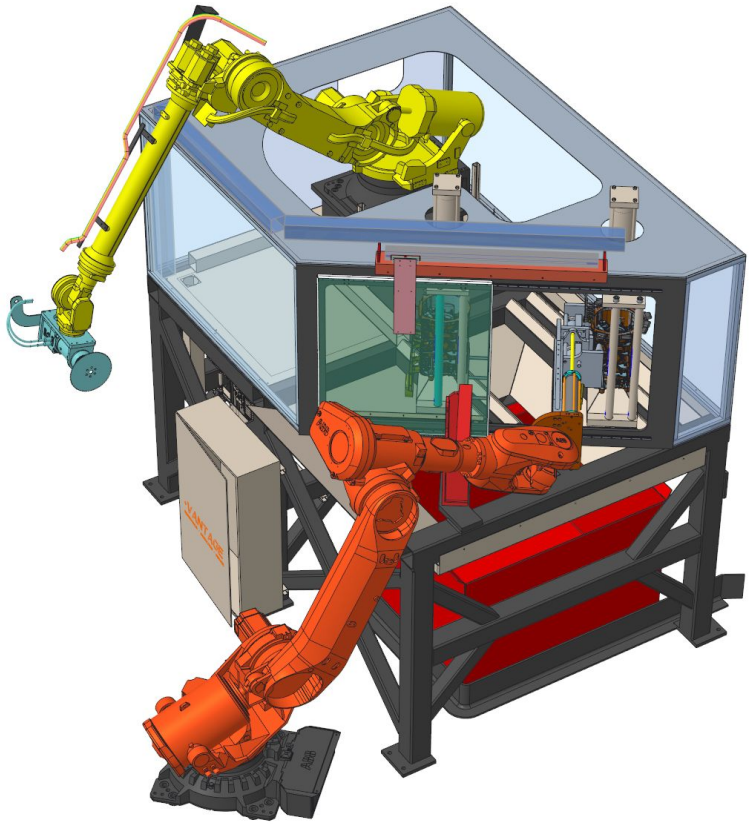
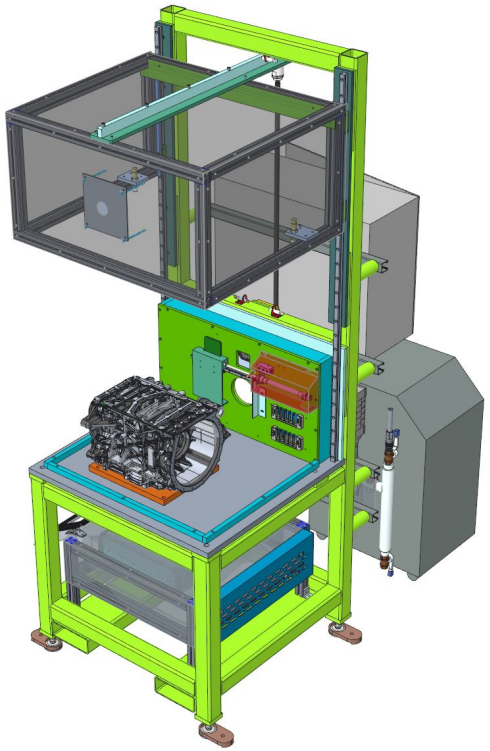
+Vantage Case Study:
Electric Vehicle Solutions

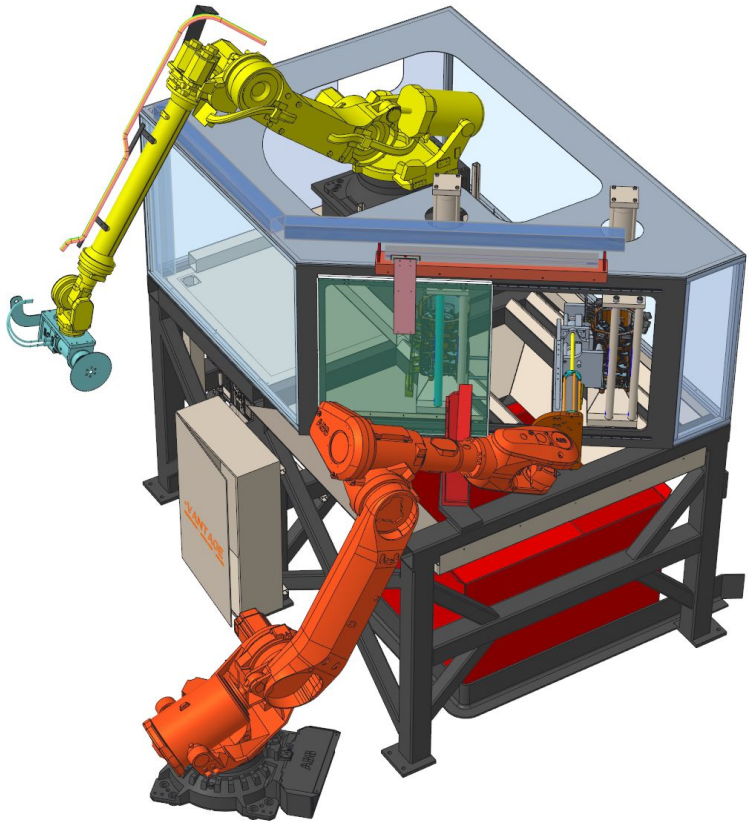
eMotor Housing Degate & Laser Marking System

