



armatron[®]
printing the future

Company Description

Armatron Systems is an intellectual property company for full-scale 3D construction printing (3DCP) technologies that has an extensive intellectual property portfolio encompassing several reinforced concrete construction systems that quickly and cost effectively construct sustainable, full-scale structures in real time (onsite or offsite), ranging from extremely simple to highly complex designs, having a wide variety of interior and exterior finishes, at a significantly faster speed and lower cost, all while producing virtually no onsite waste.

From Armatron Systems' beginning over 10 years ago, Armatron's business model was to file significant intellectual property prior to public disclosure and funding.

Founders

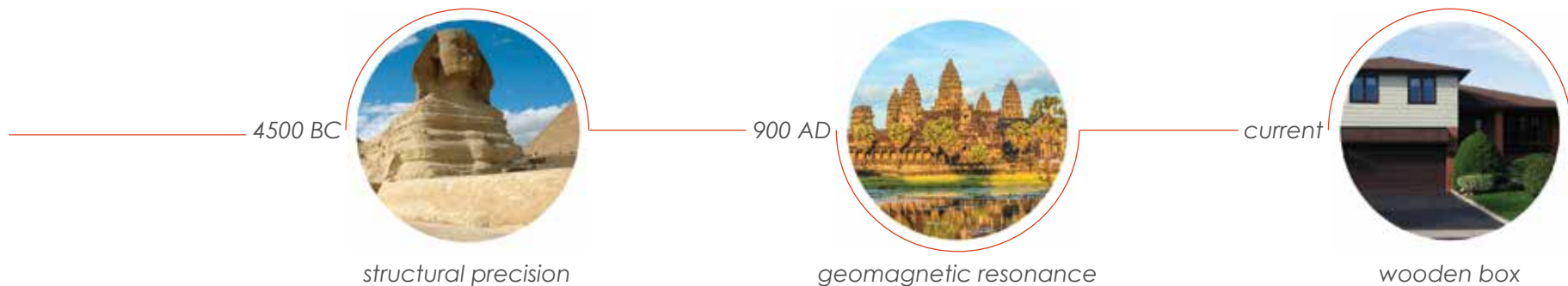
Dr. Brian C. Giles
Inventor & CTO

Blair Souter
COO

Anri Kirkoryan
Managing Member

Philosophy & Vision

Overcoming the current limitations of conventional construction; the environment is impacted, significant time and materials are wasted, and the architectural diversity is extremely limited. Armatron Systems' patented technology closes the gap between what is known and what is applied.



Globally over 1.6 billion people lack adequate shelter.

Armatron Systems' primary focus is developing and licensing patented technologies that address the urgent global need for cost effective, sustainable and energy efficient structures whilst providing architectural and aesthetic diversity.

Target Market

As a few examples, Armatron's 3D construction technology encompasses multiple scalable construction tools for building, refurbishing, and or retrofitting a wide variety of structures ranging from the rapid construction of simple 3rd world housing, water tanks, and temporary emergency structures, to high-end one of a kind homes (including near zero energy point), and even massive extremely complex skyscrapers.

The global construction market is forecast to grow 85% to \$17.5 trillion USD, accounting for almost 14.7% of global GDP by 2030 *1

An average of 100,000 new housing units **per day** will be needed over the next 15 years to meet the demand for 4 billion people living in poverty in 3rd world countries *2

\$4.59 trillion USD needs to be spent improving US infrastructure by 2025 *3

Environmental Impact of Conventional Construction



Construction waste is responsible for about 25% of all waste *4

Consumes about 50% of our natural resources *5



Produces about 40% of our carbon emissions *6

Energy consumption from buildings is expected to increase by 38% by 2050 *7



534 Million tons of construction and demolition debris were generated in the US in 2014 *7

The largest energy and resource “savings” potential lies in the building sector *8

The most effective means of curbing carbon emissions is improving building efficiency *9

*1 Oxford Economics GCP 2030, *2 United Nations, *3 American Society of Civil Engineers, *4 Legrand Green Building, *5 Legrand Green Building, *6 Economy Watch report on World Construction Industry 2011, *6 Smart 2020 Report, *7 EIA.gov, *8 EU Commission on Energy, *9 International Energy Agency

