

To: Shiloh Die Casting
Clarksville TN Plant

Date: January 3, 2018

For: **Martijn de Vries**

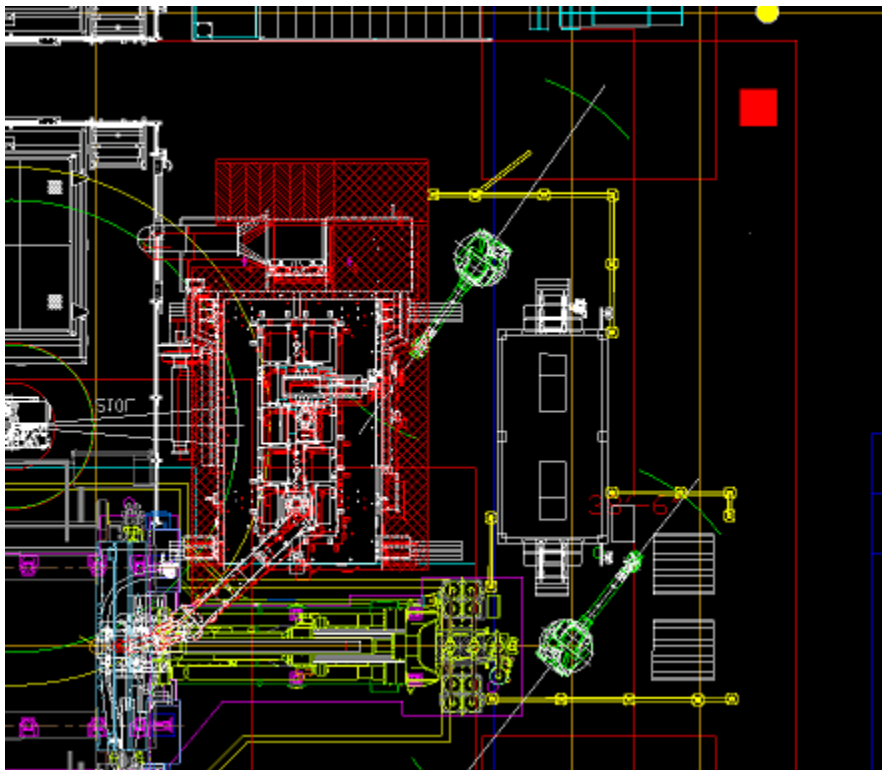
SUBJECT: Proposal #Q218247 Two Robot Ingot Load System for the 4th Buhler Carat DCM

The concept for the system is to integrate a FANUC FP M710iC/50 Ingot De-Stacking robot and a FANUC FP M710iC/45M Rauch Mag Furnace Load Robot to perform the De-stacking of ingots, loading on Pre-Heat conveyor, unloading Pre-Heat conveyor and placing the ingots directly into the Mag Furnace.

The system quoted in this proposal is for a turn-key system that includes all engineering, construction, programming, and integration into the main system.

*** Note: Shiloh White Foundry Pro options for these Robot Models is usually a 26 week lead time from Fanuc Japan. ComTech will need 6 weeks after receipt of the robots to Integrate the system on our floor ready for Runoff, hence the 32 week lead time.

1) Layout



2) FANUC Foundry Pro M710iC/50 Robot w/ R30iB A Plus Controller

- A. Payload 50 Kg / 110 lbs
- B. Reach 2050 mm / 80 inches

3) FANUC Foundry Pro M710iC/45M Robot w/ R30iB A Plus Controller

- A. Payload 45 Kg / 99 lbs
- B. Reach 2606 mm / 102 inches

4) Commonality

- A. 6 Axis Vertically Articulated Arm
- B. Repeatability 0.17mm/.008 in
- C. R30iB Plus Controller
- D. Teach Pendant Programming
- E. Brakes on all 6 axes
- F. Programming Pendant
- G. Main power disconnect
- H. Fence and E-Stop Circuits
- I. Automatic restart function
- J. Air and signals to upper arm
- K. Complies with RIA/ANSI 15.06-1999 Safety Standards

**5) Robot Options**

- A. Material Handling Software Bundle with Collision Detect and Singularity Avoidance
- B. DCS Dual Check Safety Monitoring
- C. Profibus Network Communication module
- D. Soft Float (Destacking)
- E. Foundry Pro Industrial seals
- F. Custom Painting of FANUC Robots Shiloh White RAL 1016

6) Robot Risers

- A. Comtech will make new risers with the Fanuc Robot hole pattern for both robots, to bring the centerline of the reach up to the optimal height for loading or unloading ingots .
- B. There will also be a cable guard that attaches to the back of the robot or to this riser which will protect the robot cables from any damage.
- C. The Riser will be mounted to the concrete floor with epoxy anchors.

