



Polaris Contract Manufacturing, Inc.

LOCKHEED MARTIN



**Your Partner in Electronic
Contract Manufacturing
Mission Critical Production of CCA's/PCB's**

July, 2019

Dennis Vetrano
Sales and Business Development Manager



Location



- Located in Marion, Massachusetts on Buzzards Bay
 - An hour from Boston, and 45 minutes from Providence and Newport, Rhode Island
- *25 + Year provider* of electronic manufacturing servicing high technology customers with higher mix / medium volume requirements for printed circuit assemblies & full product manufacturing. We provide flexibility, engineering excellence and on-time delivery for your mission critical components.

Polaris Contract Manufacturing, Inc.

Electronic Contract Manufacturer with 30 + years experience producing mission critical CCA's/PCB's

- Non-Traditional Large business. A wholly owned subsidiary of Lockheed Martin
- ISO 9001:2015, AS9100:2016, ISO 13485:2016 IPC-610-A- 610 Class 2 & 3. ITAR Registered
- 40,000 sq ft facility located in Marion, MA
- DoD Top Secret Cleared facility.
 - **Dennis Vetrano 774-553-6392**
 - **dennis.vetrano@lmco.com**

Core Capabilities

- 30+ years manufacturing to military specs and the underwater environment.
- DFT (design for test) Engineering if requested.
- ICT, Functional Testing are core capabilities
- Nordson Dage automated x-ray with oblique angle. Mirtec Optical Inspection



Strengths / Capability Highlights

Mission Critical CCA's/PCB's production. to military specifications and box builds.

- SMT, Thru Hole, Flex, Prototypes
- Box build and sub assembly
- DFM/DFT
- ESS/Halt/HASS Testing
- Potting
- Classified production
- Sourcing/Obsolescence Management/PM



Teaming

Companies looking for electronic CM for CCA's and PCB's and BOX builds.

- We are looking to team with companies needing quality, cost effective production. Polaris understands defense requirements, productions to military specs and the undersea environment.
 - Some past and present experiences;
- ***DoD, U.S. Navy, U.S. Airforce, Missile Defense, US Army.***
- MK48 , EMAT, Oceanographic Instrumentation, Space Fence, Stinger Fuze, Robotics, UUV



Polaris Contract Manufacturing

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- 40,000 square foot facility located in Marion, MA
- Certifications
 - ISO 9001:2015 Certified
 - AS9100 2016 Certified
 - IPC-A-600, 610 and 620 Trainer Certified
 - J-STD-001, Class 2 & 3
 - DoD Cleared facility, Classified
 - ITAR,EAR, ROHS Compliant
 - ISO 13485:2016
- Specializing in:
 - SMT/mixed technology PC board assemblies
 - Flex Circuits
 - Full Box Build Assemblies
 - Customer fulfillment distribution
 - Complex high reliability applications
 - Conformal Coating
 - Cabling



Experience with all Phases of CCA Production from Prototype to Full Rate Production including In-Circuit and Functional Testing

Surface Mount Technology and Thru Hole

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Surface Mount Technology

- Speed Line Automatic Screen Printer
- Fuji CP6 & Flex placer- High speed placement
- 40K PPH, 0201 chip placement, 20mm Square, .5mm pitch uBGA/CSP
- Max board size 14" X 18" {exceptions to do larger boards }
- No limit on layers of boards
- Fuji IPs - Multi part placer
 - 2400 PPH, 0201 chip placement, 72mm Square, 12mil pitch FQFP, .5mm pitch BGA 900 + ball count
- BTU International- Pyramax 125A Ovens
- Full BGA / uBGA competency
- Assembly technologies:
 - Double sided reflow, pin in paste
 - No clean and lead free solder paste option



Thru Hole

- Universal Axial Insertion
- Universal Radial Insertion
- Universal D.I.P. Insertion
- Contact Systems CS400