"The questions isn't whether concrete 3D printing will begin to play a large role in the construction industry, rather how soon and how much"

Advantages include:

Ability to custom print onsite what is needed, with virtually no onsite waste

Significant environmental benefits

Cost-effective production of unique architectural features

Reduction in time and labor by about 70%

Enables diverse designs, and stronger structures

Limitations of Current 3DCP Systems



Large heavy 3D Construction systems with complex setup (requires a crane) *1



Top down multi-pass extrusion out of a generally round nozzle *2



Limited to vertical walls *3



Exposed (unregulated) curing environment *4



Most can't print foundations nor roofs



Limited to complex and or proprietary concrete mixes

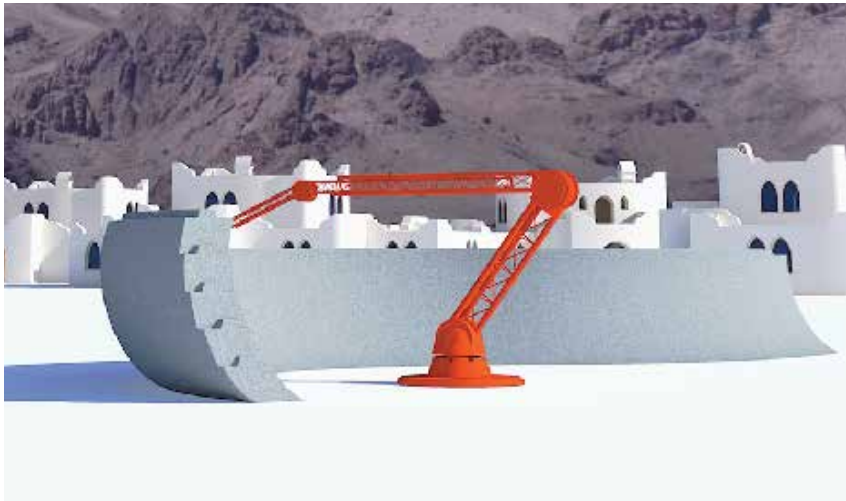
These methods can only produce rough finishes.

*1 Contour Crafting, *2 IITM, *3 Winsun, *4 WASP

Just a few of Armatron's 3D Construction Printing Advantages

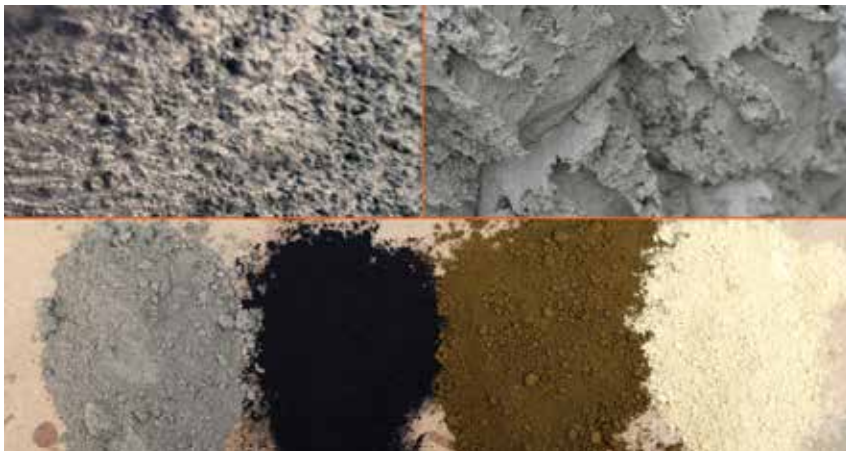
Each interlocking and externally reinforced 'long brick' layer becomes a structural member (box beam)

Optimizes the bonding interface and overcoming 'cold joint' and 'collapse / buckling' limitations



Able to print foundations and roofs onsite

Prints with a significantly wider variety of materials, ranging from simple indigenous clays to complex ultra high performance cementitious mixes (overcoming other companies' requirement for complex proprietary mixes)



