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Rapid Fusion Lifecycle Deployment When Time Is of the Essence

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Learning Objectives

- Learn how to deploy Fusion Lifecycle core capabilities in a time that's shorter than when you use any other PLM
- Learn how to capitalize on Fusion Lifecycle existing workspaces and configuration as a starting point
- Discover how this scalable solution enables you to deploy the basics of PLM and scale up on an as-needed basis for fastest time-to-value
- Learn how to deploy core capabilities of Fusion Lifecycle, Items and BOMs, ECO, and NPI using out-of-the-box configuration

Description

Fusion Lifecycle software can be deployed faster than any other PLM (product lifecycle management) tool on the market. This was tested for a company that wanted to take its ventilator project to production in the shortest time possible due to the COVID-19 ventilator shortage. A prototype of the ventilator was completed using Fusion 360 software. Now it is time to take it into mass production using Items and BOMs, ECO, and NPI Workspace of Fusion Lifecycle.

Speaker

Mr. Zohrehvandi is Technical Specialist at AUTODESK since Oct. 2015 based out of Frisco, TX. His experience includes PLM implementation, PLM integration to PDM and ERP systems, software/hardware architecture development, software deployment, process development, and deployment of PLM systems.. He has worked as a mechanical engineer for a discrete manufacturing company, IT Manager for a defense contractor, solution architect for a software development company, and PLM senior manager for a consulting firm. He has managed overall delivery of large enterprise PLM systems as a technical sales lead and project manager. His industry experience spans aerospace & defense, automotive, electronics and high tech, medical device, industrial equipment, and retail/consumer goods. He obtained a Master of Science in Mechanical Engineering from the University of Texas at Arlington.

CoSpeaker

Katelyn Wilson is a PLM Solution Architect for D3 Technologies. She studied Industrial Engineering at the University of Louisville, completing several co-op rotations in manufacturing, and graduated with her BSIE in August of 2015.

Katelyn enjoys learning and practicing Lean concepts and is a Certified Black Belt in Lean Six Sigma.

She currently serves as a Certified Fusion Lifecycle implementation specialist alongside the PLM team at D3 Technologies, delivering first-class product implementations.

Outside of work, Katelyn enjoys caring for her animals – 3 dogs, 22 chickens, 2 geese, 1 rabbit, and a few fish. She also enjoys watching scary movies and true crime documentaries, playing Beat Saber, and officiating weddings.

Introduction

This industry talk provides insight into how to implement Fusion Lifecycle Product Lifecycle Management in the shortest time than any other competitor PLM company in the market. The example we used in this industry talk is a real life example of a company trying to take its ventilator project to production in the shortest time possible due to the COVID-19 ventilator shortage.
This started by a simple email request from Morning Media Corporation (http://www.morningbirdmedia.com/), a privately held company, who is sponsoring the project. They innovate, develop, and commercialize consumer technology. Dr. Chance Glenn is the president and CEO of Morningbird Media Corporation. Chance Glenn received his Bachelor's of Science degree in Electrical Engineering from the University of Maryland at College Park. He then received his Master's of Science degree and Doctor of Philosophy degree, both in Electrical Engineering, from The Johns Hopkins University Whiting School of Engineering. In August of 2012 Dr. Glenn became the Dean of the College of Engineering, Technology, and Physical Sciences at the Alabama A&M University in Huntsville, Alabama.

Morningbird Media Corporation via Electronic Alchemy, The Morningbird Foundation, the University of Houston-Victoria, Alabama A&M University's Special Projects Lab, the Rochester Institute of Technology are all a part of this COVID-19 Ventilator Project spearheaded by Corey Mack (a former student of Dr. Chance Glenn). Corey has designed and has pulled together people, to crowdsource this ventilator design (https://www.facebook.com/covid19vent) in record time.