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Manufacturing Engineering

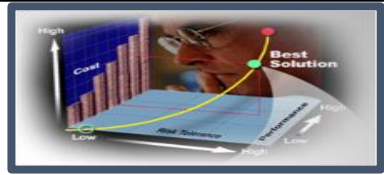


- Converts customer data into complete manufacturing documentation package
 - Programs for computer aided manufacturing system (Solumina)
 - Work instructions and visual aids
 - BOM loading to ERP system
 - Establish quality data collection points
 - DFT/DFM Excellence
- Full DFM/DFT reporting with 1st article acceptance
 - DFM guidelines are based on IPC standards

Final Assembly and Box Build

- Dedicated work cells for Major Assemblies
- Manufacturing of simple and complex electro-mechanical assemblies
- Build to print manufacturing
- Warranty and repair depot.
- Order fulfillment programs with direct shipment to end customer.

Sourcing



- 30+ years experience and history of strong relationships with suppliers to reduce your costs.
- LM affiliation creates strong buying power reducing your costs.
- Adept at finding alternate sources to avoid delivery problems and keep costs down
- Work with Component Engineering to insure alternate sources are acceptable equivalents;
- Obsolescence Management

Polaris 30 Years of Experience

- Trusted Electronics provider to both Commercial and DoD
- We have experience in mission critical manufacturing SMT in many industries. The following are examples;
 - Medical
 - Oceanographic
 - DoD
 - Robotics
 - Military
 - Prototypes



Polaris Contract Manufacturing Test and Inspection

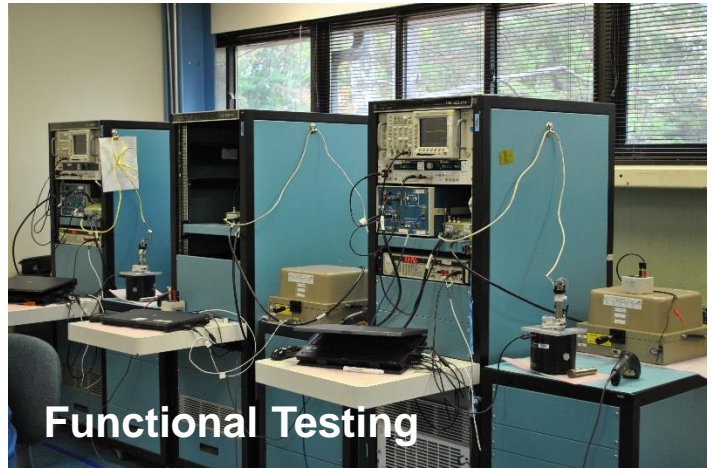
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Inspection

- Nordson Dage XD7600NT, X-Ray capacity for critical inspection
- Mirtec MV-7xies Automated Optical Inspection (AOI)
- Thermo-vision 400 thermal image camera
- Nikon Measuring microscope

Test

- Integrated design for testability guidelines and testability reviews
- Test Strategy Development / Review
- GenRad 228X ICT and TS124 In Circuit Test (ICT)
- Takaya Flying Probe Test System
- Full environmental test capability, including shock, vibration, temperature, pressure and vacuum test capability.





Polaris Customer Centric Organization

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Polaris Customer Process





Quality

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Quality is the longevity a customer gets out of their product without failure.

“

Quality is never an accident; it is always the result of high intention, sincere effort, intelligent direction and skillful execution; it represents the wise choice of many alternatives.