Creates extremely strong, sustainable structures and offers significant design flexibility (not limited to straight walls) by extruding a wide variety of interlocking brick shapes, sizes and colors



Eliminates the need for fixed concrete forms and scaffolding
Compatible with virtually all conventional construction systems

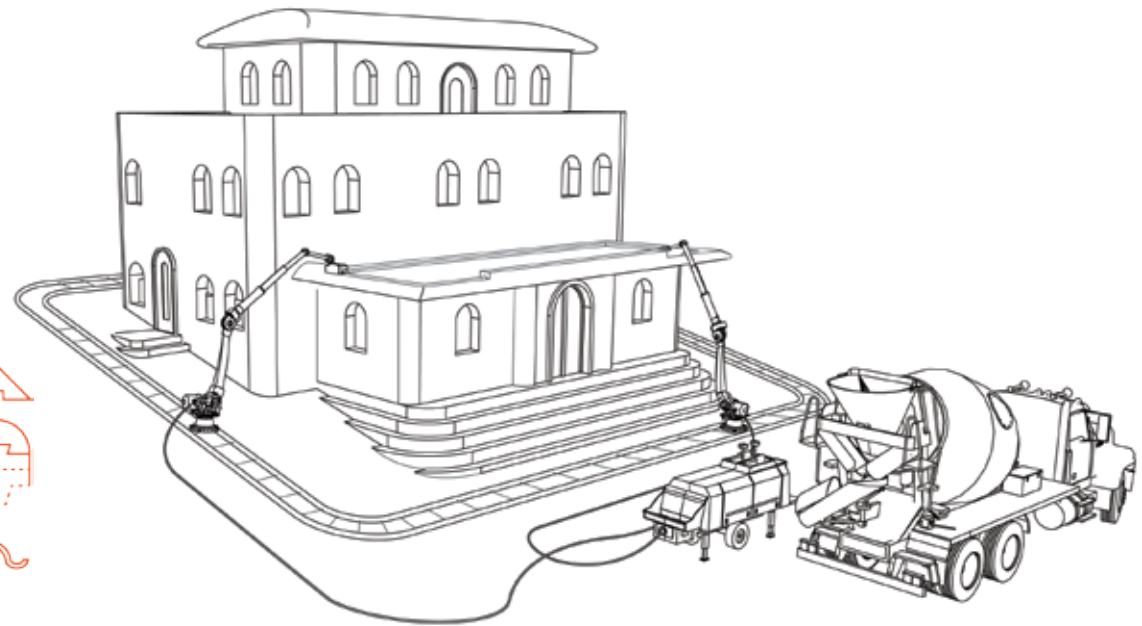
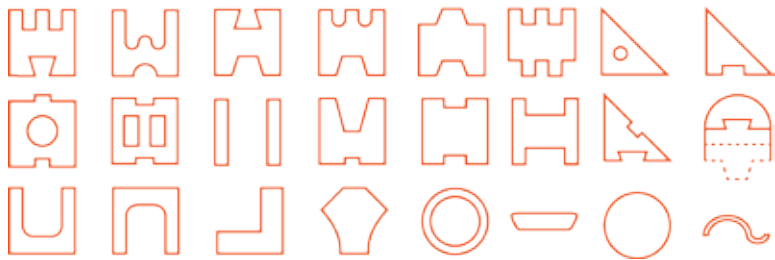


Multiple smaller and lighter systems can be deployed, simultaneously printing up to 60 ft per minute

