MANUFACTURING FOR GENERATION ME

ADVANCED DIGITAL RADIO TECHNOLOGY CONNECTS FACTORIES TO MASS CUSTOMIZATION AND LIMITLESS POSSIBILITIES IN AN IIOT-ENABLED FUTURE

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THE POWER OF ONE

There's a Nike store in New York City where you can walk in, design your own pair of shoes and walk out wearing them within an hour[1]. In Singapore, you can drop in at any of about two dozen OWNDAYS Japanese optical chain stores and make-to-order a pair of eye glasses in under 20 minutes. In Hong Kong, Jakarta, New Delhi and the rest of its over 2,000 Zara fashion stores around the world, brand owner Inditex has been using shoppers' purchase decisions and buying fancies to drive the production of affordable, high-street fashion from concept to retail floor, in under 20 days[2]. In automotive manufacturing, Mercedes Benz is taking Henry Ford's dream of customized automobiles production to the very edge with Virtual Manufacturing, which involves digital simulation of a product for acceptance testing and issue resolution before productions begin. Soon, even medicine will be customized to DNA profiles, revolutionizing the way diseases are treated.

As established brands in the standardized products arenas struggle with decreased brand loyalty, far-sighted brand leaders are stepping up capabilities and technologies to manufacture faster, cheaper and with more market precision than ever.

"Whether you call it "Smart Manufacturing",the "Intelligent Factory" or the "Factory of the Future", the manufacturing process of tomorrow will be organized completely differently than they are today. And the key will be the communication technologies that connect them all. [4]"

MORE THAN **50%**[3] — CONSUMERS INTERESTED IN PURCHASING CUSTOMIZED PRODUCTS AND SERVICES.

The ubiquity of social networks and personal digital devices have paved the way for a new breed of consumers who are increasingly dictating the buyer-seller relationship, becoming what The Deloitte Consumer Review describes as 'both critic and creator.'

On the manufacturers' side, the transformation is well on its way. But many are still in the early stages of realizing the limitless potential of IIoT not only in reducing costs and enhancing control of factory processes, but also in positioning the business for greater resiliency, sustainable growth and innovation.

New data-enabled processes throughout the production chain, new ways of working with suppliers, new products and business models, even new ways to build the perfect factory — the possibilities are endless and all backed by a technology that enables people, things and machines to connect.

THE AGE OF ORDER-FOR-ONE

In the digitized environment of the smart factory, machines, devices and equipment work autonomously and alongside humans in a highly connected way. This system of virtual and actual machines and systems enables precision in the individualization of production with great speed and dexterity — and in high volume. Robust IIoT platforms connect the entire smart manufacturing production chain — from suppliers to logistics, and across the enterprise level — enabling seamless information-sharing and optimal decision-making.

At the heart of it all is communications —

machine to machine, people to systems, control centre to factory floor, across factories, spanning countries and bridging global markets.

At Motorola Solutions, we believe advanced communications solutions endow intelligent factories with great capabilities — from knowing what each customer wants to putting together the resources and processes — to meet and exceed the demands and expectations of Generation Me consumers.

CUSTOMIZING FOR CUSTOMIZERS

The ability to tailor product in high volume is also now becoming more routine in the B2B arena. Tadcaster-based machinery manufacturer Lambert Engineering is blazing new trails making products for the healthcare sector. "For one application, we have developed a new feed system that works in a completely different way, using robotics and visioning systems," says Sales Director Matthew Cox, Lambert Engineering.

This revolutionary feeder can 'see' parts of different colours, patterns and sizes, distinguishing and processing them one at a time.

Cox adds, "The machine is linked to the factory via a wireless system into MES (the manufacturing execution system) so it 'knows' what it needs to make and tells the factory what it actually has made, so everything is connected and far more efficient. [5]"

BUSINESSES MUST DEVELOP CAPABILITIES TO KNOW WHAT EACH CUSTOMER WANTS AND PUT TOGETHER THE RESOURCES AND PROCESSES TO DELIVER IT.

1. BRIDGE THE DIGITAL DIVIDE

Whether it's a global network of warehouses or a collection of local plants, reliable communications throughout the entire production footprint is critical. In the smart manufacturing environment, it becomes the very bloodline for business growth and sustainability. And it all begins with real-time flow of information, ideas and decisions, teams connecting clearly and without interruption wherever they are located, however noisy their environment. Today's manufacturing leaders are still putting their dollar on the dependable two-way radio, and it has evolved.

The latest generation digital radio systems now offers manufacturers the cutting-edge of evolving team communications. In addition to the power of instant push-to-talk (PTT) radio communications, these digital gems now converge the best features of smartphones, with data connectivity bringing text messaging, Bluetooth® connectivity, GPS awareness, and Wi-Fi® to the frontline.