William A. Foster

USMC – Medal Of Honor - 1945 KIA

Back Up Slides





Quality – Inspection Process

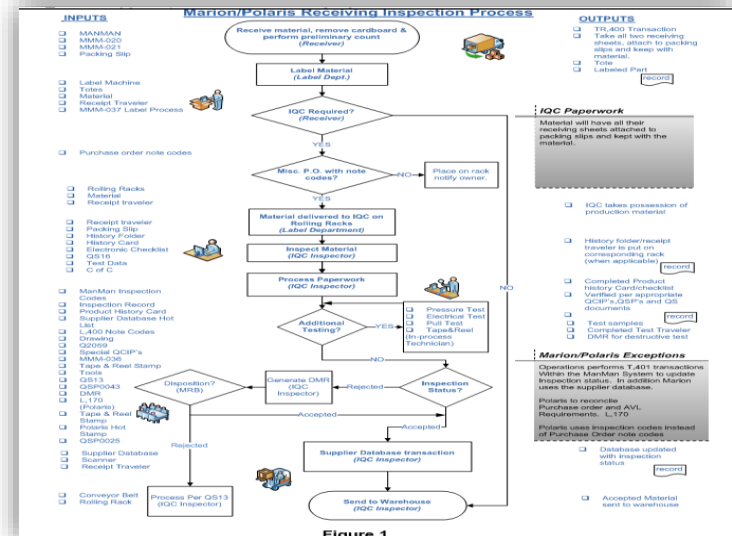
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- Polaris Receiving Inspection Process is governed by QS10-1 (Receiving Inspection Process)
- Prior to order Supplier Quality Engineering codes all purchase requisitions with the appropriate inspection code, which denotes the Receiving Inspection requirements for each PN

Inspection Code in ManMan®

Table 1. Inspection Codes

Code	Description
2	MSDS Required Inspect Per QSP0025
3	Test and C=0 or AQL Sample Inspection
4	C=0 or AQL Sample Inspection of Mechanical Parts
6	C=0 or AQL Sample Inspection of Mechanical Parts- Inspection Folder
7	Dock to Stock - Lots with Limited Inspections (DTL)
8	COTS Items Visual Inspection Required
9	Dock to Stock - No Inspection with Surveillance Audit (DTS)
20	First Article Inspection Required (FAI)
30	Inspection of Second Source Operation - Verify Parts are Programmed
40	Second Source Operation Required - Internal
50	Second Source Operation Required - External
60	AQL Internal Source XRAY Inspection
90	Consignment Material from Customers
100	Broker - Heightened Inspection Required
200	Moisture Sensitive Device from Broker - Heightened Inspection Required
300	Moisture Sensitive Device
400	On-line copy of Product History Card is Available
1000	Data Required Electronically (CofC, Lower level cert, Test, FAI, etc.)
2000	Tape and Reel Required
3000	ROHS Compliant
4000	ROHS Compliant and Tape and Reel Required
5000	Special Process- Lower Level Certification Required (Supplied Electronically)
10000	C of C Required
20000	C of C and Solder Sample Required
30000	C of C - Solder Sample- Inspection Data Required





Quality

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- Defect data is gathered in UNICAM or DMR Database per POLMEI00002, POLMEI00003, and QSP0043
 - Defect data is reviewed by the Polaris Management/Support Team on a daily basis in the Polaris Production Meeting
 - Defect data (DPTH) is reviewed at the site Manufacturing Operations / Business Performance level in the Monthly Operations Review
 - Defect data is reviewed at the Monthly CAB