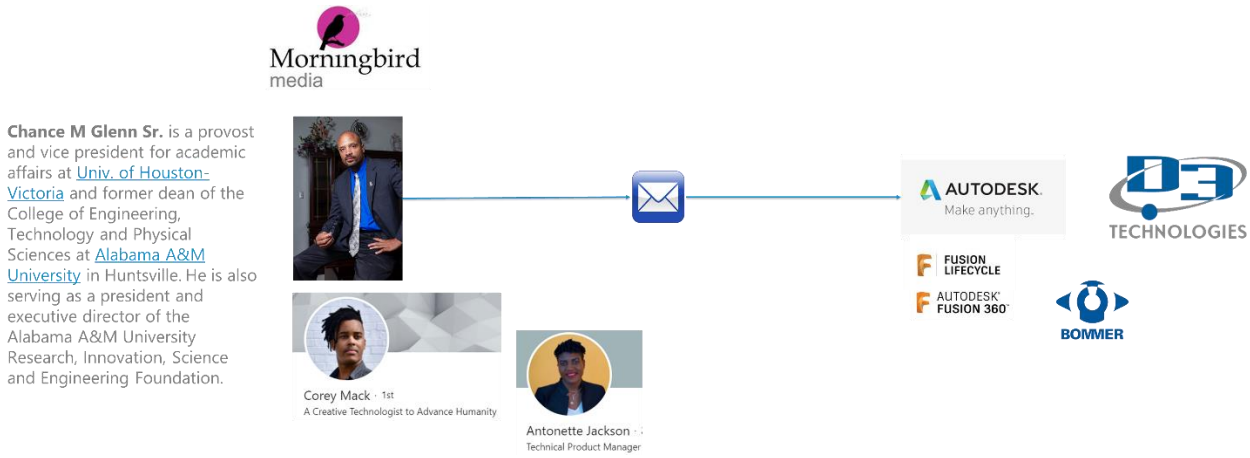
The team behind the COVID-19 Ventilator Project:

- Dr. Chance Glenn – Project Sponsor (https://www.linkedin.com/in/chance-glenn-b7bb291/)
- Corey Mack – Program Manager
- Antonette Jackson – Project Lead and managing product development efforts
- Davida Mack – She is leading the purchasing and procurement
- Andrew Kowalczyk – Leading the electrical engineering of the project with background in medical devices

All these people have other jobs and the entire project, meeting, and activities were conducted during weekends and after hours on weekdays.

They werw using Fusion 360 as the design tool and are 3D printing parts for it directly from the tool embedded into the latest version. This something that they wanted to do in days.

Autodesk provided free licenses to Fusion Lifecycle, Fusion 360, and Generative design to help with the project. In a very short time, days, we were able to provide these licenses, get them up and running, and work with our certified implementation partner, D3, to help with the rapid implementation.

