Disrupting The Manufacturing Industry: A Breakdown On Startup Driven Innovation

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As the manufacturing industry is moving to adopt new technologies it not only promotes increased productivity and efficiency – it also becomes a key driver for innovation and growth. With the global smart manufacturing market valuation predicted to grow to €445 billion (https://www.transparencymarketresearch.com/pressrelease/smart-manufacturing-market.htm) by 2024, the potential emerging technologies offer become evident. Artificial Intelligence (AI) for one, will soon grant data insight in real-time, supporting and instructing workers and robots in complex manufacturing processes. At StartUs Insights (http://insights.startus.cc/), we took a detailed look at startups working on advancing solutions and technologies in the manufacturing industry. Using a data-driven, evidence-based, approach of actual startup activity, we've analyzed 800+ young companies to identify innovation areas that transform manufacturing as we know it today.

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Robotics

Will this innovation area disrupt the industry?

Absolutely

Longshot

With the emergence of the Industry 4.0 and smart factories, robot-human interaction became prevalent in the manufacturing industry. So-called “co-bots” (or collaborative robot) assist the human workforce in repetitive tasks like packaging and palletizing, picking & placing, polishing, grinding, as well as the assembly process to improve efficiency and safety. Recent advancements in industrial co-bots elevate human-robot interaction to a coworker-like level. As technology develops further, robotics soon will be capable to accept and implement an operator’s control instructions and inform them about the current process status. Employing collaborative robotics in the manufacturing process decreases costs while improving quality and increasing productivity to allow the serial production of miniaturized products with high functional density.

Belarusian startup ROZUM Robotics (https://rozum.com/) develops the 6-axis high precision collaborative robot PULSE. The human-friendly robotic arm can perform a variety of operations in a factory or warehouse. PULSE can be operated through a laptop, smartphone, tablet or smartwatch – by a single person. As this co-bot operates wirelessly, it can be controlled independent of location, removing the necessity for human presence in the workspace.

Composite Materials

Will this innovation area disrupt the industry?

Absolutely

Longshot

Talking about composite materials, ceramic, glass, and carbon fibers are among the most advanced ones. Ceramic fibers are expected to have the highest rapid growth rate between 2022 to 2027 due to significant amounts of investment – predominantly in ceramic matrix composites (CMCs) but also in metal matrix composites (MMCs). Though glass fiber will not grow as rapidly, it already operates in high volumes specifically in the automotive and construction industry (https://magazine.startus.cc/disrupting-construction-industry-breakdown-startup-driven-innovation/). The widely discussed carbon fibers will enter new industries yet maintain a steady growth due to a decreased price. Multifunctional or smart composite materials will respectively find appliance in thermal and/or electrical conductivity, self-healing, adaptive response, energy harvesting & storage as well as embedded structural health monitoring. When moving into new applications, hybrid parts become increasingly important as pure composite materials often have limitations. Manufacturers can create hybrid composite materials through overmolding, joining, advanced coating as well as interlaminar layers & sandwich cores. Although MMCs are behind CMCs, both are an increasingly significant field as the applications vary from gas turbines and military rockets to high-performance insulation.

Swiss BIONTEC (http://www.biontec.ch/en/home) develops the Multi Parallel Technology® to produce a carbon fiber reinforced polymer (CFRP) with tailor-made mechanical properties. The company manages to manufacture monolithic structures as well as hollow parts and sandwich parts in one shot. Advantages of the in-house produced CFRP include a very high stiffness at a low weight, dimensional stability, vibration damping, x-ray transparency and a modern surface design “carbon look”. From HT or UHM carbon fiber to glass and aramid, machine-controlled processes ensure a high reproducibility and productivity.

Nano-Engineering

Will this innovation area disrupt the industry?

Absolutely

Longshot

Nanomaterials present unique chemical and physical properties and enable the enhancement of engineered materials. Currently, developments are made to improve these properties as well as to identify alternative precursors to create materials with desirable properties. Some of these entail increasing the life cycle of components and mechanical parts and including magnetic & increased optical properties to improve mechanical activity. Manufacturing processes that make use of nanotechnology reduce manufacturing time and cost while also solving the challenges of water and power storage.

Italian startup Nano-Tech (http://www.italnanotech.com/) develops a unique system for introducing nanoparticles into a fluid, obtaining consistent homogeneous dispersions. The patented process, called 3Dynamics, enables the company to design and produce advanced materials, such as low viscosity nano-engineered epoxy systems, heat resistant prepreg and high electrical conductivity thermoplastic polymers.