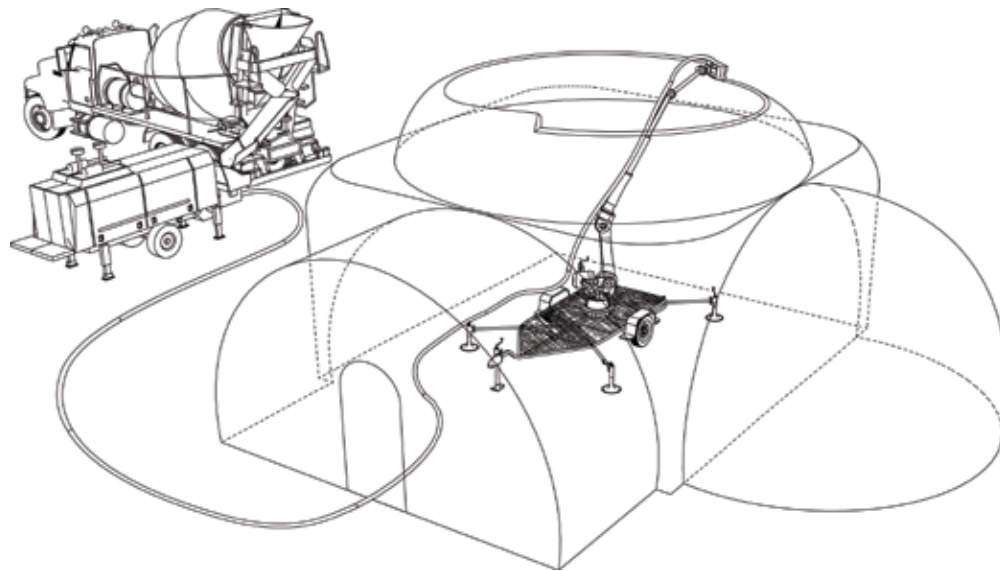
Adjustable casting rate, averaging about 60ft per minute (up to 3ft x 3ft 'long brick' size)

Provides keyway interlocking of each additive layer to the successive layer

Some of many possible brick samples:



Molds provide brick shapes having pre-existing receiving conduits (channels) for piping, plumbing, electrical, rebar reinforcement etc.



Overcomes 'pumping irregularity' challenge by tying motive power to pump output

Extrusion casting volume and placement increase of about 300 times or more than current 3DCP systems

Smaller and simpler robotic components compatible with existing software

Provides quick change of mixes

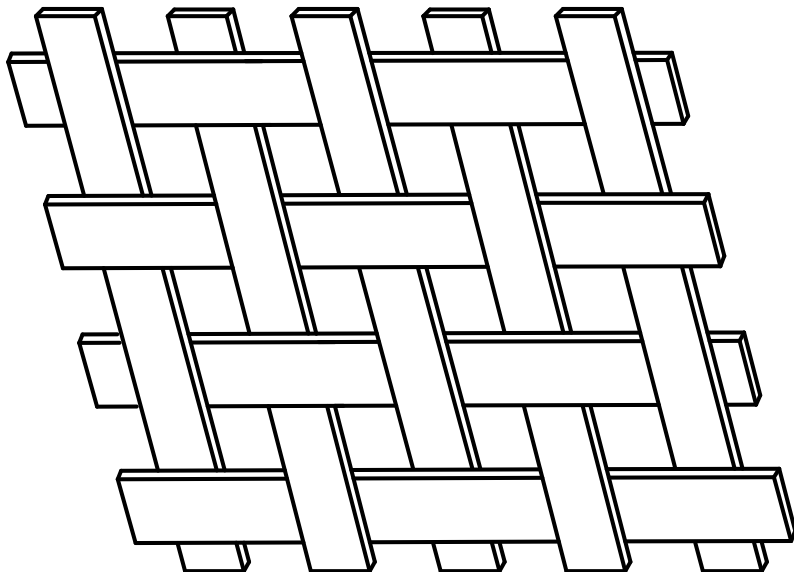
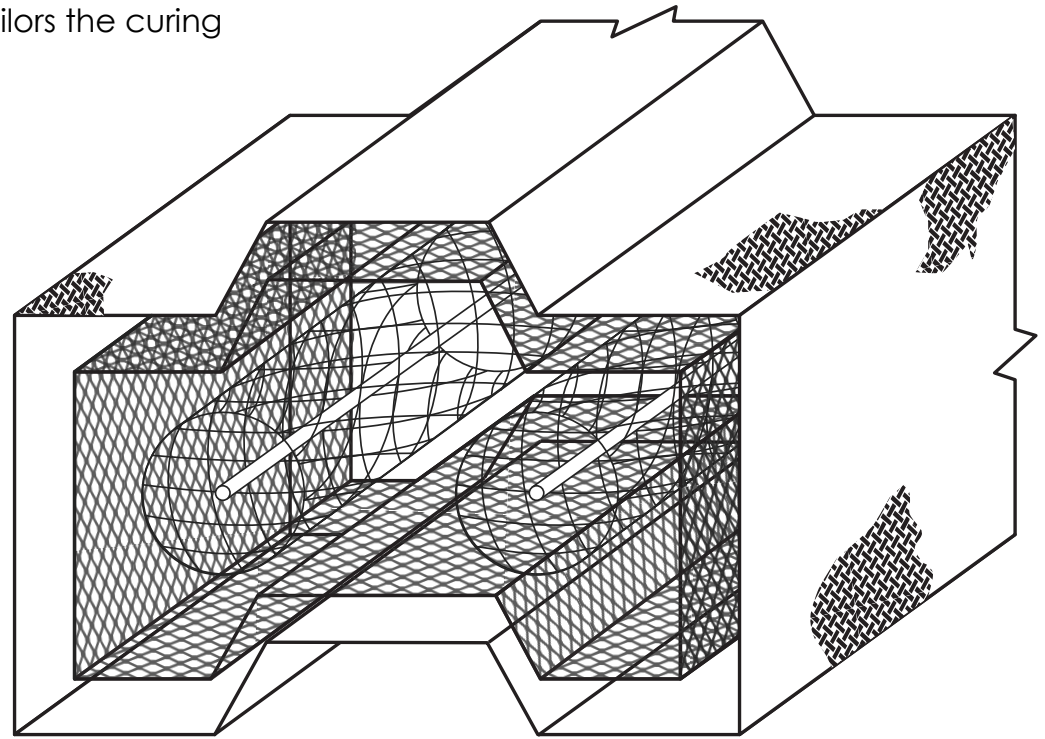
Rapid mobile deployment

