

**B. FHWA Demonstration Program To Show Benefits of Automation For Steel Bridge Fabrication**

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This presentation summarizes progress in developing a Federal Highway Administration (FHWA) demonstration project “Show Benefits of Automation in Bridge Fabrication,” and points out some near-term opportunities to the fabricators, through technology to lower the cost and speed the construction of steel bridges.

A recent technology review and scanning tour, sponsored by the FHWA, of bridge fabrication facilities in Europe and Japan revealed that the steel bridge fabrication industry in the United States could be more competitive if some of the identified select technologies that are in use in the countries visited were adopted. Following on the recommendations of the scanning tour, and subsequently a workshop in Columbus, OH, the FHWA gathered a team to promote a demonstration project titled: “Show Benefits of Automation in Bridge Fabrication.” This team includes representatives from State DOTs and the Federal government, trade associations, bridge fabricators, technical institutes, universities, and associated industries to develop a roadmap to achieve greater competitiveness.

The team has identified a number of error-prone, inefficient and time-consuming disconnects at the transitions between the various stages in the design, planning, fabrication, and erection of a steel bridge. The FHWA organized a workshop in Columbus, OH examined the various aspects of those disconnects and the emerging technologies that potentially could help to remedy them, thus bringing the era of computer integrated manufacturing from design to fabrication for steel bridges in the United States.

Some recurrent topics (areas of opportunities) in the presentations and in the breakout sessions that followed them in the Columbus, OH workshop were:

- Solid modeling based on a single 3D model as in other industries full 3D CAD drafting, enabling direct links to manufacturing machines)
- Virtual assembly
- Use of the model as a single source of data that can be extracted and packaged in various ways
- Automated inspection and data recording as is being done elsewhere and in related industries,
- Use of welding processes (e.g., GMAW) suitable for automation,
- Modifying/eliminating current specs that are unduly restrictive and outdated,
- Development of standard specifications, to replace the current myriad variety of state specifications, that would facilitate automation,
- Design-Build type of approach that overcomes the adversarial barriers that plague the traditional contracting approach, and
- A cost effective systems approach that does not merely introduce robots or increase the speed of one of the processes.

Since the workshop, the team has added a few more topics, such as developing off-line programming capabilities and developing incentives for change. To demonstrate the value of the changes, the team is proposing to have two bridges

constructed, one by the traditional approach and one by an enhanced approach. The construction process will be carefully documented for each bridge (not just costs and construction time, but also operator and managerial satisfaction).