

**AutoGen Webcast**  
**Thursday, March 29, 2007**  
**11:00 am EDT**

**Questions Posted by Webcast Participants**

1. Does Autogen planning include integration with design-for-production product model software such as ShipConstructor?

AutoGen currently only accepts \*.sat format for geometry input. However, AutoGen utilizes the ACIS Kernel from Spatial Corp for geometry analysis. The InterOp system offered by Spatial can be integrated in the commercial release of AutoGen to accept most any format of geometry input.

2. Does operator modification include variables such as joint preparation, fit-up, minor distortions, etc.?

During this phase of the software development, the AutoGen team is working on interfaces to allow the operator to apply edge preparations and pre-defined weld procedures to the part prior to path planning. This effort is directly tied to the implementation at Electric Boat. AutoGen does accept (in fact requires) the input of actual part placement within the robotic workcell. However, the accommodation of fit-up tolerances and distortion due to welding are outside of the current scope of AutoGen. Commercially available sensors, such as vision systems, touch sensing and through-the-arc sensing can be used to account for these deviations and these systems turned on or off by the AutoGen produced program, However, the active responses to the data from these sensor systems is processed by the robot controller, not by AutoGen.

3. Is application considering pipe joint welding?

Early research with AutoGen did consider pipe welding applications. At this time however, AutoGen does not program and manage part positioning systems. So, for pipe applications, AutoGen would have to transition from overhead, to vertical and to horizontal weld positions on both sides of a horizontal pipe to complete the weld; a process that AutoGen is currently capable of performing.

4. Could a long-reach general robot serve pre-outfitting on a panel line, such as welding brackets and other fixtures?

Yes, AutoGen could be used for this application. The code could also be adjusted to help with the design and/or selection of a single, pedestal-mounted robotic workcell. A various workcell configurations

could be tested in AutoGen along with the sample part to determine if all welds are reachable.

The GCRMTC could perform similar design trade-off studies with its Delmia robot simulation software. This same task has been performed for other shipyards.

5. How does AutoGen deal with part positioners? Headstocks? Tilt/Rotate tables?

At this time, AutoGen does not program coordinated part positioners.

6. Is that really necessary? If you mounted the pipe on a HS/TS,(head stock / tail stock) you could maintain the weld joint orientation.

This question was posted after the response to Question number 3 and before Question 5 had been posted by an attendee. See the response to Questions 3 and 5. AutoGen currently does not have the ability to program a coordinated part positioner.

7. Consider application to robotic high-pressure water jet cutting - an NSRP project.

The AutoGen team will investigate potential ties to this NSRP project. As noted in the Use Cases presentation, the AutoGen project is highly interested in other applications of the AutoGen geometric reasoning engine and path planning capabilities to applications outside of arc welding.

8. Will AutoGen be able to automatically generate robot controller weld & sensor process parameters (ie weld speed, weave width, weave shape, vision parameters, touch sensing, thru-arc tracking)?

AutoGen uses a welding rules database and other associated weld process databases to specify the appropriate process parameters (such as weld speed, wire feed and weave pattern) to the welds it has identified. As noted previously, AutoGen can insert the proper commands within the exported control program to tell the robot controller to use onboard sensors.

9. Can the calculation of the free path collision free routing be done in real time so that one of AutoGen's uses could be a navigation tool for autonomous vehicles?

Based on the input from the Sandia National Laboratory team members, the technology implemented within AutoGen for its free-space motion planning are not synonymous with the methods used in autonomous navigation systems. The AutoGen routines work within a fixed geometric environment defined entirely before the process begins. It is not suited to active path planning for autonomous vehicles.

10. Consider nuclear applications such as work within hot-cells. Look at trends at Idaho National Laboratory and Global Nuclear Energy Partnership (DOE project)

The AutoGen Team will investigate this suggestion.

11. Consider conversation with heavy manufacturers - Caterpillar, Inc.

AutoGen has already been in contact with Caterpillar and they are a member of the Technical Advisory Board. Caterpillar is also a customer of Spatial and they have had discussions about AutoGen already.

12. But you expect the robot controller to deal with all real-time trajectory corrections, true? AutoGen ends the moment the robot starts the weld?

This question was probably sent as a follow-up to question 8. Yes, the current process scope for AutoGen is to create the offline program based on the actual placement of the part within the workcell, using the as-designed model of the part. All real-time modifications to the program or active control and response from sensors is left to the robot controller to handle.

13. Those heavy manufacturers regularly use part positioners.

Duly noted. The investigation and incorporation of workpiece positioners has been captured for future AutoGen development.

14. Will the minutes and presentations from this meeting (and the last) be made available?

Yes, the presentations for this web cast and all previous and future web casts will be posted on the University of New Orleans Gulf Coast Region Maritime Technology Center web site

[www.gcrmtc.org/autogen.htm](http://www.gcrmtc.org/autogen.htm)

Thank you for your interest in AutoGen.

For more information, please contact:

**Frank M. Bordelon**  
Executive Director  
AutoGen Project Manager  
Gulf Coast Region Maritime Technology Center  
University of New Orleans  
409 CERM Building  
New Orleans, LA 70148  
504-280-3871 ofc 504-280-3898 fax  
[frank.bordelon@uno.edu](mailto:frank.bordelon@uno.edu)