Inventive externally reinforcing sleeve optimizes and tailors the curing environment to the specific cementitious mix

Allows for casting of multiple mixes simultaneously in a single pass

Strengthens the external surface of the printed brick layer

Can print in a wider range of temperatures and humidity ranges (including under water and in the rain)



Improved interlayer bonding adhesion is achieved by cementitious mix extruding through the pre defined apertures where the cement mix forms a mushroom shaped cap

Provides optional internal reinforcing net systems and or cables to be integrated in the precise stress zones

Venting aperture diameter, size and configuration is pre defined and to be tailored to the mix and or environment



Wide range of applications from constructing homes, schools, silos, retaining walls, sports facilities, water tanks, culverts, pools, wine cellars, stairs, underground structures, bunkers, Hyperloop components, smart cities, telephone poles, wind turbine platforms, floating platforms, supporting pedestals, architectural features, etc.



Ability to build on difficult lots

Prints a wide variety of interior and exterior finishes from simple to highly ornate (everyone else is drooling out of a round nozzle and looks like stacked toothpaste)

Simpler and faster onsite construction (may be operated by single operator)

Provides significantly improved wind, snow load and seismic (earthquake) resistance

Quickly and easily makes last minute construction changes onsite



Extensive patent application granted by the USPTO (over 100+ innovative concepts) 11/26/2019

Filed for patent protection in 100+ nations (key markets) worldwide

Received Notice of Allowance for Continuation in Part (separate patent with 30 priority claims) being granted in US

Have filed a separate and distinct patent application for new transitional construction technology (halfway between 3D Printing and conventional construction)

Continuing to develop and file significant intellectual property, innovating the field of 3DCP

As per the current need for standardized comparisons in this new and rapidly evolving industry, we are organizing, expanding and incrementally releasing a list of previously unavailable concepts and specifications so that industry professionals may make informed comparisons

Currently defining strategic alliances and partnerships with several multi national construction, robotics, and heavy machinery companies

In discussions for multiple large scale end user contracts globally, including governments

In process of prototype development in alignment with our business model and patent strategy

“It is as if it’s the early 80’s and we are confident we own the largest portion of “DOS” within 3D Construction Printing”



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Business Model

Licensing model to maintain quality control and efficient technology implementation (leasing tool; not selling)

Strategic partnerships (robotics, construction, software, heavy machinery)

