



Taking Back Manufacturing to Canada with INDUSTRY 4.0

How Canada's economy with currently an ailing resource sector with a diminished manufacturing base will stack up in this future of more nationalistic and shorter, but hopefully more sustainable supply chains, will depend on political will to drive a directive to "make much more of what we consume".

We will have to embrace effective industrial policies, new and yet to be finalized trade agreements, maintain a stable currency, reduce legislative and regulatory overhead, re-develop a social focus on manufacturing artisanship and industrial learning systems, and drastically improve many other national competitive factors to Take Back Manufacturing.

Continuous Improvement mindset needed....

Our Industry leaders must first ensure their management teams are ready for action to improve our local plants with a reinstalled mindset for Continuous Improvement and LEAN thinking, which many experts agree has been dissipated due to the many years of the distractions of an offshoring focus on cheap labor and long supply chains.

Disruptive technologies The new imperative....



An important and emerging competitive factor will be staying up with the leaders on the next industrial revolution ...INDUSTRY 4.0

This will introduce so called Disruptive technologies and cyber physical automation solutions into our future factories.

Future products that could return for local manufacturing will not be the products that were off-shored, they will have new technology in both the products and the manufacturing process, and will demand new facilities, capital, knowledge, skills and getting on board what is now deemed INDUSTRY 4.0 ...the next industrial revolution!

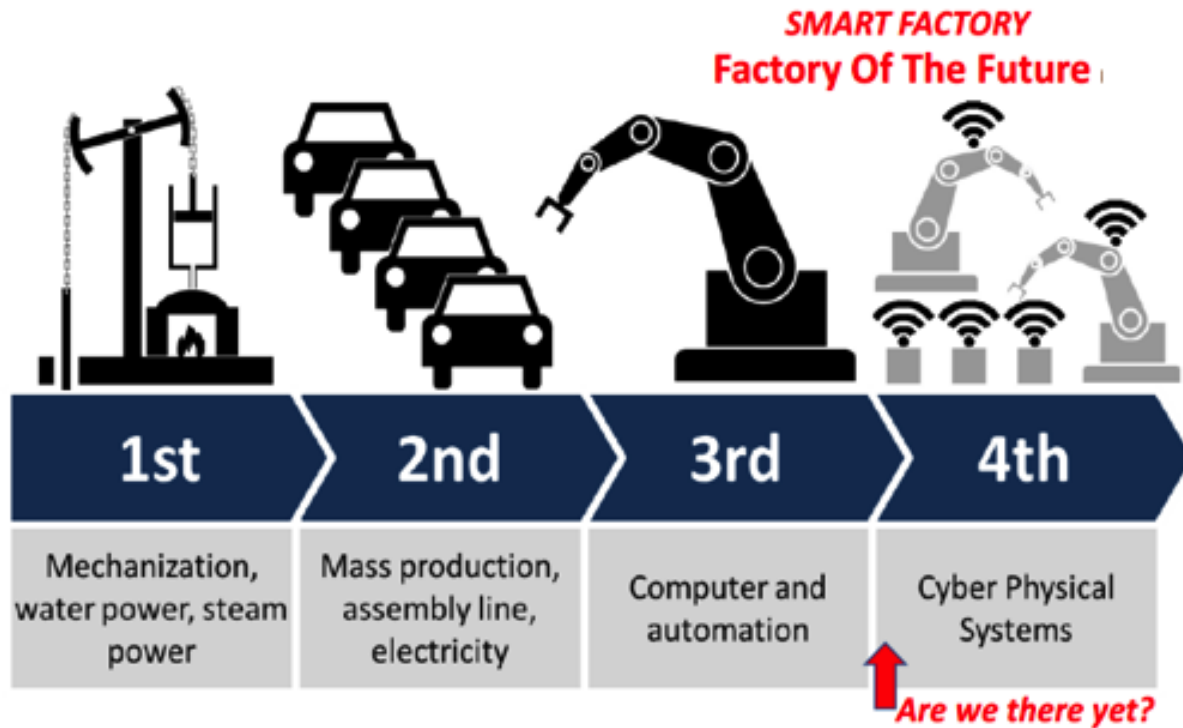
Industry 4.0 is now facilitating what some are calling the Age of Technological Disruption. This is being driven by the emergence of new advanced technologies generating new forms of innovation and industrial disruption.



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Industry 4.0...The Next Industrial Revolution/Opportunity



Many new industrial technology development organizations are emerging in Canada to provide such solutions which with early adoption may provide an opportunity to change our competitive game and level the global playing field. But, much more needs to be done to support the development of these technologies and educate the industries on how they may be applied.

Here are some of these disruptive technologies and how they will impact the future....