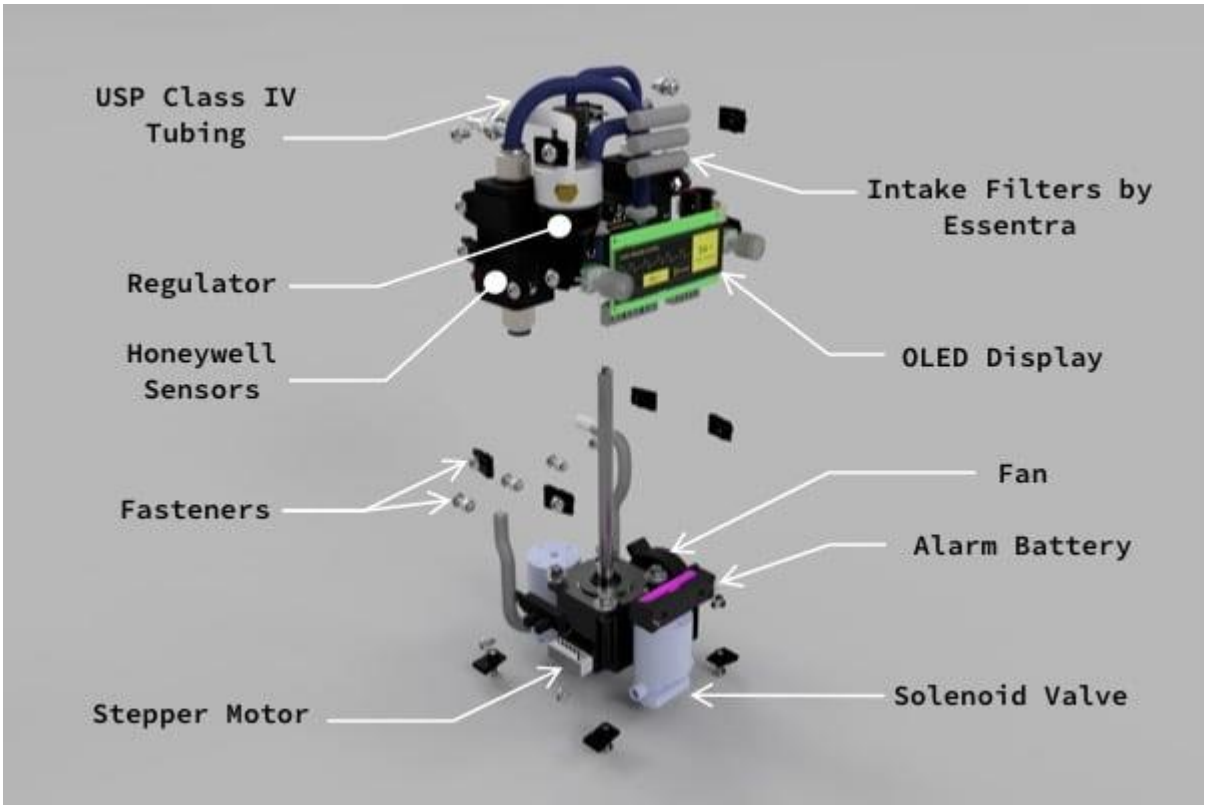


AURA Ventilator Concept

The low-cost ventilator is proposed under the assumptions that there are no ventilators in-stock and that there would be lead-times so long that numerous people would die before there were enough ventilators.

Features and Safety

- Humidifier
- 3 or 6 psi safety valve
- Dyson Vacuum Cleaner HEPA Filter
- Inline Bacterial Filter
- O2 Hookup
- Strut Bellows Derived Pump
- 16x2 LCD Display
- 4 Modes
- Assisted Control (AC)
- Pressure Control (PC)
- Pressure Support (PS)
- Constant Pressure (CPAP)
- Programmable Alarm



User Interface

The UI is designed minimally and with efforts to maximize ease of use. All critical metrics are displayed at all times and across all operating modes.
The ON/OFF switch performs the following:

1. Power ON
2. Power OFF
3. LED to indicate that the unit is powered on when lit

The level switch is used to adjust the pressure and air flow rate. There are 5 modes accessible by the Mode switch:

1. Assisted Control (AC): Use pressure sensor to deliver a specified volume. Alarm is triggered at high pressure
2. Pressure Control (PC): Use pressure sensor to deliver a specified pressure. Alarm is triggered at a low volume
3. Pressure support (PS): Initiated by patient's breath to deliver a specified pressure
4. Constant Pressure (CPAP): Initiated by patient's breath to deliver a contact pressure through inhale and exhale.
5. Troubleshoot

