

THE FUTURE OF ROAD BUILDING

Article by Herb Rubenstein President and Founder, Sustainable Business Group for The Road Builders Clinic, Cour d'Arlene, Idaho

Introduction

The title for my speech, *New and Future Technology in Roadbuilding*, has let me learn about research in many countries, as well as ongoing activities here in the United States. In 1999, the author met with a Norwegian company that had developed sensors that were built into roads that measured the weight of the vehicles as they passed by at normal speeds thus avoiding the delays and costs associated with truck weigh stations. In 2000 we met with a company that had a laser sensor system that could tell if there were ice patches ahead on the road and could alert the driver through a sound signal and a visual cue. In 2001 we talked with a person working on a laser sensor system to be installed in trucks that could detect if there were any overhead obstruction that was lower than the top of the vehicle approaching it.

New Technological Developments

Now we hear of “stone on stone” construction, creating aggregates out of land fills, innovative use of fly ash, “context sensitive design, new surveying equipment that deploys GPS technology and satellite powered terrain monitoring systems. And, through 3D technology, we can design a realistic picture of road and bridge systems so that engineers, government officials and the public can “see” the road before it is ever built. While the American Road and Transportation Builders Association in its recent publication, *Smart Construction*, suggests that “a complete integration of transportation project design and construction is on the horizon,” even the most optimistic futurist knows that there will always be large gaps between what the designers hope to do and what the construction people have to do to build the road or construct the bridge. In my own backyard, the eight billion dollar “Springfield Interchange,” or what we affectionately call the “mixing bowl” construction companies found six unmapped, undiscovered underground streams as they began the building process. These streams were newly discovered even though this project had been on the books for decades.

Five New Areas of Technology to Consider

Road building is an art, a science, and a business. Any business has to look hard at its:

future human capital needs

future financial capital availability, administration systems and sources of capital

future quality control mechanisms

future political and stakeholder issues, and

future manufacturing systems.

While this list might seem in the reverse order of importance, I suggest we start at the top since each item impacts the section below it.

The future human capital needs in the road building industry can now be predicted with some certainty. The number of workers needed to build roads will dramatically decline in the future for three reasons. First, satellite guided, humanless paving, dirt clearing and road bed construction vehicles will eliminate string line crews and many of the people associated with road building projects. Second, other labor saving devices will rapidly developed because of the continued high accident and death rates associated with road building and road repair where traffic and road workers occupy the same general territory. Third, the use of robots, smart, self diagnosing and self repairing road systems, will also reduce the labor costs and needs associated with road building in the future in a dramatic fashion. Future financial capital and administration in road building will dramatically change in the future. Through the internet's capacity to capture and display 24x7 video monitoring of all aspects of road building, those with the purse strings can and will know to the exact inch the progress made by the road building companies on a constant basis. Daily financial draws based on progress will become the standard. Private toll roads, speedpasses, pay per lane financial systems and peak load pricing systems will turn roads into cash generating assets with enormous implications on the financing of all road construction projects. Future quality control will be affected greatly by the same 24X7 video cameras that will be able to detect errors as they are occurring, allow observers to predict problems and challenges and turn around the current system where road construction companies and government agencies bring in their experts at the end of the project to fight about why a project went over budget or was delayed beyond its target completion date. These experts will review film daily and the ability to conduct a "project audit" in real time will be a reality in less than ten years. Future political and stakeholder issues abound. Road construction that offers the ability to use land fill material for aggregates (after being heated) may ease some of the environmentalist's opposition to almost every road building project being considered. Better, longer lasting construction, will ease the taxpayer's unwillingness, as recently expressed by their votes in Virginia, not to pay for road upkeep and obviously needed road new construction needed to clear up the gridlock that keep commuters on the road in Northern Virginia nearly twice as long as just ten years ago. The future manufacturing of road building materials and construction processes in the road industry build on a long history of incremental changes in the implementation of technology. High performance concrete, superpave asphalt which is mixed specially according to the job site's topographic, environmental and climate conditions, and the use of recycled construction waste and other industrial byproducts coming out of landfills to form the basis of future roads. Advances in the state of chemistry to provide for hyperfast-cure patching materials, super epoxy and fiber reinforced plastics for bridge surface and bridge pier repairs will address one of this nation's sleeping financial time bombs, the cost of repairing, replacing and maintaining

our aging inventory of bridges. TechCrete is just one of many products that will repair concrete surface problems in just less than one hour. And the reintroduction of wood into bridge construction, with its ability to be deployed in offsite assembled modular kits all will have their impact on future construction.

Road Partners

One might predict that in 50 years almost all newly built major roads in the US will be straight and we will no longer be building bridges! A futurist who sees a combination car-personal air transport vehicle will see how this air/land vehicle will turn all major roads into landing and takeoff strips. With vertical take off and landing likely to be available in 50 years on car/air transport vehicles which will be automatically guided by computers programmed to go from point A to point B and not hit anything on the way, the long term future of roads is a fascinating question. With positive guidance systems coming available in cars causing drivers to become passengers themselves, road design and construction will be molded to the needs of the computer, auto pilot systems, just as they are now molded to driver and automobile capabilities. The future of cars and the future of roads are completely intertwined. The demand for roads will not increase as quickly over the next 50 years as it has over the past 50 years, but the public and all funding agencies will be more demanding on their roads than they ever thought of being over the past 50 roads. Roads that can tell the weight of each vehicle, roads that can alert authorities about the precise size and location of an impending crack or pothole, roads that can guide and communicate with cars and drivers and roads that alert drivers via lasers and sensors of impending dangers lurking ahead. Roads will be “policed” by electronic systems that will not only give people tickets, (and just debit their checking accounts immediately rather than sending them a ticket and waiting for payments or challenges) these systems will actually be able to communicate with the electronics of a car going more than 20 miles over the speed limit or passing a large number of cars quickly and slow down the car. Future pricing systems like that installed in London or Israel transnational highway just takes electronic information from the car and sends the owner a bill, thus avoiding stopping or even slowing down traffic just to collect money from the owner.

Conclusion

Finally, the future of road building will benefit in ways we do not yet know from the role of our military in building roads in Afghanistan and Iraq. The use of cardboard to construct bridges, high speed deployment of new road systems under extreme conditions and the need for super durability all suggest that the private sector road building industry has much to learn from the military, when they have the time to let us know what these lessons are. And, there is much being done overseas from which U.S. road builders can learn as well. More than in almost any field, a road builders’ conference conducted entirely on the internet with people participating from all over the world, sees to be an idea whose time has come.

In my keynote speech at the Road Builders' Clinic, these and many other topics will be covered. It is not too much of a stretch to say, that road building itself is at the crossroads, technologically, financially and politically. This industry will not look the same in fifty years and those companies and organizations that prepare best for and pave the way toward the future of the industry will be the winners.

About the Author

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