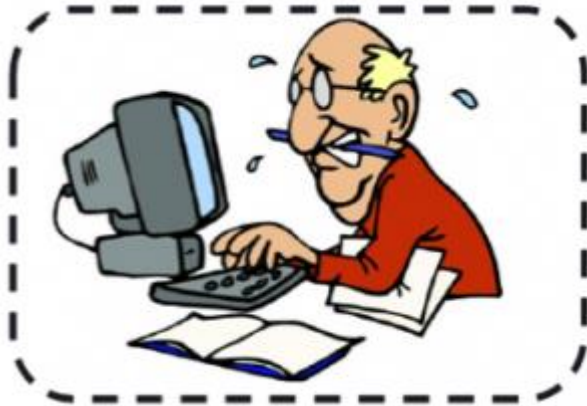
Cyber-physical systems will lead the 4th Industrial Revolution...

In the last, the 3rd industrial revolution (from 1970 until now) we have added significant computerization to our manufacturing and business processes.



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But we have many environments in industry where we as humans are trapped in the process working for the computer, not computers working for the process and benefiting us.

This has so far made us slaves to the computer.

An example is how Enterprise Resource Planning systems still struggle via multiple transactions (some of them semi manual or

manual) to keep a firm real time grip on a dynamic manufacturing process.

INDUSTRY 4.0 we will employ Cyber-Physical Systems that will eliminate the human interface with sensors and smarter systems... so we then will have the “Computers working for us NOT us for the computers” So, these Cyber-Physical Systems will eliminate the burden of managing computers by humans and allow direct linkage between the computers and the process.

Cyber-physical systems using “SMART” Sensor Technology, IIOT networks, and advanced wireless position and transaction system technology will enable not only the advancement of Robotics” and autonomous guided vehicles, but allow us to place computers much more seamlessly into our processes so we can eliminate transactional waste and solve some of the major interface issues between computers and process management. This will also allow us to redeploy human skills much more toward improving our processes and even further evolve how we do business, and how to better satisfy our customers.

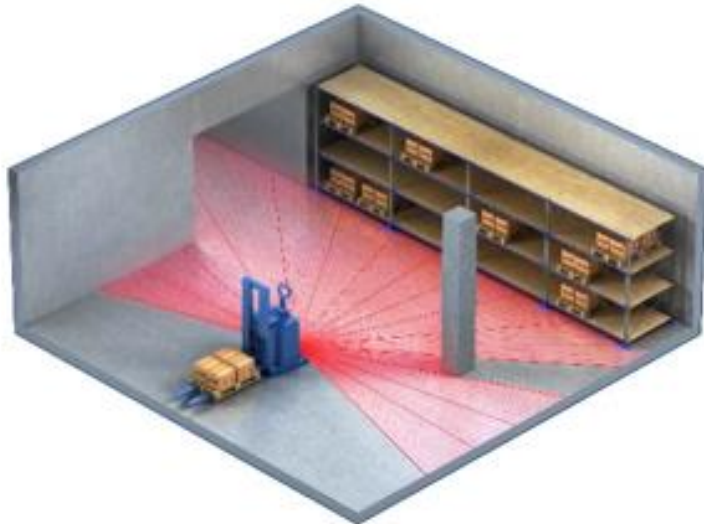
Advanced Robotics means linking traditional computerized machine and automation technology with smart sensor systems and we are witnessing this technology growth as defined by the upturn in the shipments of industrial robots of all types.

These smart sensor systems are being described as “Cyber Physical Systems” because they place the computer power even more in control of the process without human intervention and solve some of the major interface issues between computers and process management. These systems using networking technologies, sensors and using connected computing devices with integrated analytics has tremendous possibilities of effectively and cost efficiently managing a broad scope of physical assets, such as buildings, vehicles, machinery, equipment, and inventory.



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Following these dreams of autonomously self-guiding vehicles and processes that use sensors and wireless positioning systems to eliminate transactions will allow factory designers to take the whole business process to the next level...

Artificial intelligence and Big Data....

Computer technology in the last few years has taken a huge leap forward in terms of computing power measured in operations per second and operate upon enough massive multiple algorithms much faster than human thought with almost the same level of complex logic and decision capability. This will generate enough information density and complex algorithm management to become a form of artificial intelligence.

These AI systems can then operate upon massive multiple algorithms and data much faster than human thought, with almost the same level of complex logic and decision capability.

This improved computing power will also enable computing systems to handle what some are calling “Big Data” such that everything we want to know about a subject or event can be stored as a complete body of knowledge and used at will.

The Industrial Internet of Things.

Although the technical term is “connectivity” the public is embracing the Internet of Things and its industrial version the Industrial Internet of Things (IIoT)

This is suggesting that devices and therefore the knowledge they carry will be “connected” more than ever before...

Again, it is about information and knowledge at the point of use in real time...