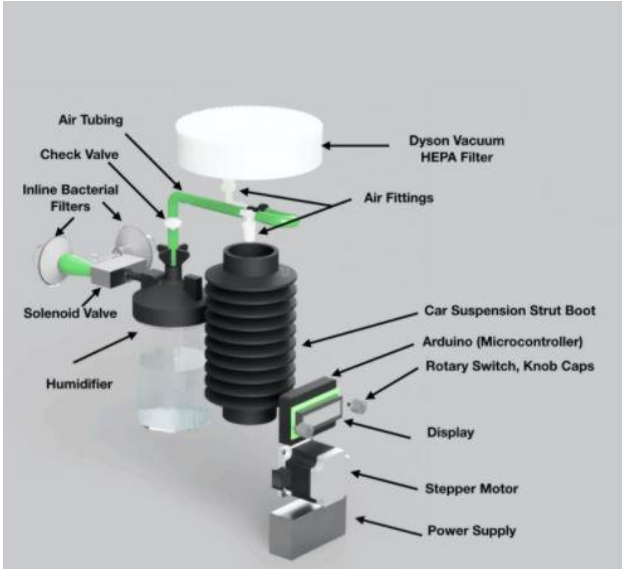
Manufacturing Strategy

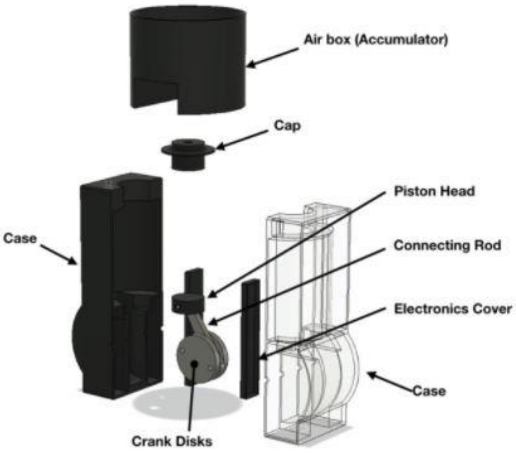
Given shortages of medical equipment, this machine was designed to be made with off-the-shelf parts, 3D printed components, and with some modular components. This enables this machine to use a variety of alternate parts should a source be exhausted. For example, first stage of the air filter is a HEPA filter for a vacuum cleaner. If this were to run out, a different air box would be 3D printed so a different filter could be used, since many of the off-the-shelf components are standardized. We will crowdsource the 3D printed components in two scenarios.

Scenario 1: Molds for plastic components are in development.

Scenario 2: We cannot make plastic parts fast enough.

This assumes that the pandemic has caused interruptions in materials and supply chain. In this case we would accept injection molded parts from suppliers and crowd sourced components.





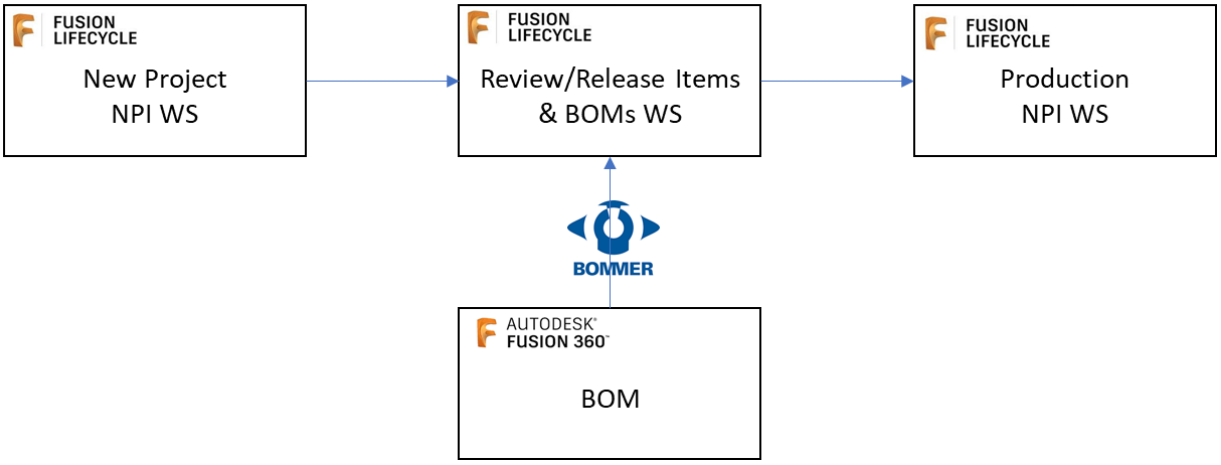
Off-the Shelp Parts vs. 3D Printed / Crowdsorces Parts

The Vaule Autodesk, D3, and BOMMER Brought to the Table

To understand the vaule that Fusion 360, Fusion Lifecycle, F360 BOMMER plug-in, and D3 expertise in implementation brought to this project, we will explore the high-level workflow and specific use cases documented by the project team.

