



# LIFECYCLE SPECIALTIES

Remanufacturing, Engineering, Manufacturing  
[www.lifecyclespecialties.com](http://www.lifecyclespecialties.com)

## **Lifecycle Specialties – Brief Background.**

**Mission Statement:** At Lifecycle Specialties, our mission is to design and implement the best remanufacturing and manufacturing processes, throughout the lifecycle of a component, to enable our customers to reduce cost and time while improving quality.

**ISO 9001:2015:** Lifecycle Specialties desires to provide superior services and chose to use the framework of the ISO 9001:2015 quality certification as the means to say what we do, and then prove that we do what we say. The certification covers quality and business processes. We have been re-certified as compliant annually Since July 2018.

**WBE and WOSB certificates:** Lifecycle Specialties is certified as a WBE (Women's Business Enterprise) by WBENC (Women's Business Enterprise National Council) and as a WOSB (Woman Owned Small Business) by the SBA (Small Business Administration). The WBE certification requires a rigorous application process and also includes an annual on-site audit to prove that the "Woman Owner" is truly running the business.

Donna has the honor of serving on the WBENC Certification Review Committee.

**Component Re and Manufacturing** - Lifecycle Specialties remanufactures components for customers that are in the whole goods remanufacturing business. We also manufacture new parts, which are typically either low/medium volume or in the "for service only" stage of the product lifecycle. Our target is to work on components that are very high precision, and are challenging to machine and/or measure.

**Consulting** - Lifecycle Specialties also does industry consulting, covering a variety of projects. Projects have ranged from designing and producing a production gage for measuring gear train backlash on 2.8 and 3.8 liter engines, to helping create a "Remanufacturing Book Of Knowledge" for reman engineers. We've also helped our customers reduce cost in remanufacturing processes, re-source parts to different suppliers, and improve their NPI processes.

**Consultants:** We don't have consultant employees - preferring instead to have a network of cost effective, highly qualified, retiree contractors that step in to do work as needed; within their skill set.

**Global Reman standard** - Lifecycle Specialties is a member of the RIC (Remanufacturers Industries Council). In addition to the RIC mission of "Advocate, Collaborate, Educate, and Research", the council has developed an ANSI standard that describes the requirements for "Remanufacturing" versus other types of repairs. Lifecycle Specialties meets the requirements of this standard.

**E2 Manufacturing System** - All businesses need to have a means of tracking inventory, planning and scheduling work and improvement through the shop, tracking hours, invoicing, paying, retaining information, etc. This is especially important since the vision is to grow, and fully utilize the machines in which we have invested. Lifecycle Specialties decided early that we'd start up using an operations system that supported our quality system and also allowed for growth over time. This system was purchased and installed in September 2017.



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**Welcome to Lifecycle Specialties! Read On For Your Tour.**



**ISO 9001 certified**

**Women Owned Small  
Business certified**



## CERTIFICATE OF REGISTRATION

This is to certify that

**Lifecycle Specialties, LLC**

113200 Scott Drive, Columbus, Indiana 47201, USA

operates a

**Quality Management System**

which complies with the requirements of

**ISO 9001:2015**

for the following scope of certification

**Manufacture & Remanufacture of mechanical components.**

Certificate No.: CERT-0144325  
 File No.: 1699609  
 Issue Date: September 6, 2021

Original Certification Date: September 11, 2018  
 Certification Effective Date: September 10, 2021  
 Certificate Expiry Date: September 9, 2024

*Frank Camasta*  
 Frank Camasta  
 Global Head of Technical Services  
 SAI Global Assurance



**HEREY GRANTS  
WOMAN OWNED SMALL BUSINESS (WOSB) CERTIFICATION TO**

**Lifecycle Specialties, LLC**

The identified small business is an eligible WOSB for the WOSB Program, as set forth in 13 C.F.R. part 127 and has been certified as such by an SBA approved Third Party Certifier pursuant to the Third Party Agreement, dated June 30, 2014, and available at [www.sba.gov/wosb](http://www.sba.gov/wosb).

