

## PBO Lab Release 1.1.3

### Latest update incorporates new features and enhancements

AccelSoft is pleased to announce that version 1.1.3 is now being shipped to current PBO Lab users. This release includes a variety of features and fixes: among the most notable are a new beamline element for use with TRANSPORT and additional features that have been added to support TRANSPORT fitting operations. The following is a list of enhancements:

- New commands in the TRANSPORT Commands menu allow the user to run TRANSPORT (a) with or (b) without executing fitting operations that may be specified in the beamline model. Fitting Constraints no longer need to be deleted in order to run TRANSPORT without executing the fitting procedures.
- Upper and lower bounds may now be used with the TRANSPORT Fitting Constraints. This has been implemented with a pop-up control in the Fitting Constraints window with selections for “=”, “<” and “>”.
- A new “Param” beamline element has been devel-

oped for use with TRANSPORT. The new Param Piece can be used to define Symbolic and Parameter Algebraic Expressions, independent of other Pieces. Symbolic Parameters defined with a Param Piece can be used in Algebraic Expressions in other Pieces and as fitting variables.

- Numerical data from TRANSPORT and TURTLE, used to generate line plots, scatter plots and bar graphs, is now written to the Plot Files in floating point format, eliminating potential problems with data sets that contain very small or very large numbers.
- Dragging Pieces in the Workspace of the Document window has been optimized, eliminating delay between selecting and dragging a Piece on the Workspace.


We welcome user feedback concerning these enhancements and new features. Please send your comments to [accelsoft@ghga.com](mailto:accelsoft@ghga.com) once you have had the opportunity to review this release.

#### GREETINGS TO NEW USERS IN 1998

AccelSoft welcomes all of the new users who have become customers during the past year. Thank you for your support! In addition to the many new individual users at long-time institutional customers of AccelSoft, we especially welcome the following new organizations to our user community:

- Air Force Research Laboratory (USA)
- CLRC Daresbury Laboratory (United Kingdom)
- Duke University (USA)
- Eaton SEO Corporation (USA)
- Eindhoven University of Technology (The Netherlands)
- European Synchrotron Radiation Facility (France)
- Everson Electric Company (USA)
- General Atomics (USA)
- Southern Cross Corporation (USA)
- Universitaet Wien (Austria)
- University of Jyväskylä (Finland)
- Westinghouse SRS (USA)

## Upcoming Conferences

Below is a list of upcoming conferences where AccelSoft plans to be a featured industrial exhibitor. We invite our readers to meet members of the AccelSoft staff and to take advantage of the opportunity to ask questions, offer suggestions, and learn more about our software. 

- **APS Centennial Meeting**  
Atlanta, Georgia 20 – 26 March 1999
- **1999 Particle Accelerator Conference (PAC99)**  
New York, New York 29 March – April 2 1999
- **14th International Conference on Ion Beam Analysis (IBA-14) / 6th European Conference on Accelerator Research & Technology (ECAART6)**  
Dresden, Germany 26 – 30 July 1999
- **American Nuclear Society Winter Meeting & AATG Topical Meeting**  
Long Beach, California 14 – 18 November 1999

