

Considerations for the Complete Product Life Cycle:

From Proof of Principle to Full-Scale Automation



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- ❑ So, you have a new product contemplation
- ❑ Production design considerations – design for automation
- ❑ Company roadmap
- ❑ De-risking
- ❑ Product Lifecycle
- ❑ Find an aligned technology partner

So, you have a new product concept?



- This may be because:
 - It's a new product concept
 - You are reshoring, near-shoring and retooling
 - You are finding ways of reducing production costs
 - Head count
 - Costs
 - Better performance
 - In 2020, Supply Chain magazine discussed that product life cycles are in decline.
 - More iterations of replacement or new products

- ❑ Thinking of reshoring? You're not the only one.
 - ❑ In a 2020 Reshoring Institute survey, 70% of respondents said they prefer American-made products, and more than 83% said they would pay 20% more
- ❑ Considerations for reshoring
 - ❑ Testing
 - ❑ Pilot
 - ❑ Scaling
 - ❑ Flexible manufacturing
- ❑ Reshoring Institute mentions 3 advantages to reshoring:
 - ❑ Shrinking the supply chain
 - ❑ Environmental compliance
 - ❑ Market agility with Lean practices

Company's Automation Roadmap



- Phases in a company's overall automation roadmap
 - For the product being considered:
 - Methods of producing the product aligning with quantity needs
 - Low throughput
 - Manual operation
 - Medium throughput
 - Semi-automatic
 - Added functionality
 - Automation and Robotic cells
 - High throughput
 - Fully automated
 - Often an afterthought, but shouldn't
 - Machine optimization

- ❑ Is your company new to automation?
 - ❑ Do you have engineering for the product
 - ❑ Do you have the infrastructure to support automation
 - Qualified, trained operators
 - Make or break a project
 - Technicians
 - Engineers
 - Spare parts
 - Quality
 - Product consistency

- ❑ Marketing vs reality
- ❑ We have seen many machines never go into production because marketing was not accurate
- ❑ Not quite ready
 - ❑ Automation failures where companies jumped through development stages and purchased full-scale production machines with no or minimal URS

- ❑ Multiple customers have talked about derisking and taking product assembly in increasing stages of ability.
- ❑ Alex Chausovsky's recent keynote about economic climate is a valid reason for this ([linkedin.com/in/alexchausovsky](https://www.linkedin.com/in/alexchausovsky))
 - ❑ Sitting on capital, spending won't resume until the end of 2024-beginning of 2025, smaller, scalable projects, reshoring
- ❑ De-risking is being asked for because of multiple failures of large assembly machines that often result in low production yield and quality.
 - ❑ We hear of OEEs of 22 and 40 of these high-dollar, high-capability machines.
- ❑ The common occurrence customers did here was to go from a product in hand with a concept to a full-scale production with no proof of concept of process capability in between.

- ❑ Declining life cycles means replacing a product or service every two years is becoming the norm across many industries. – Source: SupplyChaindigital.com
- ❑ The result of shorter product cycles means product development and commissioning times are also compressed.
- ❑ If the development and commissioning schedules are compressed, even more flexibility is needed, in addition to that required for increasing product variety. Source: www.veobot.com
- ❑ The trend toward shorter product life cycles is real; consumers are more than comfortable with frequent purchases of new variations on existing products. Source: www.veobot.com
- ❑ All of this is to say that manufacturing is changing faster now than it ever has been before. Building flexibility into manufacturing processes is likely an existential requirement, and the need for this flexibility will likely continue to accelerate. Source: www.veobot.com

- ❑ Design for service, product changes, maintenance, continuous improvement, and data gathering
- ❑ Capacity to supply market needs
- ❑ Production design considerations
 - ❑ Component Part design with automation in mind
 - Reducing part counts
 - Minimizing handling and reorientation of assemblies being built
 - Make feeding parts easier and more consistent
 - Make joining parts easier and more consistent
 - Make inspecting parts easier and more consistent
 - Make testing parts easier and more consistent
 - Is it automatable?

- ❑ Capital budgeting is the process of determining the value of a potential investment project.
- ❑ The three most common approaches to project selection are:
 - ❑ Pay Back period (PB)
 - Determines how long it would take to see enough in cash flows to recover the original investment
 - ❑ Internal Rate of Return (IRR)
 - Expected return on a project
 - If the rate is higher than the cost of capital, it's a good project
 - ❑ Net Present Value (NPV)
 - Net present value is the sum of all future cash flows over the investment's lifetime, discounted to the present value.
 - Perhaps the most effective of the three methods.

