



OCTOBER 2018

MASONRY in the FUTURE

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Masonry in the Future

The history of masonry is well known throughout Canada and the rest of the world in fact, most cities have architectural roots stemming from masonry. The Great Pyramid, The Roman Colosseum and Edinburgh Castle are all examples of how masonry structures stand the test of time while maintaining cultural significance. Canada is no exception, in fact the Chateau Frontenac in Quebec City is the most photographed hotel in the world. The buildings of the past defined the future for many built environments around the world. In an ever changing world where technology continues to be infused with all aspects of business, how will masonry adapt?

When envisioning the future many of the concepts which were considered to be highly conceptual 10 years ago are now becoming reality. The introduction and continued research of digital fabrication and artificial intelligence has drastically changed the ways in which we perceive the future. The construction industry will begin to see changes occur at an accelerated rate as new materials and applications for materials are developed. This newsletter issue will therefore take a look at technology and how it may affect the future of the masonry industry.



DESIGN

New design tools have changed the ways in which engineers and architects think about the usage of materials. Technological design aides can provide designers with more in-depth information on materials than ever before. Subsequently, this has led to the increased usage of concepts such as design build, streamlined construction scheduling, life-cycle and building envelope performance.

Technology has helped designers optimize the design process which has made construction much more efficient. The proliferation of Building Information Modeling (BIM) technology has allowed construction professionals to visualize, design, build and manage construction in ways which were not before deemed possible. In fact, BIM can have an entire project managed with 3D models, construction schedules and potential building systems clashes before a shovel even hits the ground. BIM software has impacted construction co-ordination in such a way that cost savings of up to 20% have been reported. The increased use of BIM software has also become a powerful asset management tool. Oracle Corporation reports that 75% of an ICI facility cost occurs after acquisition. The proper usage of integrated Building Information Management can help to manage these costs by providing inter-related information which is cross-referenced against factors such as performance values, life-cycle, installment specifications, warranty and more.

The masonry industry in the United States has recognized the impact BIM is having on construction and has made it a priority to integrate masonry. The Mason Contractors Association of America, National Concrete Masonry Association, International Union of Bricklayers & Allied Craft Workers, Western States Clay Products Association, The International Masonry Institute and The Masonry Society have banded together to integrate and promote the inclusion of masonry products in BIM. This effort also includes ensuring the industry is capable of accepting this process when required. Through this process BIM-M (Building Information Modeling for Masonry) is being created and developed.

The collaborative work of the above-mentioned groups has led to ground breaking advances in applying technology to masonry design. The integration of masonry into Revit software has allowed for the usage of BIM-M to design, build and manage in ways which are cutting edge for the construction industry. This work has positioned the masonry industry well with the technological software management required to remain competitive when bidding against other materials.

MANUFACTURING

Technology has had a tremendous impact on any type of manufacturing worldwide. Automation has enabled industries to increase production all the while minimizing cost. As the implementation of automation has become commonplace in manufacturing so too will the implementation of Artificial Intelligence, commonly referred to as AI. Artificial Intelligence is once again changing the ways in which manufacturing is done, and giving a competitive advantage to those companies which choose to engage.

Advances in 3D printing has enabled the creation of products and materials for a relatively small start up cost. Now with 3D printers the ability to create and produce has never been more available. This technology certainly has the potential to be a great contributor in any industry, including masonry.

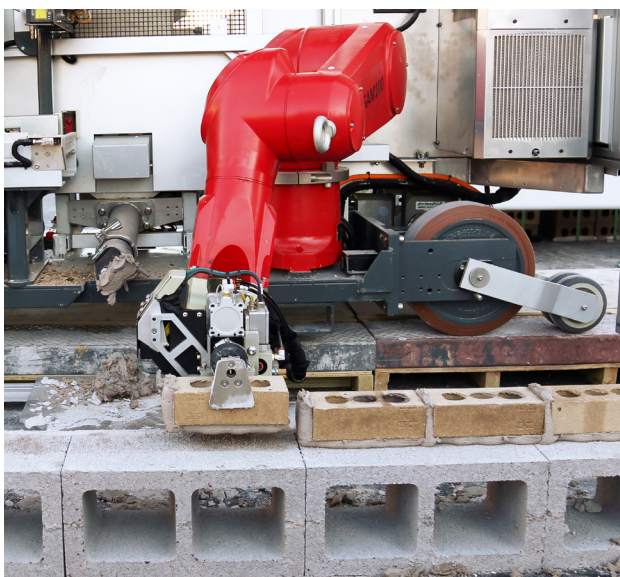
Last year MasonryWorx announced its support to the University of Waterloo, School of Architecture by the donation of funds for a Clay 3D printer, capable of producing full scale masonry units. The faculty has developed a course around this equipment and is focusing it on experimental façade components with 3D printed masonry. Utilizing this technology will allow the school to research new and innovative ways in which masonry can be used.