With mission-critical Land Mobile Radio (LMR) voice systems transitioning from analog to digital, Machine-to-Machine (M2M) and other IIoT applications can now be supported. The latest digital technologies make it possible for these LMR systems to expand channel capacity to cater for advanced data services such as M2M applications. These new digital mission-critical LMR systems can now support both voice and data services on a highly reliable network.

"Falling prices and the near ubiquitous availability of wireless communications are paving the way for new machine-to-machine adoption choices in the areas of plant floor production, logistics and field maintenance, elevating the transformational technology to new heights. [6]"

With the ability to harness plant systems and IIoT platforms via their digital radio networks, manufacturers can realize the limitless possibilities that are unlocked when they connect equipment, infrastructure, and people and leverage those connections across secure, reliable and expandable networks.

DIGITAL RADIOS: LEADING THE CHANGE

HANDHELD TWO-WAY RADIOS CONTINUE TO BE THE PRIMARY TOOL OF CHOICE FOR TODAY'S MANUFACTURERS WITH RISING NUMBERS USING THEM, AND MORE MAKING PLANS TO SWITCH FROM ANALOG TO DIGITAL [7].

- **13%** increase in manufacturers using two-way radios
- **50%** currently using digital radios or mix of digital and analog
- **1/3** plan to switch to digital within 2 years

TOP 7 BUSINESS BENEFITS OF DIGITAL 2-WAY RADIOS

- RESOLVE EMERGENCIES QUICKLY
- BOOST EFFICIENCY
- SPEED DECISION-MAKING WITH REAL-TIME DATA
- ENHANCE WORKER SAFETY
- REDUCE DOWNTIME
- INCREASE PROFITABILITY
- AUTOMATE LABOR-INTENSIVE PROCESSES

2. SIMPLIFY THE COMPLEXITIES

In the manufacturing workplace, personnel use different devices on different networks. In their day-to-day priorities, from preventing and resolving issues to optimizing workflow and safety, they collaborate with each other using multiple devices from two-way radios to telephones and even pagers.

This gives rise to two top challenges identified by manufacturers today: the complexities of connecting workers anywhere on any device, and incompatibility issues with the use of data applications on legacy devices.

What if there is a single platform that can support diverse applications, a single radio system that eliminates the need for carrying multiple devices, and a single source of data for smarter decision-making?

"Achieving the transformative potential of manufacturing solutions … requires information systems that are *open, interoperable and user-friendly,*" according to McKinsey and Co. "Successful implementation of digital-manufacturing solutions entails *fluid digital communications across the value chain* — this continuous flow of data is the digital thread. [8]"

Leading-edge team communications solutions such as Motorola Solutions WAVE™ Work Group Communications are making more possible. Taking instant PTT beyond the boundaries of radio, WAVE is enabling plant managers, production supervisors, engineering workers and other employees on smart devices to stay connected to the radio system without the need to carry multiple devices. Employees, suppliers and collaborators throughout the production and supply chain can immediately share business-critical information from applications and IIoT.

When people can communicate clearly, they can work safely and efficiently.

Motorola Solutions' IP-based networks also make it easy to converge any number of systems, devices and apps into a unified infrastructure, making it viable for legacy systems to be integrated with new technologies and services.

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3. CONNECT WITH INTELLIGENCE

AN INTELLIGENT AND CONNECTED OPERATION TRACKS ITS ASSETS, PEOPLE, AND PRODUCTION CHAIN, PREDICTS OUTCOMES, REDUCES WASTAGE, OPTIMIZES SAFETY AND EFFICIENCIES, AND ENHANCES PROFITABILITY IN A DYNAMIC MARKETPLACE OF FAST-CHANGING TRENDS AND DEMANDING CONSUMERS.

Digital Prototyping makes it possible for manufacturers to virtually create a product so as to test and predict its quality before an actual version is produced using real-time simulations based on predictive engineering analytics. This highly efficient design and production process shaves a lot from what is currently the most expensive and time-consuming step in production – prototyping. Creating a digital twin also gives manufacturers the ability to derive the optimum configuration for a product, in short, produce the perfect product. The value of such a proposition is already acknowledged by many. In fact, manufacturers in a McKinsey survey rank the 'design-make' link in the production chain as among the highest value impact of digitization[9].

By integrating with other technologies like 3D Printing, manufacturers can quickly design, print physical models and modify designs to perfection, speeding the development process, shortening time to market, and enhancing launch success rates.

Digital Prototyping is just one of the many benefits that digitization brings. Taken a step up, Digital Prototyping has evolved to give manufacturers the ability to not just virtually design and test products and machines but also manufacturing processes and production systems. Through Virtual Manufacturing, businesses can now optimize the entire manufacturing facility to meet varying objectives, including cost and quality control, cycle time and product variation runs to respond to the increasingly demanding and personalized market.