Date Defects Occurred	PRODUCT	LOT	Route Step	Defect Label	Part Number	Ref Des	Machine	Tall Pole Quantity	No. Of Brds/Assys	R/I	Status	Notes
10-24-2017	LMCO77C361837G1	30153	(0110)Test-Dur2, (0110)Test-Self1	222 Add A Note - Report a				4	4	BM	Open	
10-24-2017	LMCO8323155-100	24971	(0040)Smt/EoIInsp-Bot, (0130)AOIBottom, (0040)Smt/EoIInsp-Top	CT-Tombstone	120-CAP0021, 120-CAP0020, 120-CAP0024, 120-RE30034	C273, C65, C67, C251, C250, C272, C68, C336, C270, C271, C90, C136, C113, C42, C12, C158, C43, C232, C359, C358, C153, C318, C249, C157, C339, C338, C134, C314, C135, C66, C64, C337, C338, C343, C347, AR23, C25, C337, CR30, CR21, CR26	CP6BOT, CP6TOP	98	30	SV	monitor	Artwork stretch. Will create shift in paste to pad registration. This stretch pad layout, tombstoning can occur. Eng. worked with operators to minimize reducing tombstone defects. Moving to a one-up or two-up array w tombstoning.
10-24-2017	LMCO8323155-100	24971	(0040)Smt/EoIInsp-Bot, (0130)AOIBottom	SB-Solder Bridge	120-DI00001, 120-IC50025, 120-CAP0002, 120-CAP0021		IP12BOT, IP1BOT, CP6TOP	12	10	SV	monitor	6 of 12 defects were AR23. XP2 machine was adjusted to optimize 2 v DI00001, these are 5 pin line pitch diodes, some minor amount
10-25-2017	GOODRICHK21-25712-003	30166	(0040)Smt/EoIInsp-Top	CM-Missing part	306-10308	U66, U63, U72, U73, U67, U68	IP12TOP	10	2	BB	closed	they ran out of parts on the line, but ran the remaining 2 boards
10-25-2017	LMCO77C361803G1	24953	(0130)QTI-Dur/Open Defect Check	CA-Comp. alignment	142-CAP0025	C27, C89, C65, C148	CP6TOP, CP6BOT	47	20	JA, BB, MV	monitor	Jacob took a look and is tightening up the limits on the AOI machine. Flat to look up what time defects occur
10-25-2017	LMCO8323155-100	24971	(0040)Smt/EoIInsp-Top	CT-Tombstone	120-CAP0020, 120-CAP0021	C42, C180, C226, C111, C260, C181, C13, C204, C358, C223, C293	CP6TOP	18	12	SV	monitor	Artwork stretch. Will create shift in paste to pad registration. This stretch pad layout, tombstoning can occur. Eng. worked with operators to minimize reducing tombstone defects. Moving to a one-up or two-up array w tombstoning.



Quality

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- Rework - Assembly defects are logged and tracked in the UNICAM shop floor control system IAW POLMEI00002 & POLMEI00003
 - Each assembly is electronically identifiable as non-conforming
 - Test failure are also physically tagged to ensure pertinent test defect information is identifiable
- Material Review Board (MRB)
 - Items written on DMR are physically in an MRB cage
 - Quality Engineering is responsible for physically moving this material to its disposition location

10/25/2017 13:30:00	LMCO77C961803G1, -	24959	2495943141	(61B)LMCO Vector Sensor	CA-Comp.alignment	C89	142-CAP0025
10/25/2017 13:30:00	LMCO77C961803G1, -	24959	2495943151	(61B)LMCO Vector Sensor	CA-Comp.alignment	C89	142-CAP0025
10/25/2017 13:30:00	LMCO77C961803G1, -	24959	2495943090	(61B)LMCO Vector Sensor	CA-Comp.alignment	C89	142-CAP0025
10/25/2017 13:30:00	LMCO77C961803G1, -	24959	2495943065	(61B)LMCO Vector Sensor	CA-Comp.alignment	C89	142-CAP0025
10/25/2017 13:30:00	LMCO77C961803G1, -	24959	2495943082	(61B)LMCO Vector Sensor	CA-Comp.alignment	C89	142-CAP0025
10/24/2017 06:57:13	LMCO77C961803G1, -	24959	2495943062	(61B)LMCO Vector Sensor	CA-Comp.alignment	CR3	142-DI00003

DMR Form

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Marion

New DMR | Top Form | Disposition | Corrective Action | Rework | Print | Close

Dmr No.: 209823 Job #: 505 Originator: Shea, David
Date: 10/19/2017 WO/Rec#: 23155 Top Level PN: 8553409-1
Qty. Rec: 1 P.O. #: Desc: ASSY, TWC MODULE
Vendor #: Vendor Name:
Origin: RI INP Buyer Code: Buyer Name:

