Table 1. *Network-based description of the flow cytometer design from Live Ideas. Each functional beam segment in the system is captured in this list.*

Now the entire system can be visualized in 3-D. Based on the input network description (Table 1), BeamWise automatically generates the CAD model using preloaded component information in a database and presents the system as laid out in a 3-D view (Figure 3).

Traditional CAD actions such as shading, rotating, panning and zooming can help get a feel for the layout. But the beam-anchored architecture lets users "reach in and touch" the system model. For example, they can select a beam segment and change its direction or length, and the tool reflects the change as propagated downstream through the entire system. The user can even replace a component with another one from the database, and the new part will appear, complete with an appropriate default set of supporting hardware, such as a post and a post holder.

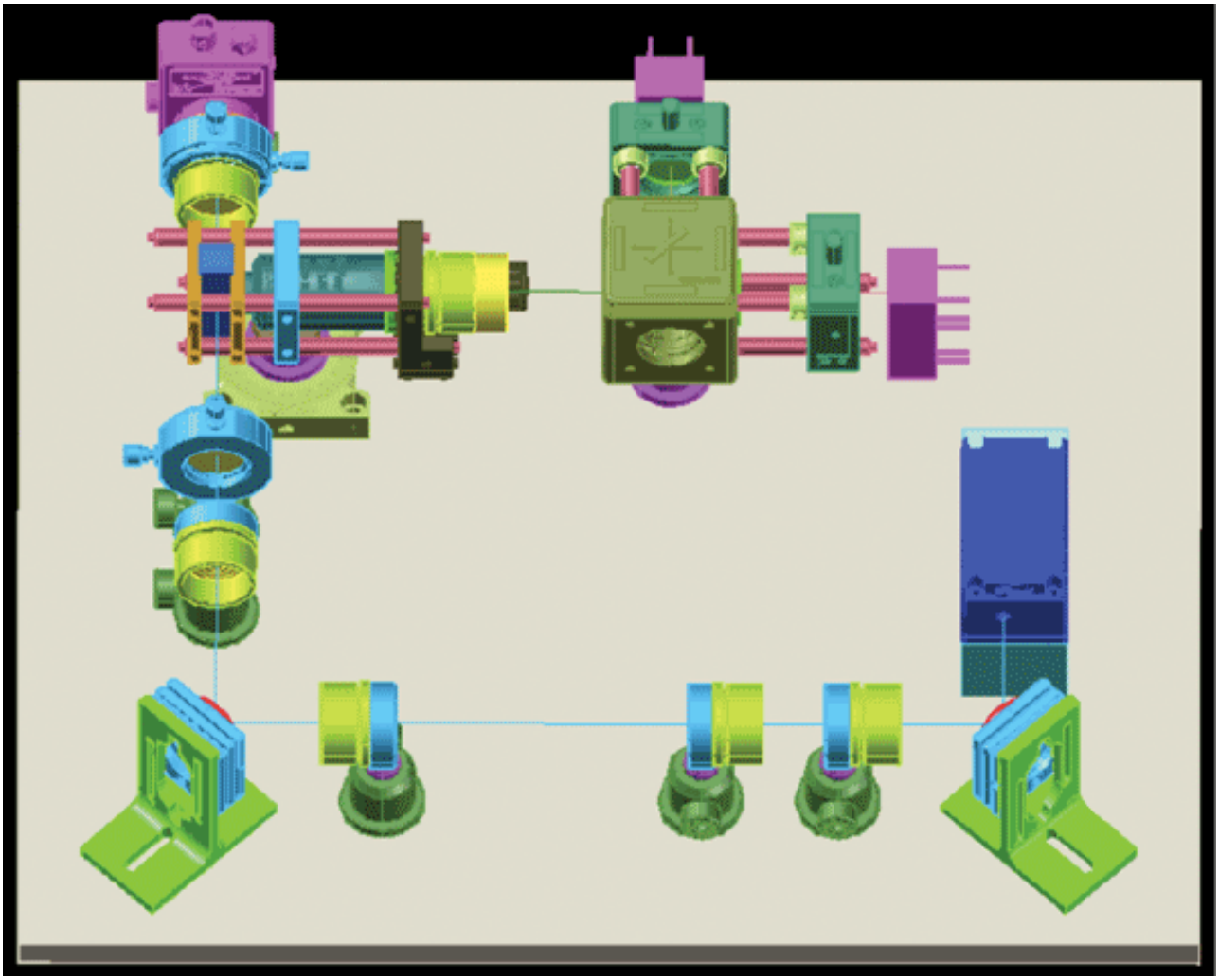

Figure 3. *BeamWise 3-D CAD drawing of the flow cytometer system.*

Design documentation and other drudgery

For many designers, design documentation is as much fun as a root canal. However, few things are more critical to long-term sustainability of a product (for medical and other applications) than a properly maintained design-history file. Export options can lift some of the burden of documentation. For example, designers can generate a fully costed bill of materials automatically, as well as layered 2-D dimensioned drawings (Figure 4), to hand out to the manufacturing engineering department.