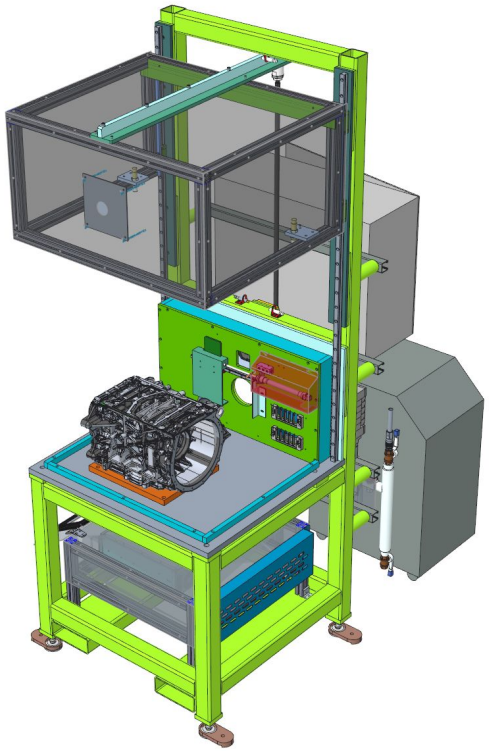




Electric Vehicle Solutions

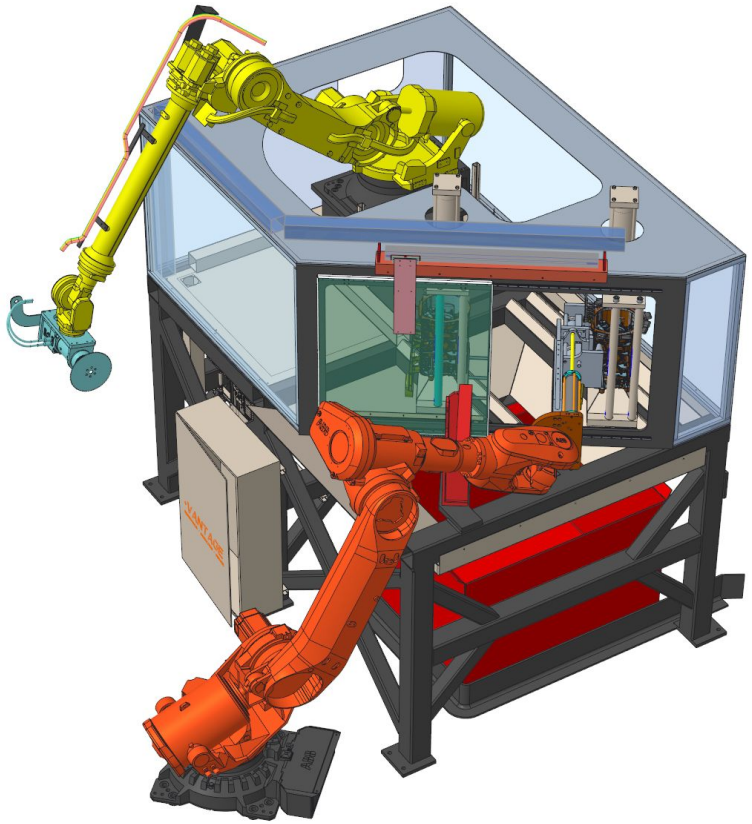
- Parts:
  - eMotor Housing
- Customer Problem:
  - Part manufacturing process develops large amounts of overflow material that needs to be degated from the part
  - The manufactured components required a method of data acquisition & part traceability at the die case process.
- The project:
  - Robotic material handling introduces part to system where overflow material is removed with various operations including robot handled servo-controlled saw and pneumatic press operation. Part is then moved to Laser marking station where barcode is added to part. Marking is verified before robot removes part.
- Process:
  - Robotic Material Handling
  - Overflow Degate Station
  - Servo-controlled Saw
  - Laser Marking Station
  - Marking Verification