APPLICATION

Masonry has been a longstanding trade throughout history. Some of the most beautiful and oldest structures from around the world were crafted by masons. As technology has changed the course of humanity many times over thousands of years the application of masonry generally remains unchanged. However, we are now beginning to see the introduction of technology into this age-old trade. Just as robotics and AI have begun to influence other areas of the masonry industry the application of new technology is being introduced to masonry contractors.

The MULE

The MULE (Material Unit Lift Enhancer) is in essence a device used to assist in the lifting and movement of materials. For masonry it has become a useful tool for block laying. The MULE has helped to not only increase production on a job site but reduce the strain incurred by masons completing the same repetitive motions with heavy masonry units for hours at a time. In fact, one of the main features of the MULE is to work to reduce strain on its user. A computer attached to the unit itself will continuously monitor and re-calibrate based on the movements of its user, in essence the MULE will learn how the mason using it moves and will work to reduce any resistance. The MULE itself is also very accessible and can be attached to scaffolding and moved with ease throughout the job site.



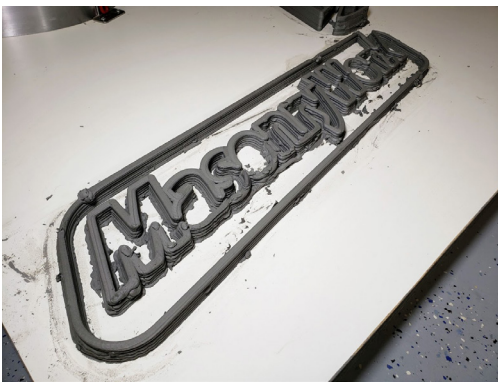
SAM Photo credit: Shutterstock

Perhaps more impressive is the semi-autonomous brick laying robot SAM. This robotic bricklayer has been reported to place between 300 and 400 brick per-hour on site. Moving forward, SAM may play an important role in addressing labour force concerns throughout the industry.

The notion of 3D printing has began working its way into construction and the application of materials. Fastbrick Robotics has made headlines over the past ten years as it continues to develop a fully autonomous brick laying robot named Hadrian X. The company is touting Hadrian X to be the most advanced construction robot in the world. The robot attached to a truck would go to the site, have the design for the structure programmed and would simply go to work. The Hadrian X is capable of placing both structural and façade masonry units and can lay over 1000 brick in an hour. The hype around Hadrian X is real, major construction companies such as CAT have invested in Fastbrick Robotics in an effort to begin making this technology commonly available on job sites worldwide.

THE FUTURE IS NOW

Technology is being actively applied throughout the construction business. Concepts which were considered to be years down the road are coming at us more rapidly than ever. The concept of a 3D printed house is in reality not that far away. The question is how will the masonry industry adapt? Fastbrick Robotics has taken a stance on disrupting what they believe to be a 6,000-year old process. Considering the use of such technology in the industry challenges us to look at construction in emerging ways that is much different from the past. The ability of the industry to adapt under these circumstances may define the wall systems and structures in the great cities of the future. The one thing that remains constant with masonry materials is its ability to portray architectural beauty which transcends generations. What is often lost when considering the beauty and permanence of masonry buildings is the human element involved. The great masonry buildings known around the world were built in the context of forward thinking and in many cases leveraged the best technology available at the time. These same ideals so deeply rooted in masonry's past can and should be applied today when considering the new opportunities technology affords the industry. Consequently, if not the masonry industry, another industry will definitely take advantage.



*Samples of MasonryWorx logo modeled and printed by 3D-Clay printer
courtesy of the University of Waterloo, School of Architecture*