7) End-Of-Arm-Tooling for De-Stacking Robot

- A. The De-Stacking Robot will have a Laser sensor mounted to the EOAT to locate the ingot on the stack.
- B. Once the ingot is positively located, the Vacuum gripper will pickup the ingot from the stack and place it on the PreHeat conveyor.
- C. Sensors will be wired into the junction box mounted on top of the arm along with the solenoid valve operating the venturi vacuum.
- D. The Filter/Regulator unit will be mounted on the robot base.
- E. Wiring, valves, sensors, plumbing, junction box and cables all included.

8) End-Of-Arm-Tooling for the Furnace Load Robot

- A. The Furnace Load Robot will have a clamp style gripper that grips the ingot from the end, off the preheat conveyor and is able to lower the ingot into the Mag bath in the furnace before

letting it go. No chutes will be used, Rauch would like a clean easy drop with the robot.

- B. Sensors will be wired into the junction box mounted on top of the arm along with the solenoid valve.
- C. The Filter/Regulator unit will be mounted on the robot base.
- D. Wiring, valves, sensors, plumbing, junction box and cables all included.

9) Add Profibus Network I/O to both Robots

- A. Since the PLC is Siemens, Profibus I/O will be required for both robots.
- B. Profibus will be used to communicate from the robots to the PLC.
- C. This will allow the status of the robots to be displayed on the HMI.
- D. All I/O signals from the robot will be incorporated into the HMI along ingot stack details.



10) Ingot Stack Locators and ingot chute

- A. There will be locators mounted on the floor to guide the operators where to set the two stacks of ingots.
- B. There will also be a chute where the operator can slide a loose ingot from outside the cell into the robot. An ingot present switch will identify an ingot is present in the chute. The robot will always take this ingot first to leave the chute open for another ingot.

11) Cell Guarding

- A. Shiloh Standard safety yellow eight-foot fencing will surround each cell independently.
- B. The entry gate to the Furnace load robot will have the standard gate lock same as used on the main cell.
- C. The ingot De-Stacking robot will have a set of light curtains across the front of the cell where the operator will place the two stacks of ingots, this will also be the entrance into the cell.
- D. The ingot De-Stacking robot cell will not stop the furnace load robot cell or the main cell from running.
- E. A Remote door entry request box for each cell will be mounted on the fence next to the entrance.



12) Electrical and Controls

- A. Both of these cells will be wired into and controlled by our System Main Control Panel (MCP).
- B. Profibus will be used to communicate with the MCP and HMI.
- C. A simple push button box will be mounted on the fence at the entrance of each cell, this will have the Cycle Start, Cycle Stop, Fault Reset, Home and E-Stop capabilities all other displays and information will be in the Main HMI.
- D. The Fence Safety circuits will keep these two cells separate from the Main System, this way the De-Stacking robot can be stopped to load a new stack of ingots without shutting down the main cell or the Furnace Load robot.
- E. HMI display screens will be similar to the other robots, Ingot counts, time out errors, Furnace or PreHeater faults, I/O status screens, will all be added to the HMI.
- F. Changes to the PLC, HMI, Electrical Drawings, I/O structure, PLC Programming, and HMI screens will be done as needed.
- G. Additional Wireway will be added to Main system to reach to these robot controls.

13) Programming and Integration for the Ingot De-Stacking and Furnace Load Robots.

- A. Programming and Setup of the ingot De-Stacking Robot to destack the ingots and load them one at a time on the PreHeat conveyor.
- B. Programming and Setup of the Furnace Load Robot to remove a hot ingot off the PreHeat conveyor and place it gently into the Mag Furnace.
- C. Integration of Signals will be controlled through the FANUC Controllers to the MCP.
- D. Installation and on site Programming and setup are included in this breakdown.
- E. Documentation of Setup Parameters, Programs and System Backup disks will be provided.

**14) Engineering Package**

Our engineering package will include:

- A. Mechanical engineering – will develop drawings of the Cell Layout, EOAT's and design any extra features to the system that may be required.
- B. Electrical Engineering – will develop ACAD drawings of all electrical components in the system including interfacing between the robots, Mag furnace, PreHeater and the E-Stop / Fence Safety Circuits.
- C. Controls Engineering - will develop the PLC and HMI programs as outlined in this quote.
- D. Robotics Engineering – will integrate the robots into the system setting up all parameters and safety devices, will program the Robots for the sequence of operations in the system.