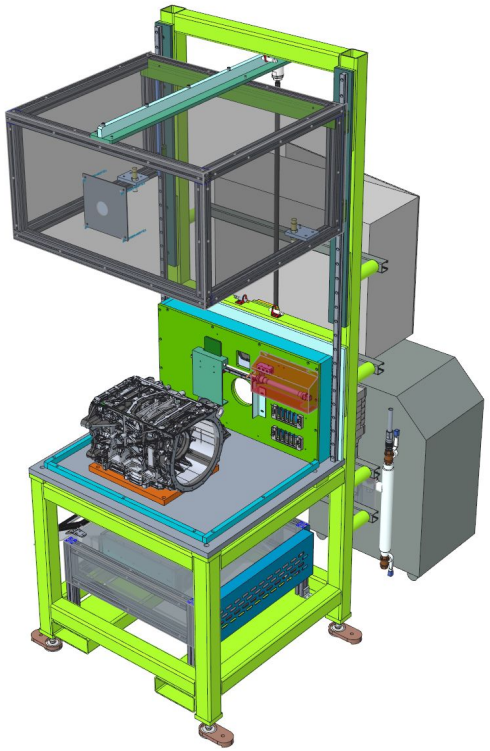




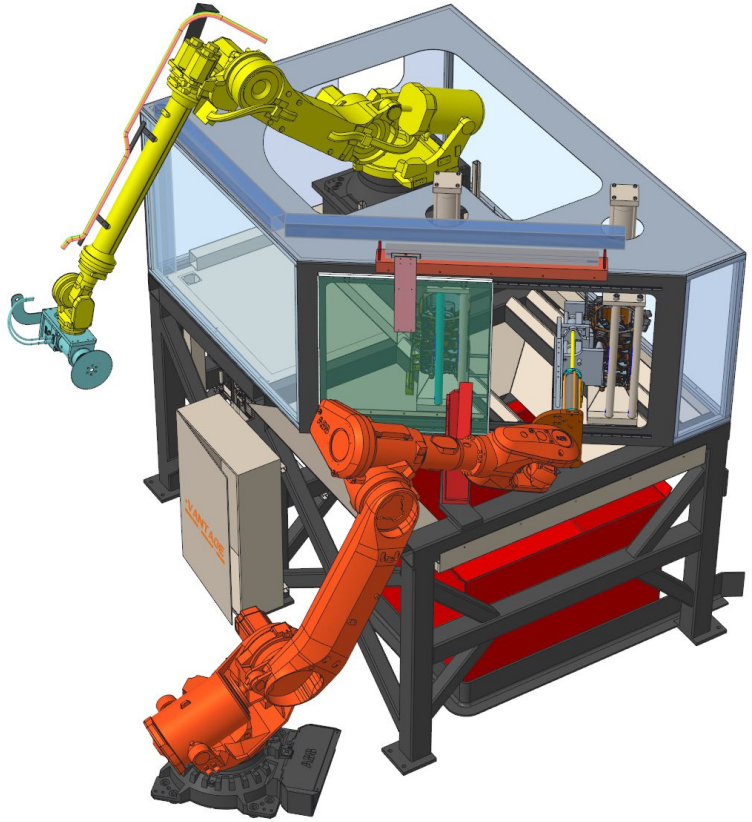
Electric Vehicle Solutions

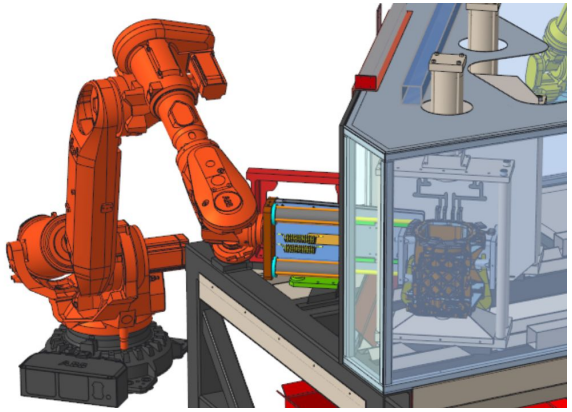
- Components:
  - ABB Robotics
  - Push Corp. Servo Spindle
  - Mecco Laser Marker
  - Keyence Barcode Reader
  - Fumex Extractor