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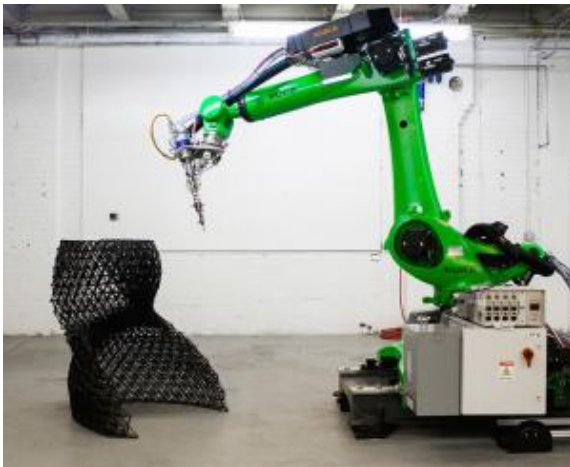
Move ideas not materials....

The other disruptor is the “globalization of Ideas” via collaborative and connected platforms that allow remote interaction and is breeding a cloud based mentality and hopefully constructive crowd sharing of resources/skills/knowledge and funds in a very interactive manner.

The control of Intellectual Property may become an issue, but in principal the globalization of ideas is far more sustainable than the globalization of manufacturing and materials.

Additive Technology needs more emphasis....

Much has been said about 3D printing/Additive technology, and the industrial applications are profound in terms of how they can change products and business process.



We now have this technology available in both a wide range of plastics and metals, but we need a stronger emphasis on designing products for this technology to enable access to the advantages. This must include integrating new design thinking across the whole product life cycle to undertake new and improved 3D Printed Rapid prototyping and early production and adopting 3D printed hi performance production tooling strategies to re-life traditional industries and breed new industries.

Many of us now visualize a strategy to operate a 3D print electronic warehouse so we can build 3D printed parts on demand in small quantities at both product early life and end of life and eliminate inventory burden and improve flexibility to customers.

New printable materials in composites and food materials as well as bone and organ building blocks will take this technology into many sectors that will touch the population far more directly and at the point of use than traditional manufacturing. It will aid the thought process of manufacturing being more effective when it is local to the customer.



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The next industrial revolution is on the way...

These technological disruptors have now come together to form the next industrial revolution INDUSTRY 4.0

This allows the “smart factory” concept to be conceived and start us on a journey toward a new factory of the future using these Disruptive technologies that will be a combination of these technologies.

These technological disruptors are now leveling the manufacturing playing field between so called low cost labor countries and mature or developed countries as technology has significantly reduced the labor cost differentiation. When the labor component is removed through INDUSTRY 4.0 any advantage of low cost labor is far less important.

The future differentiator and most important value proposition in manufacturing will be how well it can service the demand of the local customer in the most sustainable LEAN and GREEN manner utilizing short supply chains.

Much discussion is now under way that predicts that manufacturing certainly when re-capitalized will be geographically closer to the customer with much shorter supply chains and may also be organized into industrial clusters within a certain trade bloc.

Are we there yet?

For some of us this has been a long journey from the start of INDUSTRY 3.0 when we first started to use computers in manufacturing in the mid-1960s.

For most of us it will still be ... are we there yet?

We have a few leaders in the Canadian Industrial community that are worth a mention and watch.as we develop our factories of the future....

Peytec Inc at www.peytec.com has developed a range of Cyber Physical readers and smart tags that can accurately manage position and analytics through a wide range of integrated sensors that will eliminate the need for operating transactions in all forms,

MEMEX at www.memex.ca offers a sophisticated work-cell data management system that provides a complete computerized solution for monitoring and improving work-cell OEE (Overall Equipment Effectiveness)

Westburne Electric www.westburne.ca has assembled a complete partner team of IIOT/Cyber Physical experts and will be offering an Industry 4.0 readiness survey to its manufacturing clients to support the journey to the factory of the future.



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INDUSTRY 4.0 provides a window of opportunity to take back the future for our manufacturing sectors and our economy.....

A recent industrial study indicates that 70% of business leaders in North America are looking at how to embrace the INDUSTRY 4.0 environment and are revisiting both Continuous Improvement (CI) and *Disruptive Technologies* as strategic differentiators.

The goal is to further improve operating processes and better harmonize future products and processes to achieve more integrated, waste free and sustainable products, processes, and services to meet customer expectations.

The application of INDUSTRY 4.0 and these disruptive technologies has a global current market size specific to the manufacturing industry of about \$3.9 Trillion and is rapidly growing with investments predicted to exceed \$60 trillion during the next 15 years.

Advanced Manufacturing has been a continuum but the integration of these new disruptive technologies under the banner of INDUSTRY 4.0 constitutes a near perfect storm to change the face of business industry and manufacturing into the next decade.

But..... it is a case of start disrupting.... or be disrupted!

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