The WOSB Certification expires on the date herein unless there is a change to the SBA's regulation that makes the WOSB ineligible or there is a change in the WOSB that makes the WOSB ineligible. If either occurs, this WOSB Certification is immediately invalid. The WOSB must not misrepresent its certification status to any other party, including any local or State government or contracting official or the Federal government or any of its contracting officials.

|  |
|--|
| Majority Female Owner (Name, Title):   |
| NAME: KIMBERLY L. HARRIS<br>ADDRESS: 113200 SCOTT DRIVE, COLUMBUS, IN 47201-1132 |
| Certification Number: WOSB-000000  |
| Renewal Date: April 15, 2023   |
| WOSB Registration Expiration Date: 4/15/2023                                     |



*Michelle Richards*  
 Michelle Richards, Great Lakes Women's  
 Business Council President  
*Patricia Prince-Eaton*  
 Patricia Prince-Eaton, WBENC President & CEO  
*Lateisha White*  
 Lateisha White, Vice President, Certification



## National Women's Business Enterprise Certification

**Lifecycle Specialties, LLC**

who has successfully met WBENC's standards as a Women's Business Enterprise (WBE).  
 This certification affirms the business is woman-owned, operated and controlled and is valid through the date herein.

Certification Granted: April 15, 2017  
 Expiration Date: April 15, 2023  
 WBENC National Certification Number: WBE1700748

WBENC National WBE Certification was processed and submitted by Great Lakes Women's Business Council, a WBENC Regional Partner Organization.

*Michelle Richards*  
 Authorized by Michelle Richards, President  
 Great Lakes Women's Business Council





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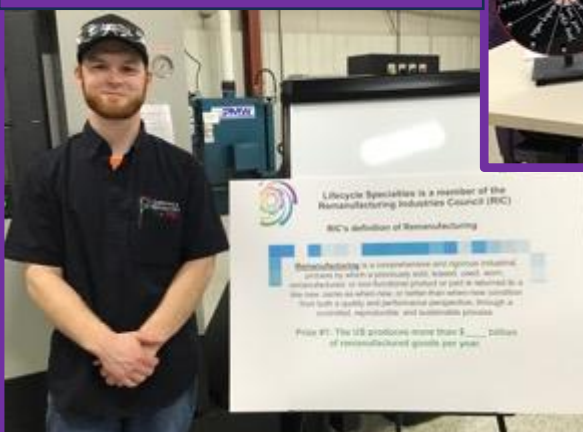
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## Lifecycle Specialties Employees - Reman Day 2022 – April 14<sup>th</sup>

Our employees make the difference and enable our quality and delivery.

Lifecycle Specialties celebrated Reman Day 2022 with a combination of reman industry training, enjoying a catered lunch together, and inviting stakeholders to our facility to learn more about Reman Day and Remanufacturing.

Below are a few pictures of some of our employees in action on Reman Day..... Clockwise from upper left are Chad, Ericka, Adam, Ben, and Yana in the center.







# LIFECYCLE SPECIALTIES, LLC®

## Capability Statement

At Lifecycle Specialties, our mission is to design and implement the best remanufacturing, manufacturing, and metrology processes, throughout the lifecycle of a component, to enable our customers to reduce cost and time while improving quality and minimizing the effect on the environment.

### Engineering and Consulting

Develop new remanufacturing processes  
Cost reduction in materials and cycle time  
Suggestions and advice to improve existing remanufacturing processes  
Usable and practical solutions  
Process development  
Process improvement  
Project management

### Manufacturing and Remanufacturing

Remanufacturing of used components  
Remanufacturing of "imperfect" new components  
"First fit" manufacturing, including low-volume, high precision production  
Fully equipped dimensional metrology lab with the ability to measure specifications within microns  
Target complex, precise, and challenging components

### Machining and Shop Capabilities

#### Fully equipped machine shop capable of doing

- CNC milling
- CNC turning
- CNC Swiss lathe turning
- CNC cylindrical grinding
- Surface grinding
- Surface lapping
- Vertical honing
- Horizontal honing
- Manual machining
- Metrology services
- Laser engraving
- Ultrasonic cleaning
- Millipore testing
- EDM
- Water jet
- 3D and CAD drawing services