# Tips, Tricks & Shortcuts

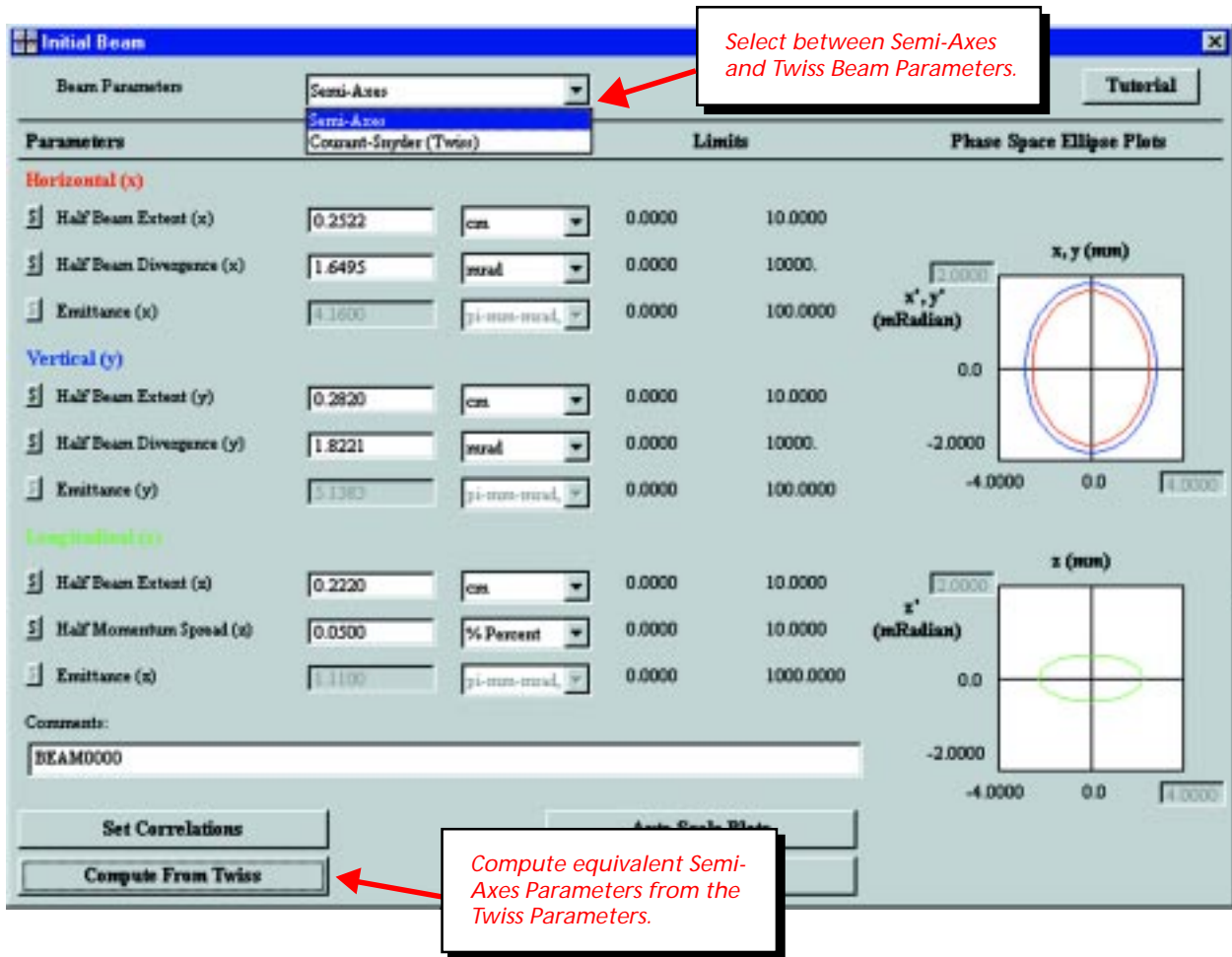
## Using Semi-Axes Beam Parameters with TRANSPORT in PBO Lab



The PBO Lab Beam Piece provides both Semi-Axes and Twiss parameters to describe the initial beam; however, there are some cases in which TRANSPORT requires Semi-Axes beam parameters. Specifically, Semi-Axes parameters are required when there is a Solenoid or Rotate Piece in the beamline model. In addition, there are several Pieces that contain Rotation (Roll) Angle parameters that must be zero in order to use Twiss Parameters. The PBO Lab Pieces that have Roll Angle parameters are the Quadrupole, Sextupole, Octupole, Bend, Sector-Bend, and the Rectangular-Bend.

If the Solenoid or Rotate elements are in the beamline model, or if any of the other elements are in the model with non-zero Roll Angle parameters, then TRANSPORT requires Semi-Axes beam parameters to be used. PBO Lab provides a conversion button that allows the user to translate between the Semi-Axes and Twiss parameters in the Beam Piece. The Figure below illustrates the PBO Lab Beam Piece Window. The Beam Parameters pop-up at the top of the window is used to select between the Semi-Axes and Twiss parameter sets.

When the initial beam is specified by Twiss parameters, but TRANSPORT cannot use Twiss parameters for the reasons outlined above, then a conversion can be made from the desired Twiss parameters to the corresponding Semi-Axes parameters using the Compute From Twiss button in the Beam Piece window.



The screenshot shows the 'Initial Beam' window with the following details:

- Beam Parameters:** A dropdown menu is set to 'Semi-Axes'. A red arrow points to this menu with the text: *Select between Semi-Axes and Twiss Beam Parameters.*
- Parameters:** A table with columns for Parameters, Limits, and Phase Space Ellipse Plots.
 

Parameters	Limits	Phase Space Ellipse Plots
<b>Horizontal (x)</b>		
Half Beam Extent (x)	0.2522 cm	x, y (mm) x', y' (mRadian)
Half Beam Divergence (x)	1.6495 mrad	
Emittance (x)	1.1600 pi-mm-mrad	
<b>Vertical (y)</b>		
Half Beam Extent (y)	0.2820 cm	x (mm) x' (mRadian)
Half Beam Divergence (y)	1.8221 mrad	
Emittance (y)	1.1380 pi-mm-mrad	
<b>Longitudinal (z)</b>		
Half Beam Extent (z)	0.2220 cm	
Half Momentum Spread (z)	0.0300 % Percent	
Emittance (z)	1.1100 pi-mm-mrad	
- Buttons:** 'Set Correlations', 'Compute From Twiss', and 'Tutorial' are visible. A red arrow points to the 'Compute From Twiss' button with the text: *Compute equivalent Semi-Axes Parameters from the Twiss Parameters.*
- Phase Space Plots:** Two plots are shown on the right. The top plot shows 'x, y (mm)' and 'x', y' (mRadian)' with two overlapping ellipses (red and blue). The bottom plot shows 'x (mm)' and 'x' (mRadian)' with a single green ellipse.

