



# Vista™ - Visual Turbomachinery Analysis

## Preliminary design of radial turbines: an ideal computer tool

- Thoroughly tested and validated ensuring rugged and reliable performance.
  - Data requirements kept to a minimum so that the designer can get the design process off to a fast start, and then move quickly to an optimum preliminary design.
  - Extremely short run-times allow many candidate designs to be assessed in a short time.
  - Built-in loss correlations obtain accurate efficiencies for each design.
  - Choice of fluid property specification – either user-specified or semi-perfect gas model
  - Smooth data transfer for subsequent off-design performance prediction.
  - One-button launch of 3D geometry in ANSYS® BladeModeler™ from standalone Vista RTD
- or
- full integration of Vista RTD in ANSYS® BladeModeler™ within Workbench 11 and 12
  - Continuing addition of new facilities and PCA's established fast-response user support

## Vista™ RTD – Radial turbine preliminary design

### Overview

Preliminary design, sometimes called 'sizing', remains an essential first step in the design of a new turbomachine. Despite immense progress in the applicability and accuracy of CFD systems, it is widely acknowledged that a poor preliminary design cannot easily be remedied by subsequent analysis of a more advanced type. However, used together, a good preliminary design method and advanced CFD can complement each other very effectively in the design process.

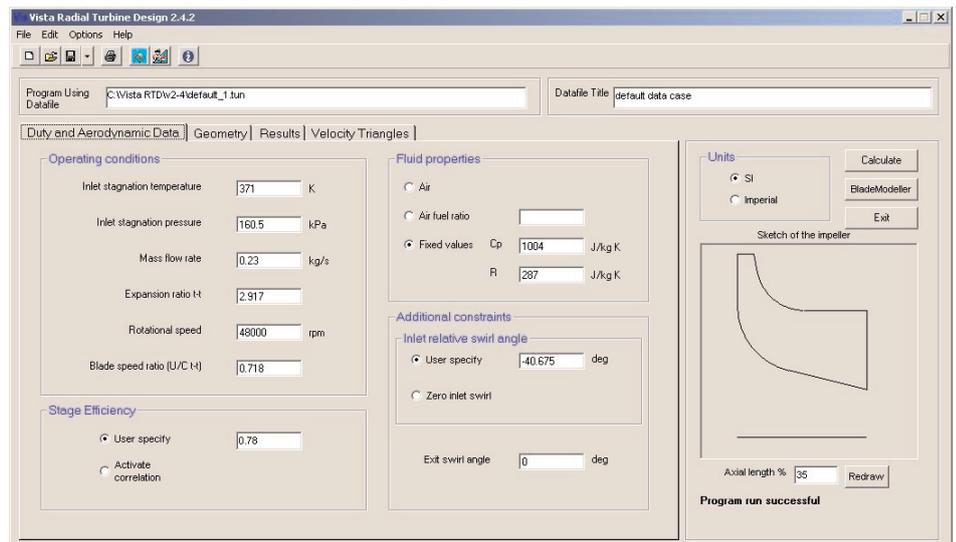


Fig. 1 Vista RTD user interface

For preliminary design of radial turbines, PCA has developed over the past twelve years a simple yet powerful code, Vista™ RTD, which enables the turbine designer to move from initial ideas about the turbine's basic duty to a full 3D geometry launch in a few minutes. Vista RTD is available as a standalone design tool but it is also integrated in ANSYS® BladeModeler™ within Workbench 11 and 12.