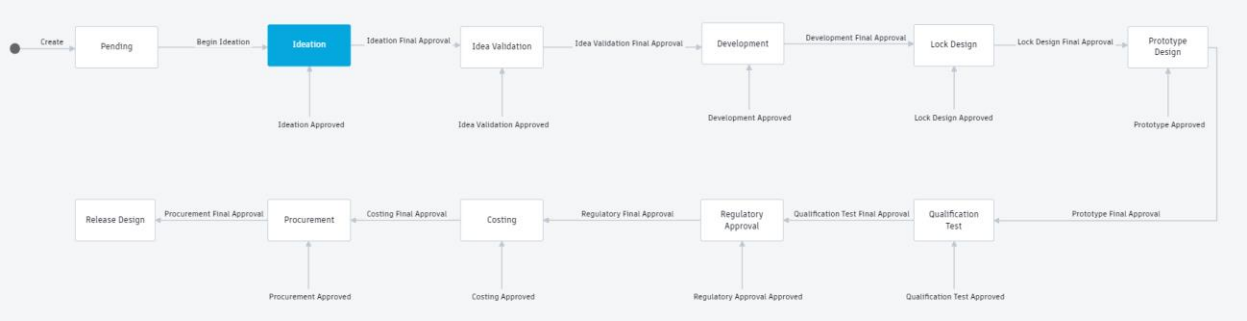
Workflow

The workflow was to start a product in Fusion Lifecycle NPI Workspace and take it from concept to production, the BOM will come from Fusion 360 model and will be reviewed and approved in Fusion Lifecycle Change Order workspace. NPI, Items & BOMs and ECO Workspaces will be used to accomplish this.



Fusion Lifecycle NPI (New Product Introduction) Workspace

Fusion Lifecycle NPI Workspace will be used to take the AURA ventilator project from Ideation → Idea Validation → Development → Lock Design → Prototype Design → Qualification Test → Regulatory Approval → Costing → Procurement → Release Design

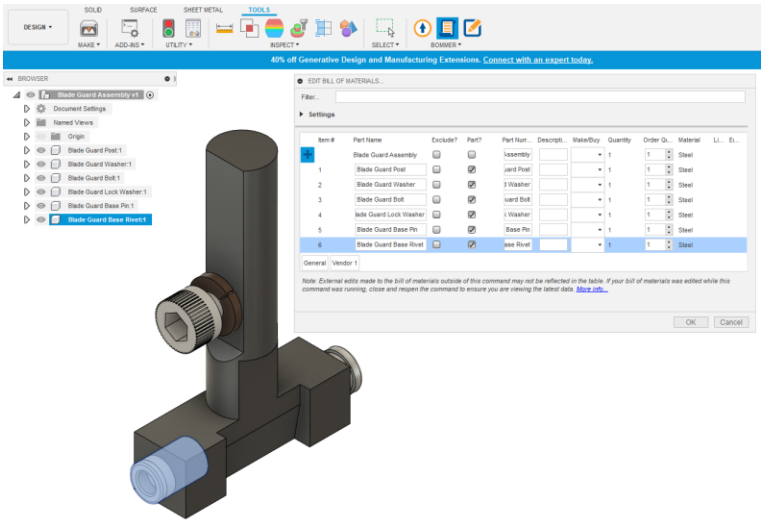


Fusion 360

All the components are designed in Fusion 360 and design is optimized using the Generative Design feature of Fusion 360.