Mr No: 209823 Risk: **Open** RMA Rec: 1 1 of 1
Part No: 8553409-1 Rev: G CIA Req: Due: QCE: 5 Hainey, Paul
Desc: ASSY, TWC MODULE Resp: ME: 5 Fuda, Lou
y Def: 1 EA S/N AP686 No FRACAS Due: Design: 5 Branco, Paul
Date: 10/19/2017 Seq #: 6130 Consign: Resp: PC: 5 Cavacio, Penny
Disp: 5 Repair RMA Rec: VMA # VDMR # SQA: Create Direct Cost:
Class: Show All RMA Rec: VMA # VDMR # Create Direct Cost:
Defect: CL Component Lead Defect - a RMA #: VDMR #: \$2,313.59
Desc.: Pin damaged and solder pad lifted off board on the P1 connector. See arrow.
Will be repaired under QSP0125. DCMA will be notified on the monthly QSP0125 report.

No Mvage
Find Rec Status: Description:
Corrective Action:
Mr No: 209823 Resp:
Part No: 8553409-1 Quality Eng:
Record: 4 of 9789 of 9815 No Filter Search



Polaris Manufacturing Operations

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**Polaris
Manufacturing
Andrew Minville**

**Manufacturing
Program Mgr
Scott Satur**

**Polaris Ocean/Met
Manufacturing
Alan Sequeira**

**Circuit Card Assemblies
OPEN**

**GNC, Value Add
Anthony Maciel**

**Manufacturing
Engineering & MFTA
Bill Frazer**

**Test & Test Eng
Support
Brian MacHaffie**

- **T16-ISIS**
- **SSBN-R**

Brandon Ginnetti
 Ali Shokohzadeh
 Evan Dupree
 Surn Nguyen
 Gabriel Abade
 Laurianna Doire
 Justin Ieronimo
 Gina Pires
 Jamie Gallagher
 Linda Charron
 Danny Ly
 Navid Shokohzadeh
 Grace Chu
 Conner Borus
 Matthew Macedo
 Amrit Bachan
 Chanouch Soeum
 Marcui Horta
 Kayleigh Simas

SMT/EOL/AOI/Xray
 Quyen Pham-Nguyen
 Pierre Gavilanez
 Zachary Odle
 Robin Pina
 Adam Fisher
 Phillip Jenkinson
 Bruce Yonn
 Lynn Para
 Jala Phromsalee
 Bonna Chea
 Mark Thibodeau
 Baylaka Collazo
 (Bay) Phoungoun
 Saengsyri
 Georgi Dimitrov
 Drew Harrison
Final Assembly
 Kevin Andrews
 Marie-Rose Bouramia
 Linda Hogan
 Kevin Loranger
 Matthew Marble
 Edwin De Leon Rosa
EMATT
 Erin Lopes
 Maureen Guarino
 Chan Souza

GNC
 Marcia Regan
 Denise Satur
 Stephen Burroughs
 Joanne Carter
 Kent Childs
 Chindaly Kingvilay
 Lucky Sing

**Value Add/Wave
Solder**
 Michael Bilodeau
 Nga Nguyen
 Donald Parker III

LPA
 (Lisa) Sareth Soeum
 (Scott) Robert Teague

Machine Shop
 Richard Deterra

Mfg Eng
 Stephen Vargas
LEAD
 Jacob Andrews
 Gregory Chin
 Louis Fuda
 Annalisa Santoro
 Stephen Vargas
 Lawrence Lewis
Document Cntl
 Patti Hood
 Jonathan Zinck
TB29 & TB37
 Thu Perry
 Cody Berger
 Nathan Marshall
 Sokhen Kim
 Soulisith Komsa
 Aarron Baptiste
 Robert Cormier
 David Gouveia
 Victoria Vohnoutka
 Sam Proeun
 Ilda Vincent
 Will Rogers
 Jennifer Gabdius
 Isaiah Pires

Test
 Al-Amin Ahmed
 Lawrence Bizarro
 Pierre Desir
 Wendy Howard
 Charn Ratanakich
 Gary Tavares
 Jake Tobiason
 Yves Lebrun
 Leonard Glickman
 William Carberry
 Ron Bush

Shipping
 Odelta Mendonca