### Keeping it simple for the user

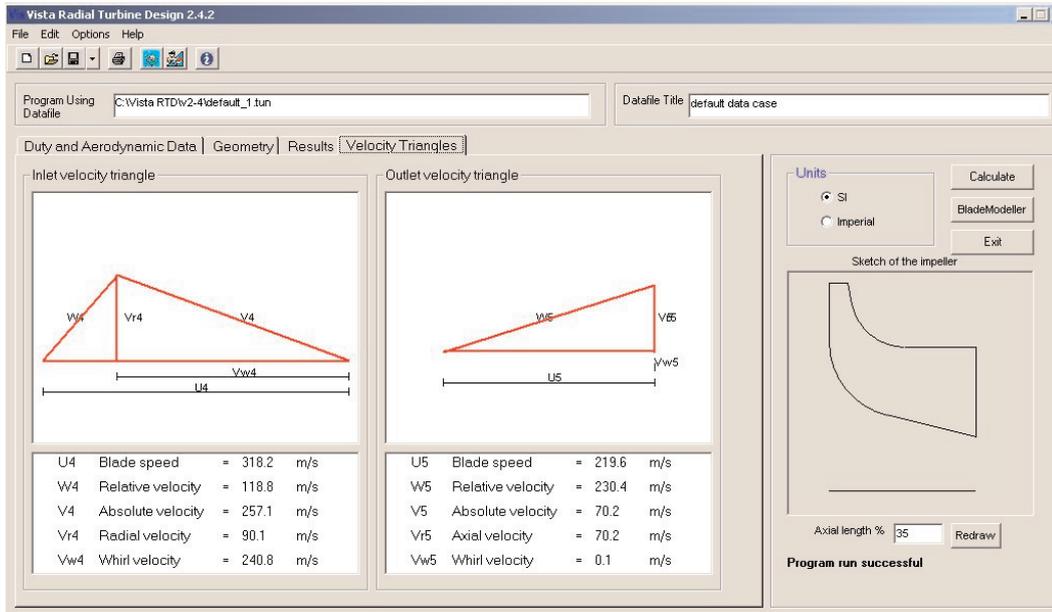
One of the essential aims of Vista™ RTD development has been to free the user from the burden of a great amount of data preparation. The scope of the code has been kept within bounds consistent with this approach, avoiding over-sophistication that would cost the user dearly in data preparation time. This is especially beneficial at the very beginning of a new design when the designer may know little more than the required expansion ratio and mass flow, a speed constraint and perhaps one or two geometric constraints. There is



also appropriate use of default data settings in Vista RTD; the default settings can be reliably used in the early phases of design, again avoiding irksome and unnecessary data preparation and entry.

### Links to off-design performance prediction

There is an interface for the creation of data for PCA's off-design performance prediction method, RITA.



Simple yet effective graphic displays

Figure 2 shows:

- a sketch of the meridional profile of the computed turbine wheel design.
- diagrams of the inlet and exit velocity triangles.

Fig. 2 Vista RTD user interface showing velocity triangles

### Efficiency prediction

The user may specify the turbine efficiency or, alternatively, select an option for the code to access its own internal loss correlations from which a reliable estimate of the efficiency will follow, and is then iteratively used in the design of the machine.

### Choice of units

Vista RTD has a choice of units system – either SI or Imperial.

### Graphic display

Vista RTD has simple but useful graphic displays to augment the numerical results. A thumbnail sketch of the calculated meridional shape of the turbine wheel is shown and diagrams of the inlet and exit velocity triangles may also be optionally displayed, all as shown in Figure 2.

### Vista™ RTD and ANSYS® BladeModeller™

Vista RTD is available as a standalone program but it is also integrated into ANSYS® BladeModeller™ within Workbench 11 and 12, so that it may be used to generate an optimised 1D turbine design before moving rapidly to a full 3D geometry model and subsequent CFD analysis. In its standalone form, Vista™ RTD has an option to launch ANSYS® BladeModeller™.

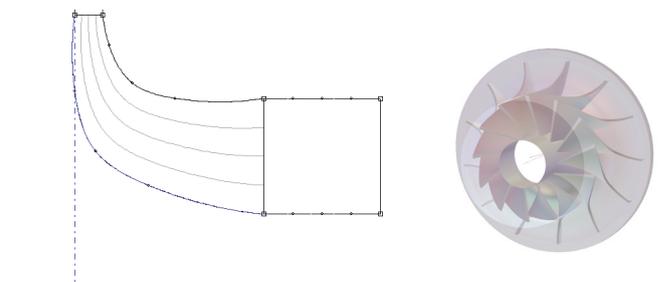


Fig. 3 Instantly-launched 3D geometry in BladeModeller™.