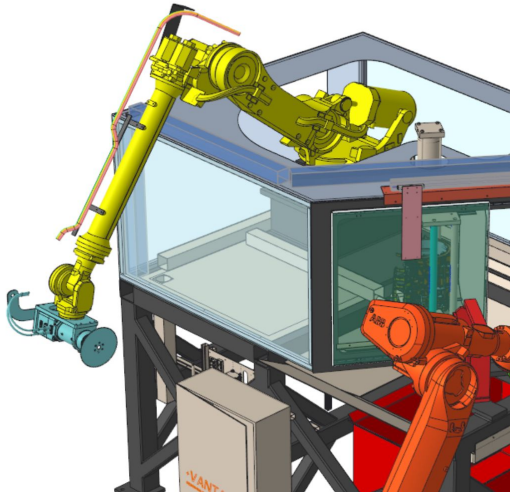


Electric Vehicle Solutions



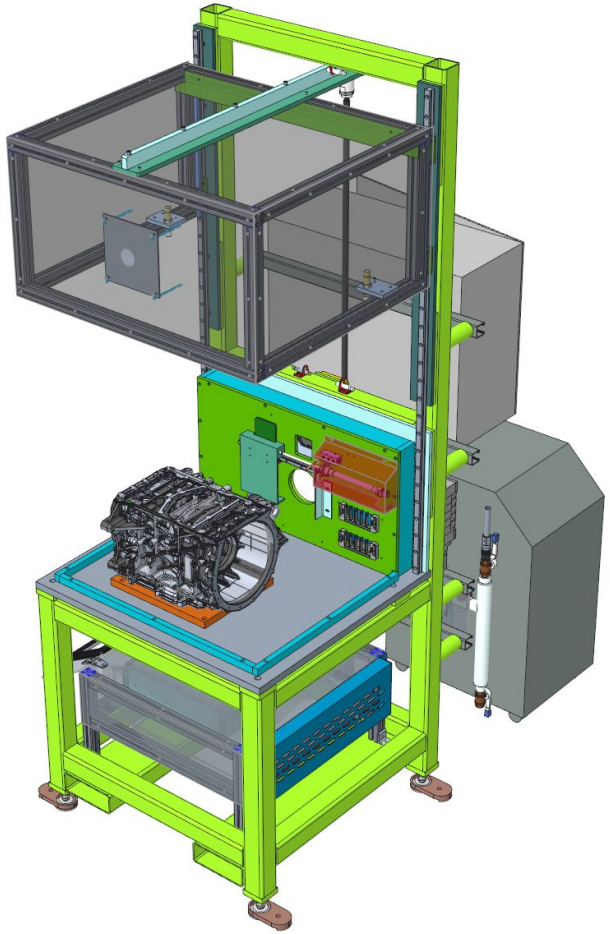


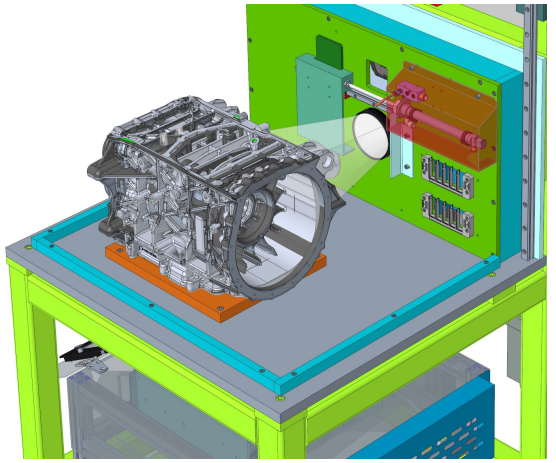
Pneumatic Press Degate



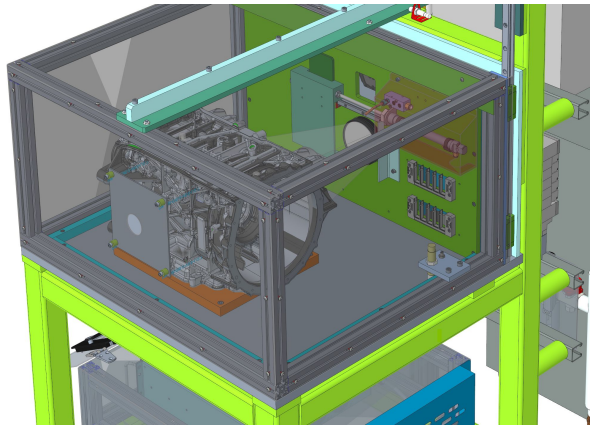
Servo-controlled Saw

Electric Vehicle Solutions



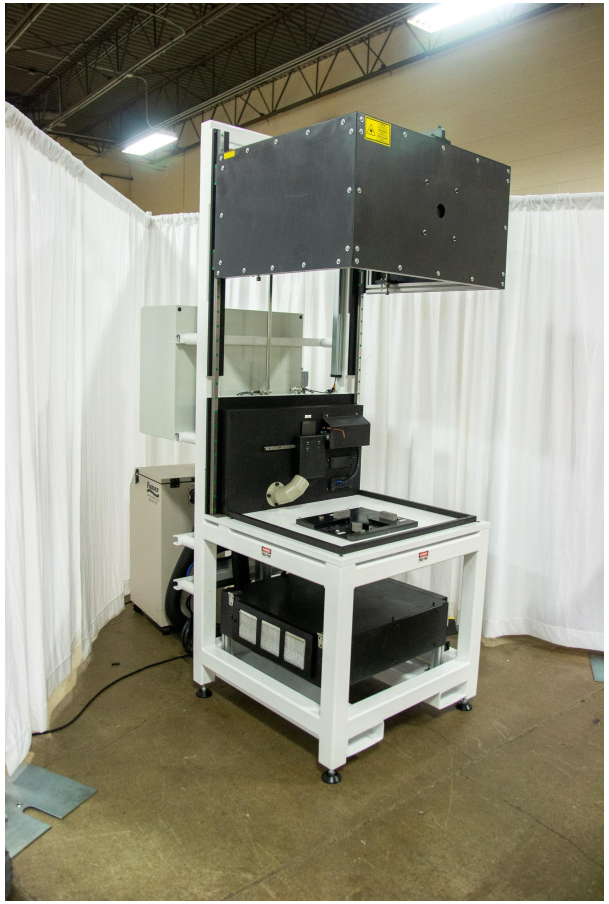


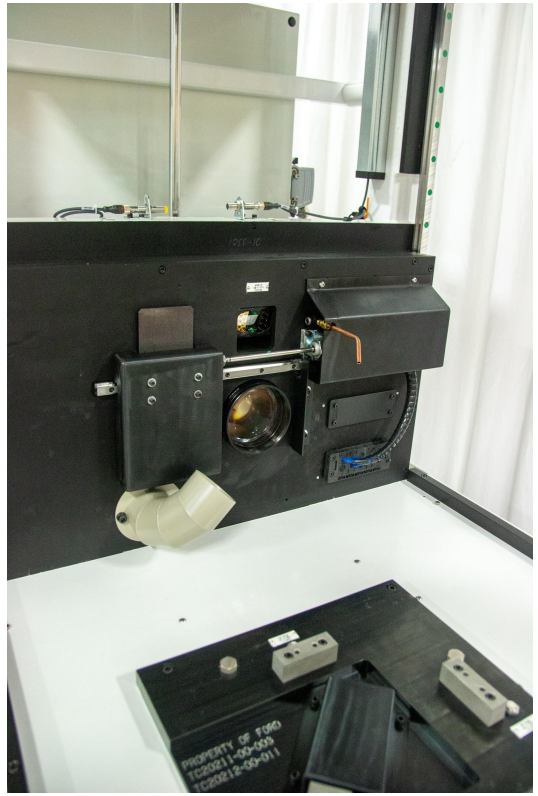
Laser Marking Station



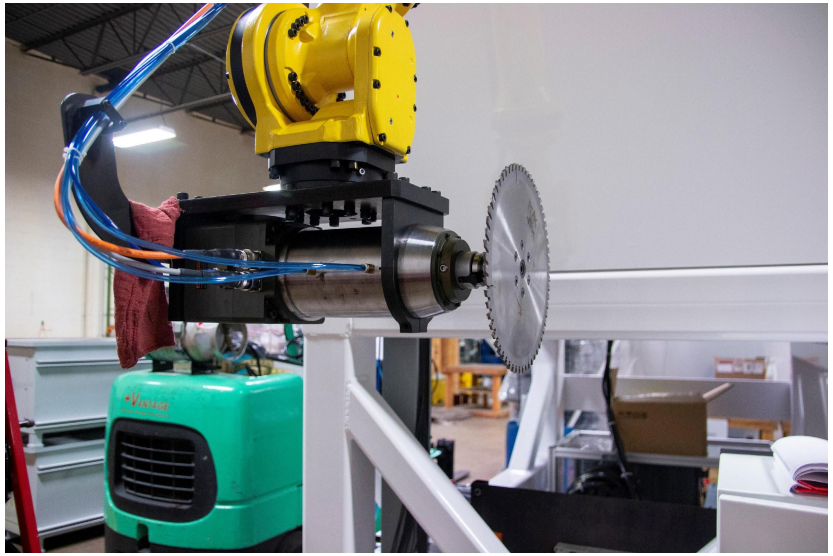
Light Controlled Enclosure

Material Handling Systems & CNC Automation



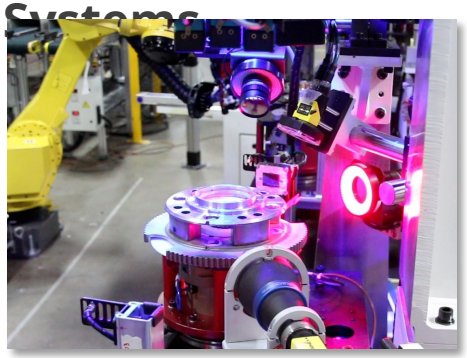


Material Handling Systems & CNC Automation



Core Product Overview

Inspection Systems



Vision, Laser, Pneumatic, Dynamic, Torque, as well as Classification and Identification

Automation & Robotics

Fully automatic systems to streamline your manufacturing process and increase production