BOMMER

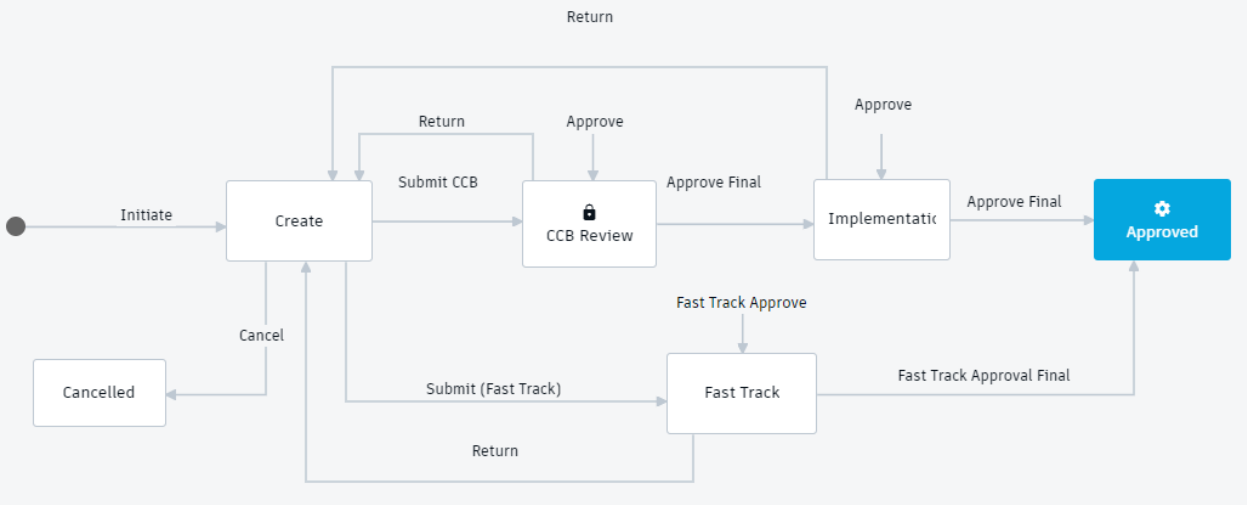
Once design is completed in Fusion 360, during the development phase of NPI process, BOM is extracted using Fusion 360 BOMMER plug-in tool and imported into Fusion Lifecycle Items & BOMs Workspace using the Import capability of Fusion Lifecycle.



Item #	Thumbnail	Part Name	Part Number	Order Quantity	Material
		Blade Guard Assembly	Blade Guard Assembly	1	Steel
1		Blade Guard Post	Blade Guard Post	1	Steel
2		Blade Guard Washer	Blade Guard Washer	1	Steel
3		Blade Guard Bolt	Blade Guard Bolt	1	Steel
4		Blade Guard Lock Washer	Blade Guard Lock Washer	1	Steel
5		Blade Guard Base Pin	Blade Guard Base Pin	1	Steel
6		Blade Guard Base Rivet	Blade Guard Base Rivet	1	Steel

Fusion Lifecycle Items & BOMs and ECO Workspace

After importing the Items & BOMs into Fusion Lifecycle, ECO Worksapce will be used to review and release the BOM which is a step in the NPI process.



The Stages of PLM Implementation

The stages of implementation were simplified to planning, requirements gathering, solution development, and testing/training/deployment all in one stage. We developed a simple project plan and worked backward from the go live date of 30 days. The plan was to go live on July 1st, 2020, so we worked backward from that date to 30 days which put our kickoff date on June 1st, 2020. Remember this was not anybody's full time job, we all had our day to day work and devoted nights and weekends to work on this project. Autodesk, D3, and AURA team.
In a moment I will hand it over to Katelyn to walk you through her process. But our approach was to take advantage of many out of box features of Fusion Lifecycle and leverage them as much as possible. We decided collectively that we need three Workspaces as a minimum to accomplish what we set to do. New Product Introduction Workspace to be used for Product Development Process, Items & BOMs Workspace to be used to manage Items & BOMs configuration and revisioning, and Change Order Workspace to be used to review and release BOMs.

Planning – Simple Planning

As I mentioned we had a simple project plan. We identified high level tasks, added RACI, Responsible, Accountable, Consulted, and Informed to those tasks. Established hard dates for each activity and followed up to make sure we are completing our tasks as they were listed in our project plan on time.

Requirements Gathering – Start with Basics

Fusion Lifecycle out of box, has bunch of pre-built apps that are designed to match 80% of basic needs for product development processes. For example, the New Product Introduction Workspace out of box has a form to capture attributes, Workflow with predefined stages or phases, tasks tab for tasks within each phase of product development, scripts that drive the behind the seen logic of Workflow transitions, and preconfigured email notification to mention a few. Instead of reinventing the wheel, we decided to review what is available with the AURA team and identify gaps that are needed for the final solution in order to use what is already there. NPI Workspace has a set of attributes and we showed the AURA team those attributes and asked if they need more, or can we use what is already there by renaming them, or change the attribute properties like instead of free text turn them into pull down selection. Again, we are not starting from a blank sheet of paper. On the Workflow, we showed Workflow stages and how they transition. On the task tab we showed how we can have multiple tasks associated with each stage and how to make these stages dependent upon each other were you cannot complete a stage unless all the tasks are completed.