Low income housing and emergency structures

International infrastructure development

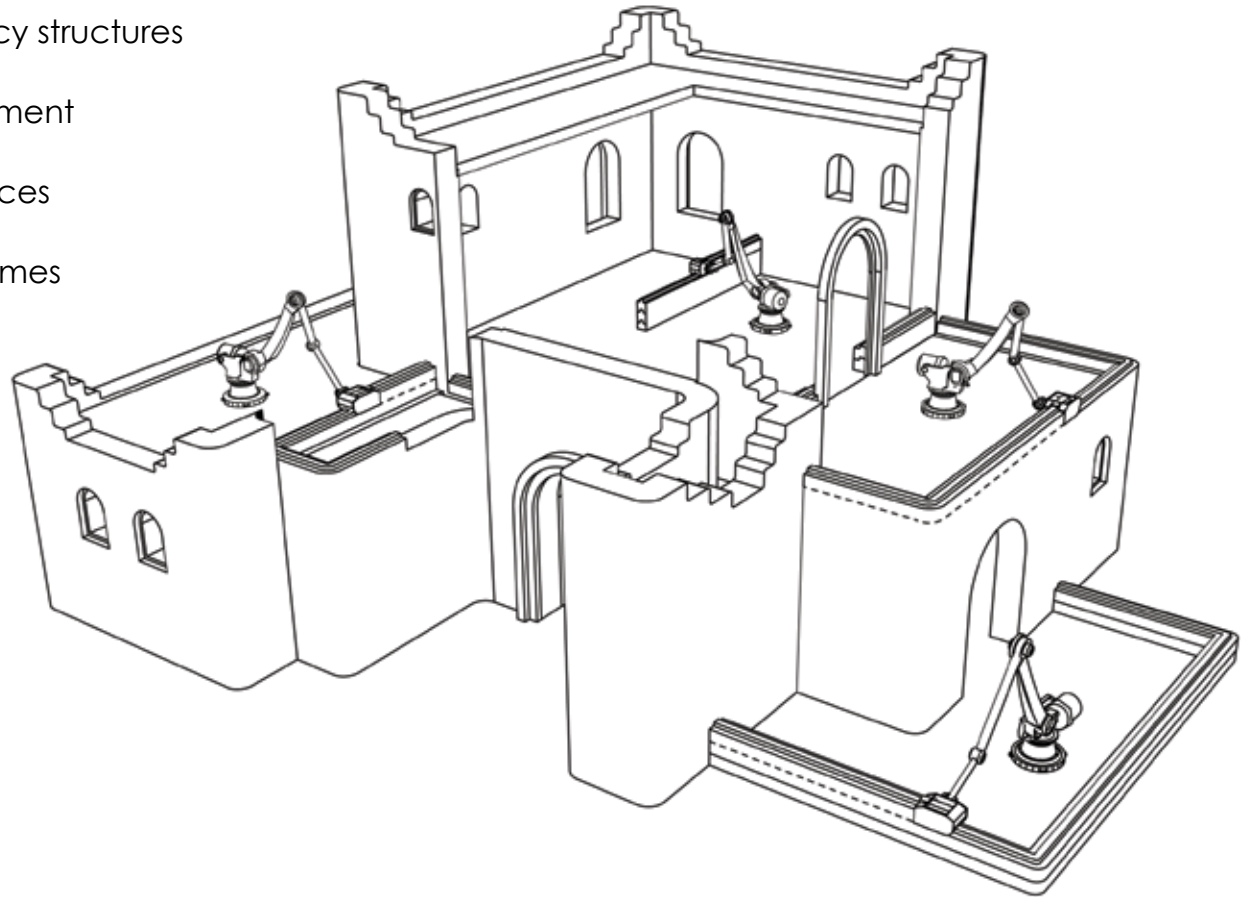
Offer design / build contractor services

Construction of unique high end homes

Near zero energy point commu-
nity design and construction

Government contracts

Armatron Systems' method
training and certification
program



Contact Us

 info@armatron.com

 [/armatronsystems](https://www.facebook.com/armatronsystems)

 +1 888 808 9688

 [armatronsystems](https://www.instagram.com/armatronsystems)