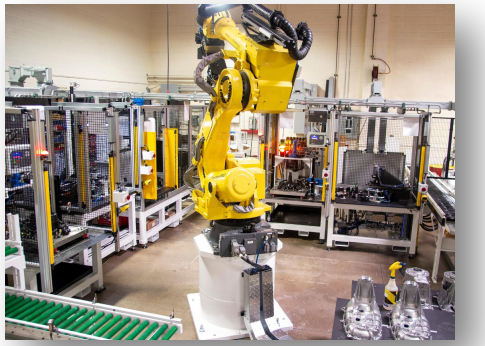
Systems Integration

Custom design or upgrade/retrofit existing lines with the latest sensors and manufacturing technology

Engineering & Service

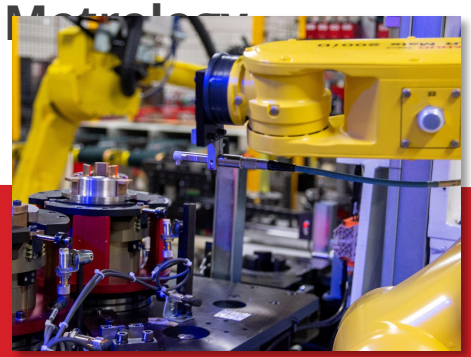
Let the +Vantage team's decades of experience solve your manufacturing challenges

Assembly Systems



Manual and semi-automatic multi-station assembly systems for pressing, torqueing, & riveting

Industrial Metrology



Contact and non-contact gages for precision measurements. In-line and audit room.

Automation Made Seamless

Global Customer Reach

1,500
MACHINES BUILT

250
YEARS COMBINED EXPERIENCE

12
SYSTEMS INSTALLED IN +12 DIFFERENT COUNTRIES

USA (HQ)
12651 Newburgh Rd
Livonia, MI 48150
tel: +1 734 432 5055

Canada
London, ON Canada
tel: +1 226 234 1515

Mexico
Micro Parque Finsa Eje 2 #470-2
Ramos Arizpe, Coah. 25210
tel: +52 1 844 270 9389

China
14/F Suncome Cimic Tower
800 Shangcheng Rd
Pudong New Distric Shanghai. 200120
tel: +86 137 7103 2628

Company Overview

Company Size

- 70 Employees Globally
- 100,000 sq. ft in Livonia
  - Additional office space globally

Certifications

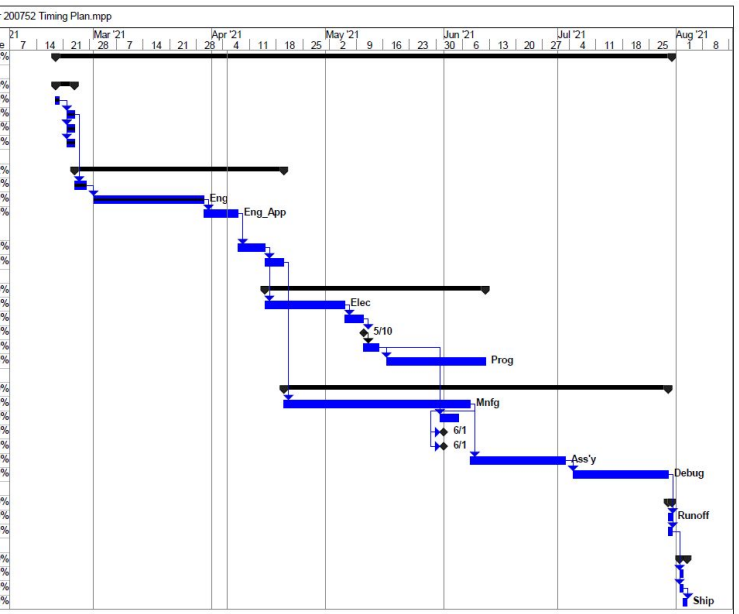
- ISO 9001:2019
- Coherix System Integrator
- Fanuc Authorized Integrator
- Q-DAS ASCII Certification
- Schunk Official Partner
- Solartron Orbit 3 Integrator