- ❑ Return on Equity (ROE)
 - ❑ ROE calculates the percentage return on invested equity
- ❑ Return on Invested Capital (ROI)
 - ❑ ROI calculates the percentage return on investment
- ❑ Return on Asset (ROA)
 - ❑ ROA calculates how much profit a company can generate from its asset
- ❑ 2 years is typical for many companies
- ❑ Helping with payback once operational
 - ❑ Downtime impact: <https://arthurgrussell.com/impact-of-unplanned-downtime/>
 - ❑ OEE impact: <https://arthurgrussell.com/maximizing-revenue-power-monitoring-oeo/>

- ❑ Valuable traits of a technology partner
 - ❑ Do they have a lab to develop key processes?
 - ❑ Are they capable, and affordable, of starting with manual and semi-automated processes?
 - ❑ Do they have the ability to do a pilot scale?
 - ❑ Can they scale to full production?
 - ❑ Do they have in-house capabilities for all design and production needs?
 - ❑ Do they offer the proper solution for the job (multiple platforms available)?
 - ❑ Footprint consideration – important in reshoring
 - ❑ Do they balance robust, proven technology versus new technology and apply the proper technology
 - ❑ Matching the proper level of technology that the customer can handle
 - ❑ Designed with customer capabilities in mind
 - ❑ Helps develop the URS

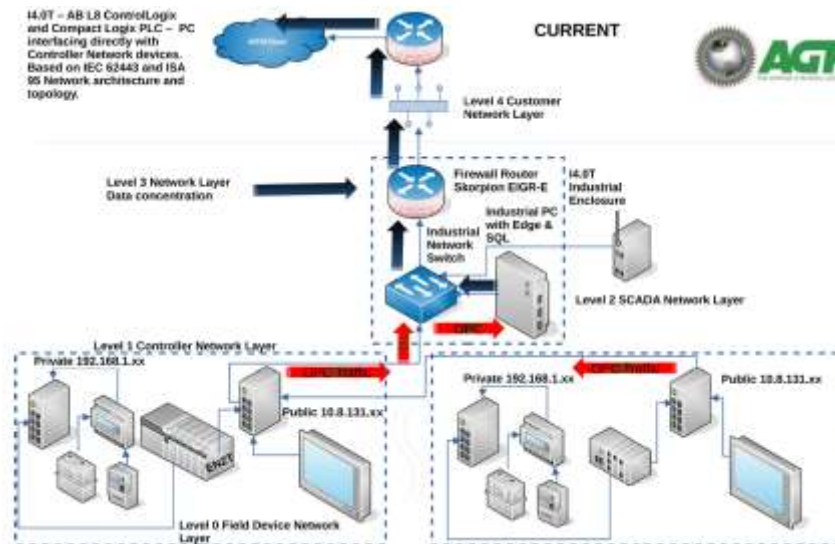
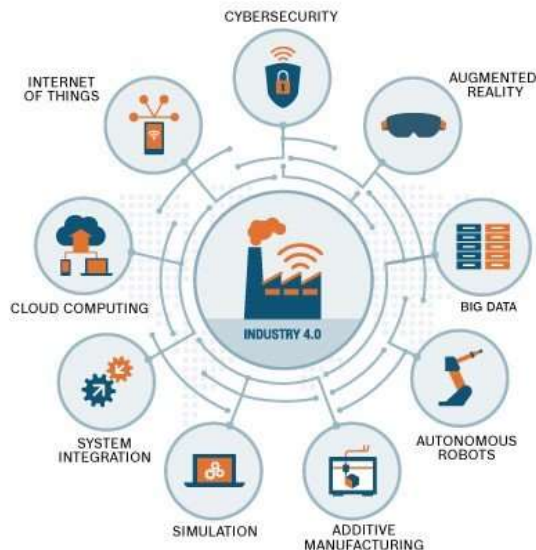
- ❑ From a 2021 Manufacturing Tomorrow article – Taking the Next Step in Automation: Overcoming the Challenges to Automate Manufacturing
 - ❑ In such cases, companies looking to increase the speed and efficiency of their manufacturing lines need an automation partner that can quickly and cost-effectively deliver tailored, even custom solutions. This includes the ability to design, build, and integrate high-speed, high-volume automated equipment and systems for some of the largest companies in the world, as well as growing corporations seeking to become world-class.
 - ❑ For projects of any size, however, it is often crucial to partner with an expert supplier to overcome a range of obstacles, such as meeting specifications and regulatory requirements, system integration, and necessary customization, as well as completing the work on time and within budget.

- ❑ Starts with Innovation
- ❑ Requirements Document
- ❑ Conceptual Design
- ❑ Detailed Design
- ❑ Design Verification
- ❑ Pilot Production
- ❑ Full Production



Don't Forget Industry 4.0

- ❑ Incorporate Industry 4.0 practices at both pilot and production levels
- ❑ Meant to tie the IT and OT together and let a company do more with less





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Questions?

Thank You!