Powered by IIoT-enabled technologies, such as virtual reality, high-speed networking, rapid prototyping, and performance-driven 3D modeling applications and simulation interfaces, Virtual Manufacturing has expanded its reach to almost the entire production cycle, from prototyping to design, materials planning, operations and workplace safety[10].

By collecting data from various nodes in the production chain, IIoT enables a unified view of the entire manufacturing process giving businesses the invaluable the advantage of intelligence to activate the best suppliers, production timeline, raw materials, quantities and costs at optimized profitability and customer satisfaction.

SMART MANUFACTURING

82% OF MANUFACTURERS WHO HAVE IMPLEMENTED "SMART" MANUFACTURING TECHNOLOGIES HAVE SEEN AN INCREASE IN EFFICIENCY:

- **49%** reported fewer product defects
- **45%** reported increased customer satisfaction[11]

Sensors, video, RFID, precise location data, and analytics technologies give plant control centers 360° visibility of the entire production process for maximum management control and foresight, and optimum management of resources, manpower and workplace safety.

The use of remote terminal units (RTUs) can notch up the speed and accuracy of operations by securely automating remote factory processes. Control can be further expanded by integrating the RTUs with the two-way radio system or a combination of almost any other network for all encompassing data communications.

'Events' captured in real-time are translated into data that can be used to act, mobilize and transform the entire operations at plant level and enterprise-wide.

By leveraging IIoT communications technology such as SCADA/M2M, manufacturers can achieve heightened levels of visibility for proactive decision-making in areas such as quality control, raw materials inventory, machine breakdowns and more. M2M communication devices also help manufacturers maintain a robust and reliable IIoT network that makes strategies such as mass customization attainable, cost-effective and sustainable.

4. DON'T JUST OPTIMIZE. TRANSFORM.

> **Embrace and master transformation, and accelerate your journey because there's not much time.** [12]
>
> — **NIGEL UPTON, GENERAL MANAGER (IIOT & GLOBAL CONNECTIVITY PLATFORM), HEWLETT PACKARD ENTERPRISE**

At a Mercedes-Benz smart factory, products, machines and processes come together in an Industry 4.0 connected environment to achieve several specific automotive manufacturing goals. The world leading auto maker has now taken its digital transformation to a new level with full visibility of all its global smart factories right down to the sensor level. Plants can now not only assist each other across geographies, but also access control over each other's assets such as to reprogram a robot.

SPEED IS THE NEW SCALE

In the long run, IIoT makes it possible for plant upgrades to be executed in unison rather than one after the other. The Project team works faster with the advantage of being in one place to get everything done.

IP-based networks, such as Motorola Solutions' networks, enable the convergence of any number of systems, devices and apps into a unified infrastructure, making it viable for legacy systems to be integrated with new technologies and services.

Beyond optimization, IIoT technologies are ultimately about business transformation. How can you turn the data gathered into intelligence to improve R&D, design, marketing, sales, and find new ways to work with suppliers or even design the ideal plant of the future?

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USE INTELLIGENCE WISELY

While business intelligence, from real-time and historical data, helps you run your business better, it is analytics that transforms your business. In addition to data-mining, analytics uses predictive modeling and other technologies to help you explore new avenues of growth, accelerate improvements and seize upcoming opportunities.

IIoT technology helps makes sense of complex and valuable data by giving manufacturers access to five powerful types of analytics.

WHAT IS IT?	HOW IT WORKS?	KEY BENEFITS
DESCRIPTIVE	SEE THE NOW SO YOU CAN ACT SMARTER AND FASTER	MAXIMIZE UPTIME, MINIMIZE EXPENSES AND MANAGE PROBLEMS IN REAL-TIME
DIAGNOSTIC	DETERMINE IF AN ALERT IS VALID OR LEARN THE CAUSE OF FAULTS, PROBLEMS OR FAILURES	FASTER TIME-TO-MARKET, SHORTER INNOVATION CYCLE, REDUCE COST OF TESTING
PREDICTIVE	KNOW WHEN SOMETHING IS LIKELY TO HAPPEN, POSTIVE OR NEGATIVE	REDUCE DOWNTIME, ENHANCE LAUNCH SUCCESS, REDUCE DELAYS, INCREASE FLEXIBILITY IN PRODUCTION VOLUME
PRESCRIPTIVE	GET THE BEST RECOMMENDATION FOR YOUR NEXT COURSE OF ACTION	REDUCE COMPLEXITY, ENHANCE DECISION-MAKING BY NON-TECHNICAL PERSONNEL
AUTOMATION	ENABLE MACHINES TO MAKE DECISION AND TAKE ACTION AUTONOMOUSLY	REASSIGN PEOPLE TO HIGH VALUE ACTIVITIES