Once we identify the gaps between what comes out of box and what the AURA team wants, we documented the requirements and review them before getting approval to move forward with the solution.

Solution Development – Minimize the Gap

D3 Implementation Methodology

Fusion Lifecycle comes with preconfighured Workspaces. We tried to leverage as much as we could from the existing confighuration in order to save time. There were some changes to workflows and attributes but using what is available allowed us to complete the implementation in record time.

Once the AURA team approved the documented requirements and any gaps in the out of the box configuration, we began architecting the solution. The architecture was partially pre-determined by the deliverables and functionality defined in D3's Foundation Packs. However, there are specifics that have to be determined to fully document the architecture of the implementation. To do this, we hosted a couple of sessions online. During these sessions, we reviewed documentation the AURA team already had through screenshare and we asked additional questions. The questions during this phase are no longer qualifying questions, as those happen prior to this step, but the questions do help us understand the current state of processes, the desired future state, and any specific metrics/reporting for the data. Some of the questions include:

- Can you walk us through the product development workflow?
- Who is assigned tasks along the way and what are those tasks?
- Do the workflow steps require approvals? Who approves?
- Could you walk me through some of the documentation used today?
- Are there any other systems that you will be replacing with Fusion Lifecycle?
- Are there any other systems that you will continue to use alongside Fusion Lifecycle?
- Are there any integrations that need to take place?

These questions lead us down different avenues of questions depending on the answers but the outcome will all be the same – the Solution Architect understands the customers processes, requirements, and goals well enough to begin documenting the solution architecture.

Once the Solution Architecture is developed, it is reviewed with the customer. If any changes are required then we will make revisions to the documentation, otherwise the customer will approve and implementation will begin.
The Solution Architecture ultimately becomes the “single source of truth” for the overall project. It includes any or all of the following:

- data fields (item attributes),
- permissions,
- workflows,
- workspace tab names,
- automation details (pseudo script),
- advanced print view outlines, and
- security configuration.

As soon as the Solution Architecture was approved for the AURA ventilator project, we began implementing. Tony will discuss how implementation was performed in parallel with testing.

Testing, Training, and Development – Overlap

We started the implementation and perform validation testing in parallel. Katelyn would let me know what is completed and I would validate test it. This was an iterative process until all the requirements were validated and satisfied through testing. We used the validation testing to develop test script for mock testing and user acceptance testing of all the capabilities deployed. After successful mock testing, we decided to combine user acceptance testing and training to save time. User acceptance testing was conducted with all real roles and actors such as product manager, electrical engineer, mechanical engineer, and others. Anything that came out of testing that did not satisfy the requirements were captured to be added and anything that was part of a wish list was noted and considered for future expansion. Once testing was completed, we made any changes that came out during the testing, purged the Workspaces, and ensured all systems are go and provided additional hyper care until stable condition reached. Hyper care is to be available to answer question and help users on an as needed basis for a period of time after go live.

Phases / Stages

Here is a snapshot of our high-level activities with dates. We did try to keep this simple. Project kick-off on June 3rd, 5 days for requirements gathering and validation, 14 days for solution development and validation testing, and 12 days to get the system ready, develop test scenarios, conduct user acceptance testing, and training.

Closing

At the end I wanted to summarize what we just presented. Fusion Lifecycle software can be deployed faster than any other PLM tool in the market. Fusion Lifecycle comes with some prebuilt applications or Workspaces that can be leveraged to speed up your implementation process. It is designed to be scalable, meaning you can always expand the initial solution, and to get the fastest return on investment. Start with low hanging fruits and take advantage of what is already there.
Thank you for your time and please reach out to me or Katelyn for additional information or answer any questions you might have.