Project Management

+VANTAGE

Camcor 200752 Timing Plan.mpp

ID	Task Name	Duration	Start	Finish	Predecessors	% Complete
1	**Camcor 200752 - Base Shaft Assembly System**	**116 days**	**Fri 2/19/21**	**Fri 7/30/21**		**18%**
2						
3	**Open Job**	**3 days**	**Fri 2/19/21**	**Tue 2/23/21**		**100%**
4	Receive PO	1 day	Fri 2/19/21	Fri 2/19/21		100%
5	Initial kick off meeting	2 days	Mon 2/22/21	Tue 2/23/21	4	100%
6	Assign a Job Number to the Project in QuickBooks	2 days	Mon 2/22/21	Tue 2/23/21	4	100%
7	Send PO Acknowledgment	2 days	Mon 2/22/21	Tue 2/23/21	4	100%
8						
9	**Mechanical Engineering**	**39 days**	**Wed 2/24/21**	**Mon 4/19/21**		**62%**
10	Project in Engineering Que	3 days	Wed 2/24/21	Fri 2/26/21	5	100%
11	Create Approval Drawings and submit to Customer	21 days	Mon 3/1/21	Mon 3/29/21	10	100%
12	Design approved by Customer - Design updates by Danilo following feedback and discussions with Camcor ** Critical Path Timing***	7 days	Tue 3/30/21	Wed 4/7/21	11	0%
13	Complete mechanical design	5 days	Thu 4/8/21	Wed 4/14/21	12	0%
14	Release commercial items and build details	3 days	Thu 4/15/21	Mon 4/19/21	13	0%
15						
16	**Electrical/Pneumatic Engineering**	**42 days**	**Thu 4/15/21**	**Fri 6/11/21**		**0%**
	ical design and submit for Approval	15 days	Thu 4/15/21	Wed 5/5/21	13	0%
	ved Customer approval for Electrical/Pneumatic design	3 days	Thu 5/6/21	Mon 5/10/21	17	0%
	utility information with Camcor	0 days	Mon 5/10/21	Mon 5/10/21	18	0%
	se electrical build	4 days	Tue 5/11/21	Fri 5/14/21	19	0%
	amming	20 days	Mon 5/17/21	Fri 6/11/21	20	0%
	sembly	**73 days**	**Tue 4/20/21**	**Thu 7/29/21**		**0%**
	facturing	35 days	Tue 4/20/21	Mon 6/7/21	14	0%
	ve Electrical/Pneumatic items	5 days	Mon 5/31/21	Fri 6/4/21	20FS+10 days	0%
	ve parts from Customer for Setup and Runoff	0 days	Tue 6/1/21	Tue 6/1/21	24FS-5 days	0%
	ve press from Customer	0 days	Tue 6/1/21	Tue 6/1/21	24FS-5 days	0%
	nbly	19 days	Tue 6/8/21	Fri 7/2/21	24	0%
	ate programming and debug	19 days	Mon 7/5/21	Thu 7/29/21	28	0%
	at Vantage	**1 day**	**Fri 7/30/21**	**Fri 7/30/21**		**0%**
	)ff	1 day	Fri 7/30/21	Fri 7/30/21	29	0%
	mer Acceptance	1 day	Fri 7/30/21	Fri 7/30/21	29	0%
	?ackage/Ship	**2 days**	**Mon 8/2/21**	**Tue 8/3/21**		**0%**
	n	1 day	Mon 8/2/21	Mon 8/2/21	33	0%
		1 day	Mon 8/2/21	Mon 8/2/21	33	0%
	/21)	1 day	Tue 8/3/21	Tue 8/3/21	37	0%



+Vantage - Action Item Deck

Revised 3/24/21

Project: Camcor 200752 Assembly System

+VANTAGE

Q064 Action Item Deck Rev 1 9-18-2017

item	Operation	Item Description	Key Contact for Item	Actions	Date Open	Target Close date	Actual Close Date	Comments (and note effectiveness if applicable)
5	Press	max expected press force for retainer	Shawn		3/8/2021	3/12/2021		(3/10 Shawn working to get this info from Eston) (3/18 Shawn still waiting for info - will try again) (3/24 Shawn sent some older 2018 and 2019 data - loads are VERY low.- some around 126 N. Danilo talked with Promess and they calculated 12.5 Kn. Big difference. - Shawn still trying to get current data. Danilo said Shawn could send sample parts to Vantage and the Vantage could send parts to Promess. Per Shawn they are not machining parts now - would need to get parts from Eston. Shawn to see if he can get 5 shafts from Eston and some retainers we can send to Promess)
9	Eng	Shawn to look at in process tolerances for journals - Danilo is considering to use Vees to support journals during press.	Shawn		3/10/2021	3/12/2021	3/24/2021	(3/18 +/- .1 current tolerance. Vantage is wondering if in process spec could be that all diameters on one part are held within tighter tolerance) (Per Bobby Large journal will be +/- 0.01 mm and smaller inside journals can be +/- 0.1 mm. They are done in different operations. Bobby indicating concern with shaft bending. Critical item to get press force info - see item 5 so analysis of potential bending can be performed) (3/24 will close - see item 5 and 15)
11	Feeding system	Vantage using Feeding Concepts for feeding systems. Request deviation from Camcor spec that was sent 3/12. PO has been placed.	Shawn		3/18/2021	3/19/2021	3/24/2021	(3/18 Shawn will investigate. Vantage has developed this project with Feeding Concepts before specification was received.) (3/24 Deviation approved to use Feeding Concepts - commercial issue - Vantage did not have machine spec revision in quoting stage)
12		Bobby requesting to look at feasibility to check retainer height 0/-0.3	Danilo/Todd		3/18/2021	3/31/2021		(3/24 request in in Proposal department - should have by next week)
13	Feeding system	1/2 cubic feet retainers and coffee can of balls	Shawn		3/18/2021	4/1/2021		(3/24 Shawn working with Eston to try and get parts)
14	Shipping/ install info	Shawn requesting info re. shipping and utilities	Shellie/Zach	KTA tooling Vendor | KTA tooling at Camcor | Crating? | Special Requirements | Voltage | Electrical Service Size	3/22/2021	7/23/2021		(See email sent 3/22/21 from Shawn. Utility information can be provided sooner after electrical design)
15	Eng	FEA Study for press operation	Danilo	Ref Item 5 and item 9				(3/24 Danilo did Preliminary FEA study on current design based on 20Kn and 12.5Kn. If 20Kn force applied, will deform shaft. 12/5Kn would not deform shaft. Is below max yield)