### Why Lifecycle Specialties?

- 60+ years of experience in  
Engineering  
Manufacturing & Remanufacturing  
Quality  
Six Sigma
- ISO 9001:2015 certified
- Environmentally friendly solutions
- Industry network with thousands of relevant connections
- Woman-owned business - Certified as WOSB by SBA & WBE by WBENC



**DUNS: 080480138**  
**UNIQUE ENTITY ID: WFGW3TB9A35**  
**CAGE: 7RUG9**  
**EIN: 81-4478626**  
**NAICS Codes: 339999, 541330**

**Contact:**  
**Donna Turner - Owner/CEO/President**  
**[donna.turner@lifecyclespecialties.com](mailto:donna.turner@lifecyclespecialties.com)**



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## Shigiya GAE – 30B CNC O.D. Angular Cylindrical Grinder

This grinder is of ultra rigid construction to allow extremely precise dimensional control.

It can handle a variety of parts and is able to grind faces and shoulders at the same time.

The grinder is equipped with a CNC programmable dresser for wheel shape and also a dynamic balancer.

It can take parts up to 12" in diameter, 20" long, and uses a 20-inch wheel.





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## **Citizen L20 CNC Sliding Headstock Type Automatic CNC Swiss Lathe w/Bar Feeder**

The Swiss style CNC lathe is used to produce intricate components quickly and accurately. It is capable of ID/OD turning, milling, drilling, and tapping, all in the same chucking.

It can machine the front, side and the back of a part at the same time, enabling higher productivity.

It is capable of machining soft and very hard materials to precise tolerances. The bar feeder capacity enables longer unattended running. Parts can be turned from HEX, square or round stock depending on component geometry.

The rigidity of the machine enables highly precise machining.

### Some features

- 5 HP spindle
  - Maximum RPM – 10000 (main), 8000 (sub), 6000 (gang)
  - 37 mounted tools (gang, turning, back drilling)
- Programmable tailstock
- Tool pre-setter, Parts catcher







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## Samsung SL20 CNC Lathe (3 Machines)

This 2 axis CNC lathe allows versatility to enable a variety of part sizes.

It is capable of machining soft materials as well as very hard materials to very precise tolerances. It has a rigid 45 degree angle cast iron slant bed and integrated box ways, which in addition to other features enables highly precise machining.

### Some features

- 20 HP spindle
  - Maximum RPM – 4000
  - 10 position turret
- Programmable tailstock
- Tool pre-setter, Parts catcher





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## Samsung SL2500 CNC Lathe with Live Tooling and Sub-Spindle

This 12 tool station CNC lathe, with live tooling and a sub-spindle, allows versatility to enable a variety of part configurations. It is capable of ID/OD turning, milling, drilling, and tapping, all in the same chucking.

It is capable of machining soft and very hard materials to precise tolerances. The bar feeder enables some unattended running.

The rigidity of the machine enables highly precise machining.

### Some features

- 20 HP spindle
  - Maximum RPM – 3500 (main), 4500 (sub)
  - 12 position turret
- Programmable tailstock
- Tool pre-setter, Parts catcher







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## Haas VF-2 4 Axis Vertical CNC Machining Center

This CNC machining center has a digital probing system, which allows the machine to “know” where features are relative to each other and to the drawing.

Very flexible, especially where we are taking existing parts and modifying them in production to add features, thereby converting old designs to the newest revision.

### Some features

- 30 HP CAT 40 spindle, 8100 Max RPM
- 24 tool vertical turret
- Renishaw probe system
- 4 axis control with rotary head
- Tool pre-setter





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## CNC Vertical Honing System

Certain components have extremely precise & critical ID dimensions like roundness, straightness, taper, diameter, & surface finish. These wear during use, but the surfaces can be restored by removing material and going a small amount oversized.....if proper dimensional control is achieved.

