 V/m/s

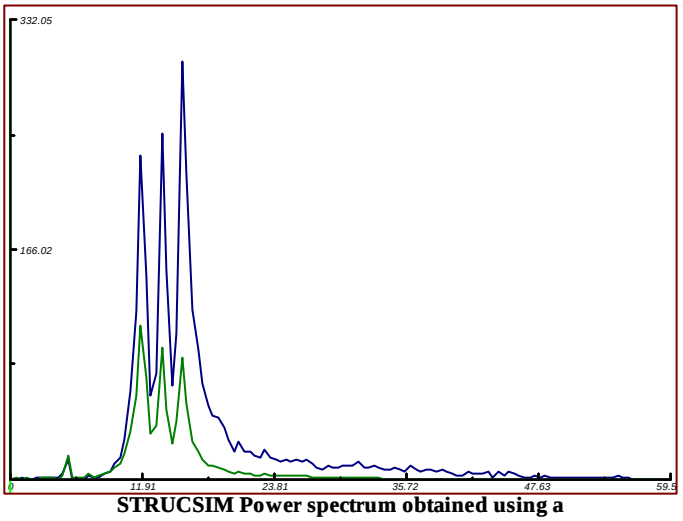
Acceleration pick-ups: 1 V/g

An internal gain can also be programmed via the output connectors using a two bits TTL signal. This gain, applied to all channels, has a value of 1, 2, 5 or 10.

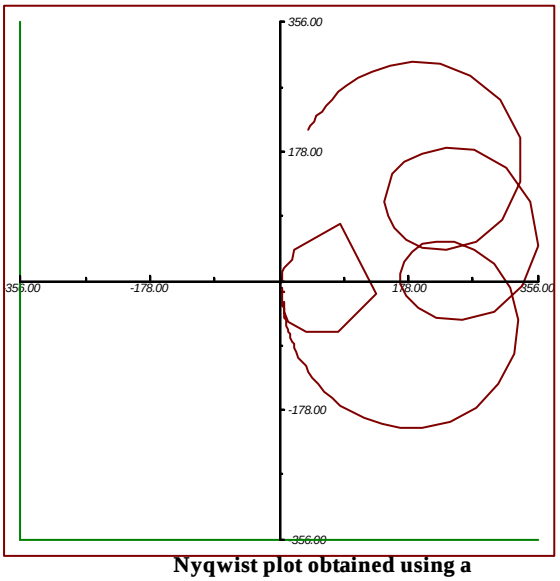
STRUCSIM-3-Dâ MODES

Eight different modes are available on the STRUCTSIM-3-Dâ electronic structure, each one with a predefined resonance frequency, modal mass, modal stiffness, damping factor and mode shape.

These modes are distributed in the frequency range commonly used on modal analysis. Sometimes coupled, their identification requires the use of all the capacities of the analysis system.



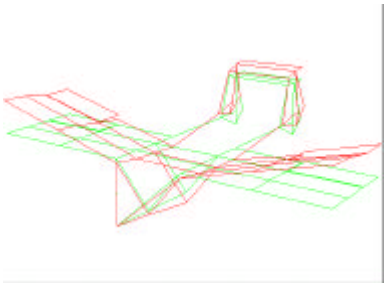
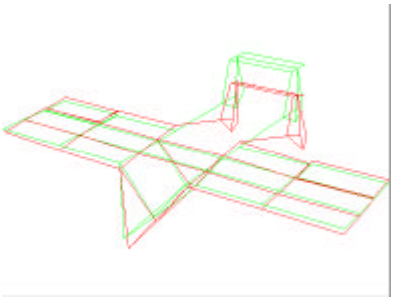
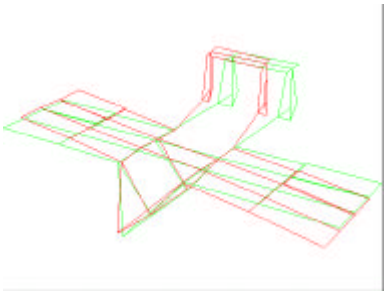
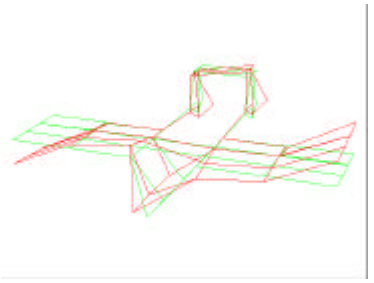
STRUCSIM Power spectrum obtained using a PRIN85/PRINUP system.



Nyqwist plot obtained using a P-Sys-Modal®/P-Win-Modal® system.

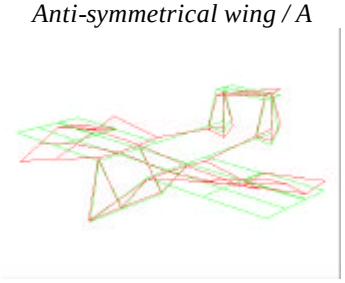
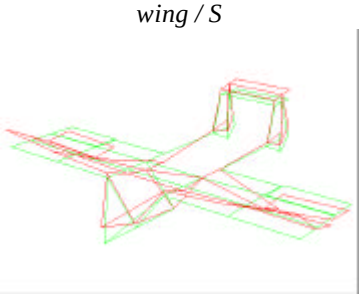
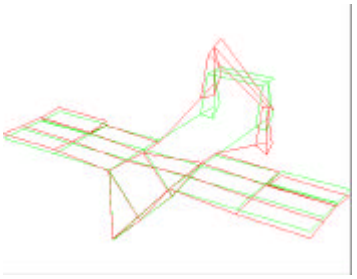
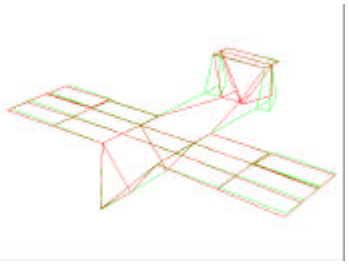
The purpose is not to test the glider aircraft, the characteristics of which, apart from some manufacturing dispersions, are perfectly known, stable in time and independent from the test conditions. The aim in reality is to carry out tests and qualifications on the means of analysis, the hardware, the software, the test strategy and the methods.

STRUCSIM-3-Dâ
MODES

N°	Natural frequency in Hz	Generalised mass in m².kg	Damping factor	Natural shape / Type (*)
01	5.19	148.9	0.020	2 knots flexion wing / S 
02	6.96	18.81	0.030	Vertical flexion beams / S 
03	8.99	17.16	0.029	Lateral flexion beams / A 
04	11.97	31.63	0.045	3 knots flexion wing / A 

(*): Type S: Symmetrical shape
Type A: Anti-symmetrical shape

STRUCSIM-3-Dâ
MODES

N°	Natural frequency in Hz	Generalised mass in m².kg	Damping Factor	Natural shape / Type (*)
05	13.57	48.44	0.030	Anti-symmetrical wing / A 
06	16.51	48.41	0.030	Symmetrical torsion wing / S 
07	31.03	3.999	0.051	Anti-symmetrical vertical flexion beams / A 
08	40.07	2.720	0.058	Lateral flexion beams / S 

(*): Type S: Symmetrical shape
Type A: Anti-symmetrical shape

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