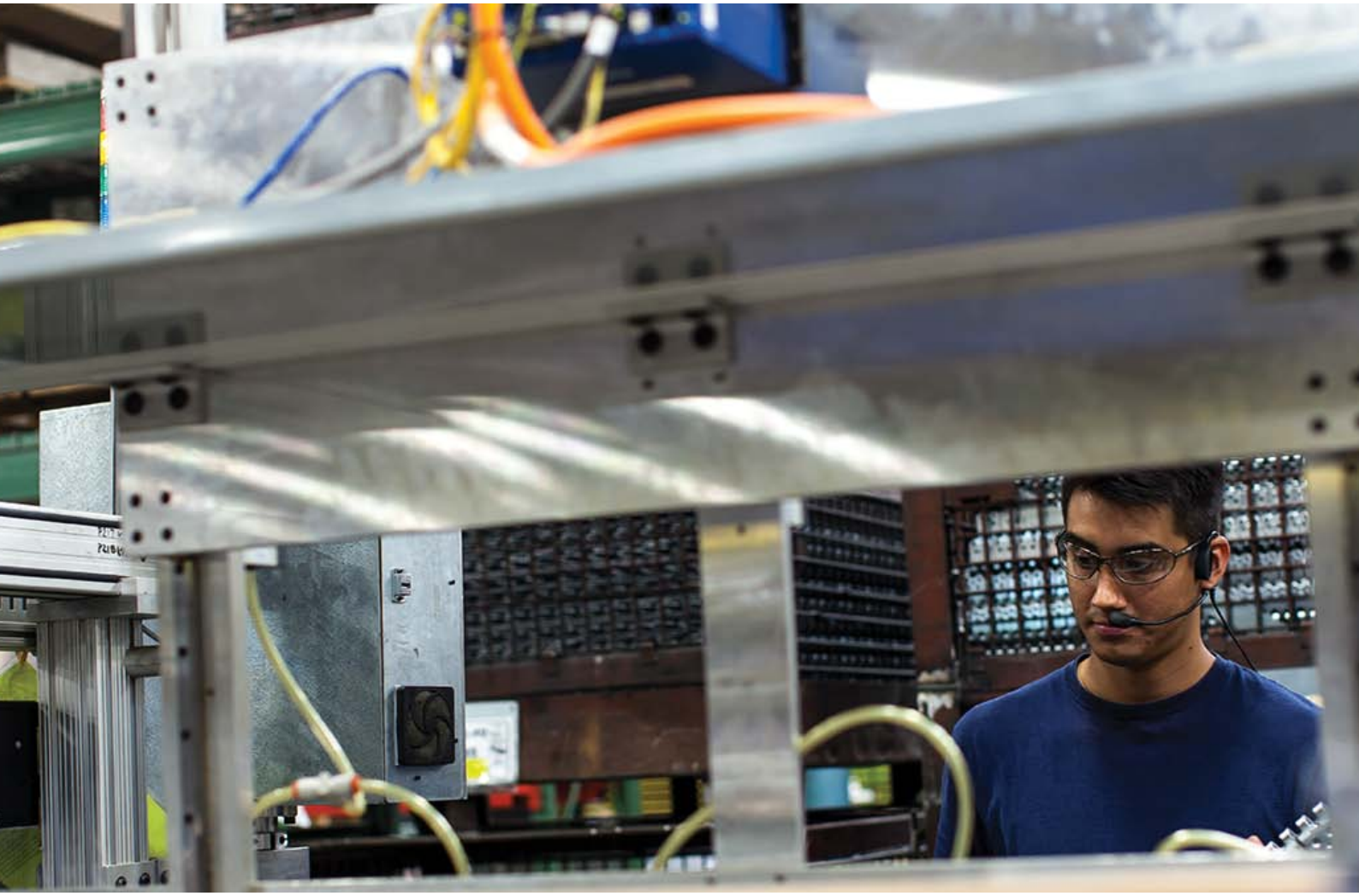
Combining the best-of-breed two-way radio and broadband technologies with a hybrid work group communications solutions, Asia's manufacturing forerunners are accelerating the transformation of their factories into highly digitized production environment.

The ultimate goal is to achieve end-to-end digital operations – from concept to design, to prototyping, manufacturing, assembly, testing and final delivery to customer — enabling lean productions, flexible and fast turnaround, and innovation leadership to meet the demands of today's Generation Me marketplace.

The time is ripe. Whether you are just embarking on your digital journey or deepening your digital roots, the key to a swift, smooth and efficient passage could be in your existing communications system. No complete overhauls and massive upheavals required.

Advanced communications technologies can open new doors to full digitization of your factories today and in the future.

> **Customer centricity is key for companies to survive in today's competitive markets.** [13]
>
> — **PWC**



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