Lifecycle specialties developed a process to hone non-symmetrical EUI Bodies, restoring the bore ID features to "better than new" capability. Now that this equipment is in place, it opens new possibilities for many other precision bore salvages.



CNC Vertical Honing Machine



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## Manual Equipment.

At the heart of every machine shop is the tried and true manual equipment. All of our manual machines are used for secondary operations to either hone or polish the end product. Tighter dimensional controls are maintained using secondary finishing operations such as the operations/equipment shown below.

This equipment technology may be prior generation, however when we combine it with the know-how and measurement capability of Lifecycle Specialties, it can be very productive while producing high quality parts.



Sunnen Horizontal (Stroker) Hone



Centerless OD Lapper



Multi Station Hone



Precision Surface Lapper



Surface Grinder w/Precision  
Multi-Part Fixture



Centerless OD Grinder





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## Precision Manual Surface Grinding.

Many components wear in a way that does not allow for salvage by obvious means. By combining an older (but capable) surface grinder, modern fixture/work holding principles, modern measurement methods, and engineering creativity - Lifecycle Specialties was able to create a cost effective salvage.

This is just one of several similar examples. This type of approach can be applied to other challenging components.



Surface Grinder w/Precision Multi-Part Fixture



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## Welding Cell – Broken Fastener Extraction

Many components are assembled with fasteners such as studs or bolts. Over time, the fastener can “seize” into the higher value iron or aluminum mating part. When disassembly for remanufacturing is attempted, the seized fasteners can then “break off below the mating part surface”. Due to this there are many cases where the higher value component is scrapped because the lower value component could not be extracted from it.

When the fastener size is  $\leq 6$  mm, and it is broken below the surface of the mating part, traditional methods of extraction are not very capable.

To solve this problem, Lifecycle Specialties created a welding process that is ~98% successful. This type of approach can be applied to many other challenging components with broken fasteners.



Welding Station – Broken Bolt/Stud Extraction



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## Metrology Lab

Lifecycle Specialties provides precision parts - which requires capable measurement equipment & processes.

The Lifecycle Specialties Metrology Lab contains an assortment of measurement equipment and tools that allow measurements for PPAP, ongoing quality control, and the measurement of "one off" parts for both internal and customer product or process development. The measurement systems are capable of measuring down to single microns and even nanometers. The lab is maintained at 68 +/- 1 deg. F and equipment is stationed on anti-vibration tables..

A calibration process for all measurement tools and equipment is in place. We possess a variety of the appropriate standards/artifacts to conduct most of the calibrations in-house. Some gauges are sent to outside labs, ISO 17025 certified, for calibration.

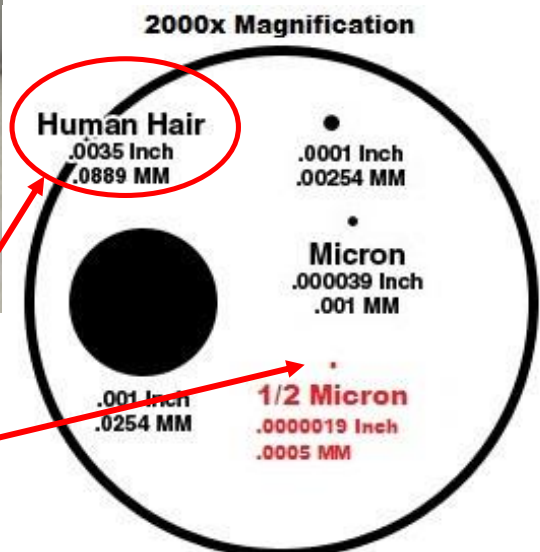
Additionally, we are among very few facilities that tracks measurement system capability over time with the use of a documented reference part program. In this program, the same physical "reference part" is measured each time that part is run in production. The reference part measurements are charted, so we understand the real effectiveness for the measurement system, over long periods of time.

Lifecycle Specialties employs a full-time metrology technician who conducts in-process inspections, maintains the measurement equipment and the calibrations, documents standard operating procedures, and much more. Additionally, each of our skilled machinists are

capable of using the highly advanced measurement systems to do in-process inspections, if needed.