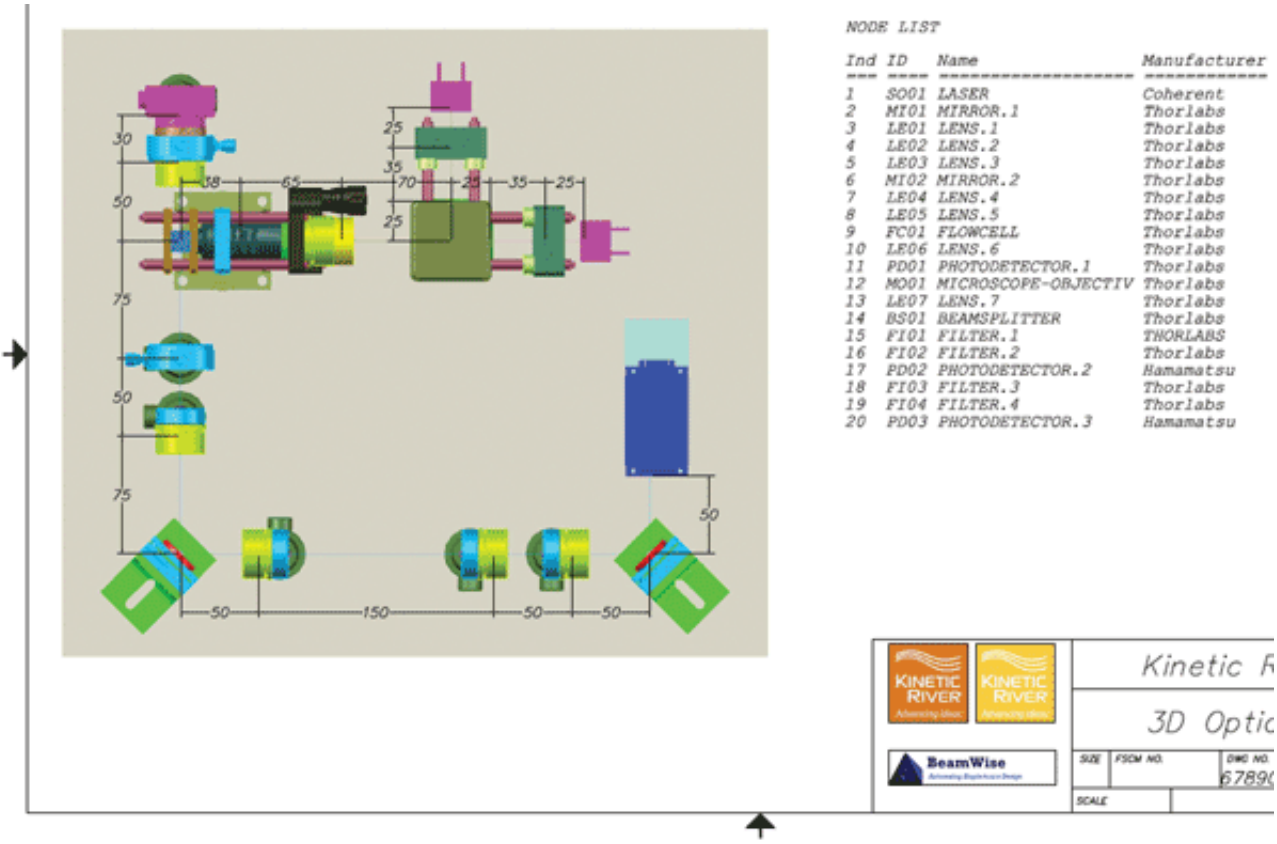

Figure 4. *Detail of BeamWise 2-D dimensioned drawing and parts list.*

Many component-focused tools developed to accurately model beam propagation do not easily lend themselves to the kinds of multidomain simulations needed in many biophotonics applications.

They also do not support the kind of system-level performance optimization that instrument designers are routinely called upon to deliver. New and emerging tools are starting to fill the gap by making it easier and more intuitive to ask (and answer) system-level questions. They can catch potentially serious design oversights, identify more cost-effective approaches, improve overall performance and bring solutions to market more quickly.

Better and more sophisticated design tools, and even design-automation solutions, will not replace the insights and expertise of systems designers. They're not meant to. Used properly, they instead let the designer focus on tasks only he or she can perform – while automating away a lot of the grunt work.

Meet the author

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