Automation Made Seamless

Proud Partners of:

+VANTAGE

Robotics

FANUC

ABB

MITSUBISHI ELECTRIC
FACTORY AUTOMATION

adept

Kawasaki Robotics

KUKA

IAI
Quality and Innovation

Vision Systems

KEYENCE

COGNEX

LMI TECHNOLOGIES

DATALOGIC
THE VISION IS YOURS

wenglor
the innovative family

Coherix®

Marking Systems

DATALOGIC
THE VISION IS YOURS

KEYENCE

MECCO®

TELESIS

VIDEOJET

PLC

Allen-Bradley

SIEMENS

MITSUBISHI ELECTRIC

GE

Torquing/Pressing

Ingersoll Rand

FEC

Atlas Copco

Desoutter

TOX®

Our Featured Customers

+VANTAGE

Cummins · zion AUTOMATION · AAM · ACCU-CUT · GM · MACIMEX THE POWER INSIDE YOUR ENGINE

BorgWarner · WOODWARD · HELLER · means II

CAT · MAHLE Driven by performance · SHILOH · ALBON ENGINEERING & MANUFACTURING plc · EATON · CBS · JD Norman INDUSTRIES

berger · nemak · HILITE INTERNATIONAL · SUNNEN · GT Technologies

MAGNA POWERTRAIN · DOER FER Companies · FUJIFILM · FEDERAL MOGUL · DAYCO

Formsprag Clutch · HITACHI · DELPHI · nexteer AUTOMOTIVE

STELLANTIS · varroc EXCELLENCE · NAGEL · LINAMAR Power to Perform

federal Screw Works PRECISION COLD FORMING & MACHINING · Coherix · TRW · BRIGGS&STRATTON · C&H DIE CASTING

Automation Made Seamless

On-Site Service & Support

100% Dedication to Customer Service

Global Support On-Site Representatives

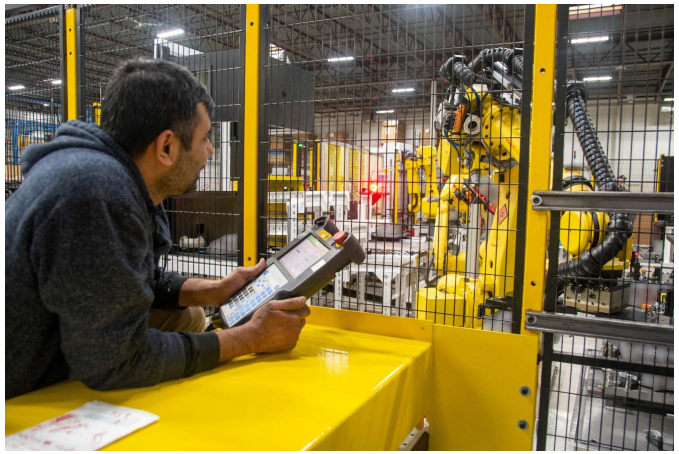
Quick Response Unit and Down Time Recovery

Remote Log In Service in a Moments Notice

24/7 Service Support

On-site Contracts Available

Highly Trained Staff of Engineers & Technicians



USA
12651 Newburgh Rd
Livonia, MI 48150
tel: +1 734 432 5055

Automated Inspection

Mexico
Micro Parque Finsa Eje 2 #470-2
Ramos Arizpe, Coah. 25210
tel: +52 1 844 270 9389

Quality Assurance

Canada
London, ON Canada
tel: +1 226 234 1515

Thank You for Reading!

Zero Defects

China
14/F Suncome Cimic Tower
800 Shangcheng Rd
Pudong New District Shanghai. 200120
tel: +86 137 7103 2628

+VANTAGE
Metrology & Assembly Solutions