- Illustration of measurement precision needed:
- Precision Bore; Max. Roundness Spec = 0.55 micron
    - This size is illustrated relative to a human hair.
    - Since 1,000 Nanometer (nm) = 1 micron...
    - This Bore Max. Roundness Spec = 550 nm.
    - This is 1/178<sup>th</sup> of the diameter of a human hair.







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## Metrology Lab - Zeiss Surfcom 2000SD3

This machine is capable of measuring a variety of straightness, flatness, profile, texture (Ra, Rp, Wt, etc.) on a large range of part sizes.

The Surfcom is programmable and, with proper fixturing, allows repeat measurements to be productionized.





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## Metrology Lab - Mahr MMQ 400

This machine is capable of measuring a variety of roundness, runout (total, axial, and circular), concentricity, true positions, etc., on a large range of part sizes.

The Mahr is programmable and, with proper fixturing, allows repeat measurements to be productionized.





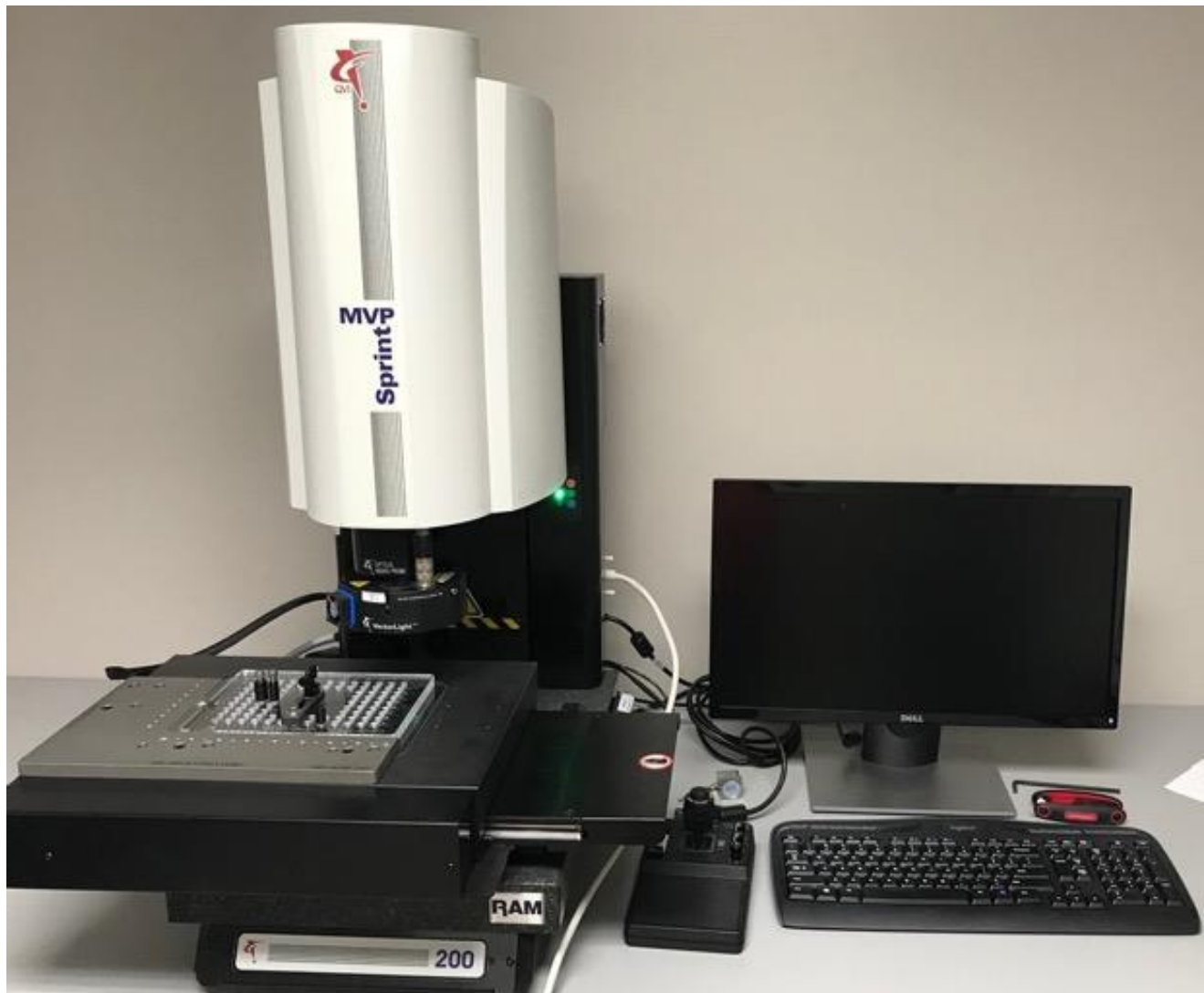
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## Metrology Lab - QVI Ram Sprint MVP 200