Additive Manufacturing

Will this innovation area disrupt the industry?

Absolutely

Longshot

First used for prototyping, additive manufacturing, or 3D Printing, is now finding its way into the production process. Printing layer by layer enables production companies to create objects in various shapes as well as objects that consist of multiple parts. Particularly effective in printing multi-material parts or parts with irregular voids and holes, additive manufacturing speeds up the development of the end product and the replacement of individual parts as it contributes to downsizing the production chain. Advancements in 3D Printing are progressing at a fast pace and it will soon be possible for large components or machines to be entirely 3D printed as well as using 3D printing for mass manufacturing and replacing traditional CNC machines.

Rize 3D (http://www.rize3d.com/) developed the first inclusive 3D printer, Rize One, enabling their customers to sustainably deliver a vast range of custom and replacement manufacturing parts with high isotropic strength. Achieving “additive at scale”, the startup’s printer is used for prototyping, tooling fixtures & jigs manufacturing and the production of end-use parts.

The Industrial Internet of Things (IIoT)

Will this innovation area disrupt the industry?

Absolutely

Longshot

Through the increasing prevalence IIoT is experiencing in the industry, manufacturers are faced with a technology that promises greater efficiency and productivity than ever before – two benefits they can hardly ignore. The Industrial Internet of Things is transforming traditional factories through streamlining processes and maximizing production yields. Advanced sensor technology, PLC automation, the integration of manufacturing execution systems as well as asset performance management are only a few of the advantages manufacturers can now benefit from. Taking it further, IIoT acts as an enabler for artificial intelligence (AI) and predictive analytics, creating valuable insights into production management among others.

Ubidots (https://ubidots.com/) develops an IoT platform to enable the communication and data-sharing of smart factories with engineers in real-time. The startup makes it easy to connect hardware and/or digital data-services to Ubidots' device agnostic cloud – predicting equipment failures, sending mobile alerts about production and quality failures, and encouraging operators to keep pace with dashboard display. Overall, the company supports asset monitoring, maintenance, automation, energy management, and supply chain optimization.

Simulation Tools

Will this innovation area disrupt the industry?

Absolutely

Longshot

Simulation software, specifically motion simulation and animation/virtual prototyping have been described as "the most cutting-edge tools for the future of mechanical engineering (https://www.asme.org/getmedia/752441b6-d335-4d93-9722-de8dc47321de/state-of-mechanical-engineering-today-and-beyond.aspx)". These tools enable engineers to test various iterations of a prototype before moving to physical manufacturing. Using torque data simulation tools empowers engineers to predict the behavior of a system before the actual machine is built – speeding up the process and avoiding expensive failures. Overall, the advantages of simulation tools culminate in a cost-effective way to ensure better product performance design satisfaction of the product.

One startup working on leveraging simulation tools for the mechanical engineering industry is Simularge (https://www.simularge.com/). The Turkish startup develops a collaborative platform and 3D Computation Tools enabling engineers to predict the strength and quality of machine parts or systems prior to their production. Their tools facilitate the virtual testing of machine parts in an economical, fast and collaborative way to painlessly meet desired specifications.

Artificial Intelligence (AI)

Will this innovation area disrupt the industry?

Absolutely

Longshot

AI has rapidly found its way into many industries and mechanical engineering is no exception. Used in a number of areas, diagnosis proves to be one of the promising application areas. Through adding new data, artificial intelligence continuously improves diagnostics in order to ward off engineering failures while improving the overall quality of products.

Used by DecisionIQ (http://www.decisioniq.com/), AI not only monitors the health of plants but also predicts the "when, where and why" of disruptive equipment anomalies and failures (diagnosis). The AI platform, called Genesis AI, incorporates machine learning and a prescriptive maintenance engine to solve the pain point of how to react ("what to do") to a failure by recommending the cost-optimal repair planning.

> StartUs Insights provides data-driven intelligence on startup driven innovation & technology.

While all of these technologies make their mark in the manufacturing industry, they are far from being the only ones. Automation, optimization, cloudification, and biomechanics will further advance the industry and pose immense opportunities. For manufacturing companies, the collaboration with cutting-edge startups presents an additional chance to intensify their innovation efforts as well as to gain a competitive advantage. This Breakdown on Startup Driven Innovation is only a fraction of what we have found during our research. Interested in learning what's next? Leave your email below.

Find out what's next for the manufacturing industry!

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