Did you know? PBO Lab 1.1.3 Professional users can now use Visual Fortran 5.0!

# AccelSoft User Profile

## ESRF Operations Manager Shares Views on PBO Lab

As the Operations Group Manager in the Machine Division of the European Synchrotron Radiation Facility, Laurent Hardy must be certain that all accelerators are in good working condition in order to deliver high-quality x-ray beams to users. He is also in charge of the Booster synchrotron as well as the transfer line from the synchrotron to the storage ring. Hardy purchased PBO Lab to improve the injection efficiency from the booster to the storage ring and to reduce the amount of lost electrons, thus decreasing the radiation level around the transfer line.

“Presently, I use PBO Lab to make a good model of our transfer line (65 meters) going from the synchrotron (300 meters circumference) to the storage ring (844 meters circumference),” explains Hardy. In order to have good transmission efficiency from the transfer line to the storage ring, the beam parameters at the end of the transfer line must match the lattice parameters at the place of the injection of the storage ring. “The first time I tried PBO Lab on the real machine, I could improve the transfer efficiency and reduce the beam losses by a factor of two, which was a great step,” continues Hardy.

He runs the standard version of PBO Lab with both

the TRANSPORT and TURTLE modules on Windows 95 on his Dell laptop with a 233 MHz processor and 48 MB of RAM. Using a laptop offers Hardy greater flexibility to be in the Control Room for an experiment, to make computations immediately, and to test the new parameters generated by PBO Lab. “Thanks to the fact

that it runs on a laptop PC, I can process the data and work at home instead of being obligated to stay at the office,” he says happily.

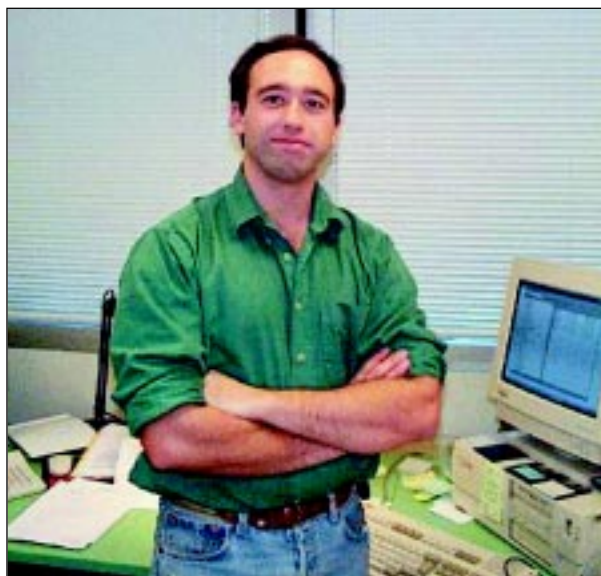
Hardy has also taken advantage of AccelSoft’s technical support via email. “Each time I sent a question, I got an answer the day after,” he comments. “I would recom-

mend the software to people like me who are involved in designs or existing lines not only for its capabilities, but mainly because you know that there will be someone who will help you when you are stuck.”

After receiving his Masters’ degree in Physics from the University of Louvain-La-Neuve in Belgium in 1989, Hardy took a position as Project Leader in the Research and Development Department at Ion Beam Applications, where he worked on the development of a new prototype cyclotron for medical purposes. He then went to the McGill Hospital in Montreal to install the prototype. Once he finished work on this project, he served at the theoretical physics laboratory of the Royal Military School in Brussels until June of 1994. Following his military service, Hardy was hired by ESRF in France as the assistant to the Operations Manager. He assumed the role of Operations Group Manager himself in January 1997.

During his time away from work, Hardy enjoys photography (he takes and develops his own pictures). In addition, he is busy with plans for his wedding in May of this year. Refurbishing his home in the mountains also occupies a great deal of his spare time. Considering the hectic nature of the schedule he keeps, we are extremely grateful to Laurent Hardy for taking the time to share his thoughts on PBO Lab with AccelSoft!

**“The first time I tried PBO Lab on the real machine, I could improve the transfer efficiency and reduce the beam losses by a factor of two, which was a great step.”**



*Laurent Hardy in his office at ESRF in France.*

### \*\*\* ACCELERATOR NEWS BULLETIN \*\*\*

The U.S. Particle Accelerator School is currently using PBO Lab in the following January course:

**Title:** Accelerator Fundamentals  
**Instructors:** Mike Syphers, Elvin Harms



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