This machine is capable to quickly measure distances, diameters, lengths between features, radii, perpendicularity, etc., on a large range of part sizes.

Like the Mahr MMQ 400 and the Surfcom, it is programmable and, with proper fixturing, allows repeat measurements to be productionized.







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## Brown and Sharpe CMM

Within each part machined during production in the Lifecycle Specialties shop, there is a need to frequently check certain dimensions quickly, and some are checked 100%.

To reduce traffic in the measurement lab, a CMM resides in the shop.

As time goes by, it is likely that there will also be a CMM inside the measurement lab.





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## Metrology – Wide Range Of Coverage

In addition to the previously mentioned measurement equipment in the metrology lab, there is a large variety of smaller, more portable tools used to confirm quality on an ongoing basis.

Whether it be dimensional, weight/force or surface finish measuring apparatus, the instrumentation used is subject to the same calibration process as are the other equipment.





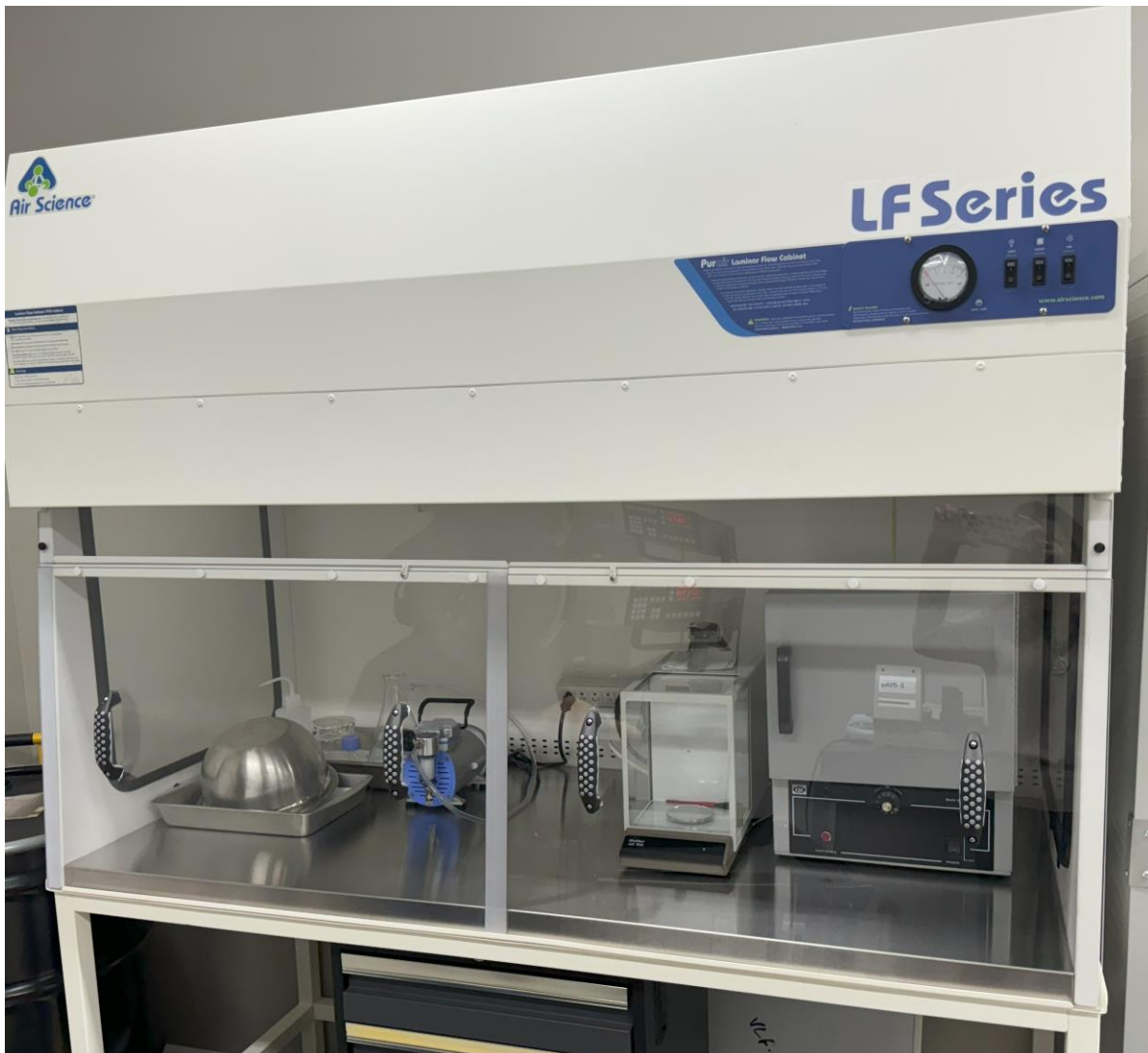
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## Verification of Component Cleanliness

Most components have a cleanliness specification. Lifecycle Specialties has the capability to check the parts for maximum contaminant size, manual particle counting, and also determining total weight of contaminants.

The Laminar flow hood ensures that containments within the room do not compromise the results of our Millipore testing.



Cleanliness Checking – Millipore Equipment





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## Cleaning Of Components

Most components that Lifecycle Specialties manufactures have an “industrial clean” specification, because the customer cleans the parts prior to final assembly.

Some components have a more stringent cleanliness specification. Therefore Lifecycle Specialties has 2 small ultrasonic cleaners and also the means to check the parts for magnetism, and de-gauss if necessary.



Pro Ultrasonics – (2) Pro 2013D Cleaners



Demagnetizer



Gauss Meter



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## Marking and Packing Components

Lifecycle Specialties produces a number of small parts that need to be marked, and/or the customer requires individual packaging.

Because of these requirements, we have invested in both an auto-bagger, and a laser marker.

The auto-bagger helps the person responsible for the bagging, go faster while maintaining quality.

The laser marker is capable of human readable marking, as well as 2D data matrix. It also has the capability to “grade” the readability of the 2D data matrix and report the results.

This equipment is applicable to a large variety of parts.



Auto-bagger For Small Parts

Desktop MECCO LightWriter Laser Engraver



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## Well Organized Receiving, Packing, and Shipping

Parts come in, are tagged, inventoried, and logged into the E2 system to meet ISO 9001:2015 requirements.

Typical practice in remanufacturing is to send the parts out in the same packaging used in the original shipment.

After parts are finished and all the required inspections are completed, they are packed as specified by the customer and shipped out.







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## Well Thought Out Equipment Layout

The machines are grouped in a logical way, so that 1 person can run more than 1 machine. This allows Lifecycle Specialties the flexibility to optimize production depending upon the demand.

For example, the 3 Samsung lathes, and the Mill; are located close together. The Grinder is located close to the Mill. Within the cycle time of the parts, and depending upon overall demand - It is possible for the machinist to control more than one machine.



Lifecycle Shop Layout & Work Cells



Lathe Cell & Mist Collector



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**North Room – Used for Employee Communication, Training,  
& Production Meetings**