15) Documentation Package

- A. Documentation package will include all electrical and mechanical Assembly drawings on CD.
- B. The package will also contain a backup of all robot setup parameters and programs.
- C. All vendor manuals will also be in this package.
- D. A detailed startup/shutdown procedures and operations procedures will be furnished in the documentation.
- E. Recommended PM schedules and spare parts lists will also be furnished.

16) Service and Engineering

- A. Project Management
- B. Cell layout development and comprehensive reach study
- C. Mechanical engineering and tooling/cell design
- D. Controls engineering and integration of all ComTech supplied deliverables
- E. All designs, schematics and information to be formally documented and provided to Shiloh Industries
- F. Documentation to include standard robot manuals on CD, system-specific operation manuals and program documentation, etc.
- G. System set-up and run-off prior to shipment at the ComTech's facility.
- H. Robot path programming for one (1) ingot style
- I. Installation supervision and start-up assistance estimated at 2 weeks at Clarksville.

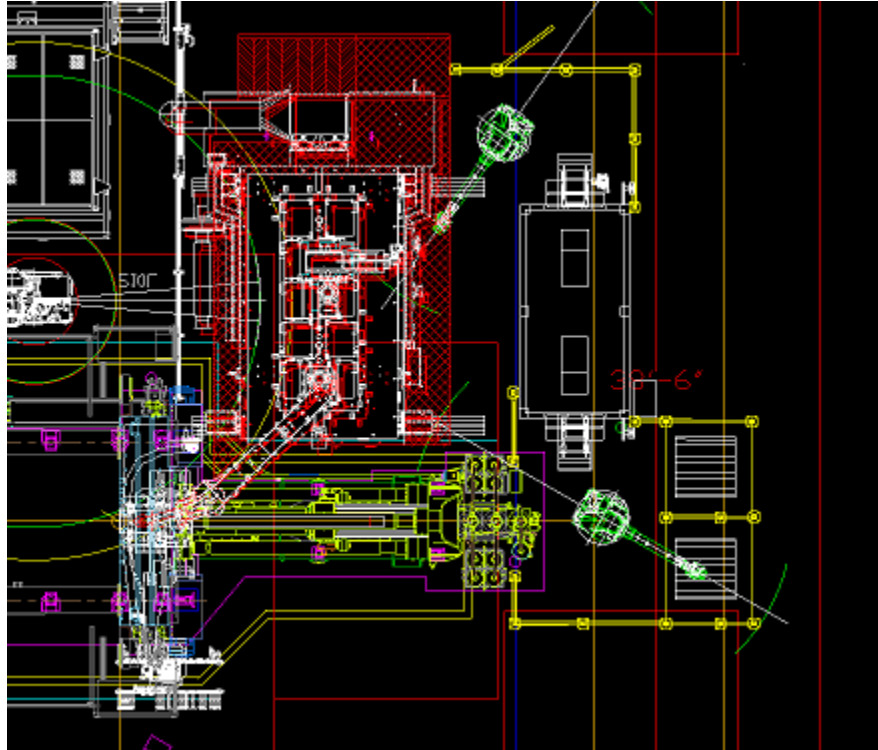
17) Installation

- A. The system will be run off at Combined Technologies.
- B. This will include demonstrating functionality and programming.
- C. Quality and craftsmanship of the system will be approved.
- D. After runoff acceptance, the system will be shipped to SHILOH INDUSTRIES.
- E. ComTech will abide by OSHA and Shiloh Industry safety rules, environmental regulations and procedures. ComTech will document their understanding of Shiloh Industry safety and PPE requirements and shop rules prior to entering the work place.
- F. Onsite labor- ComTech will supply 2 men onsite to perform the following labor support:
 - 1. Mechanical Technician
 - 2. Electrical Technician
 - 3. Robot Technician
 - 4. Controls Engineer
- G. Installation is based on weekly hours Monday through Friday 7am to 7pm.
- H. ComTech will supply all Electrical and Mechanical equipment necessary for the installation.
- J. Upon shipment to SHILOH INDUSTRIES ComTech personnel will help place the system in place and complete all plumbing and wiring interconnections to the cell.
- K. Once the equipment is in place ComTech will wire in the equipment, power it up and debug it.
- L. After system is mechanically and electrically installed the ComTech supplied robots will be taught to run one production model of ingot.
- M. After system installation and acceptance is complete, training on system operations and maintenance will be done.
- N. SHILOH INDUSTRIES will be responsible for off-loading the truck, setting the robots and risers in the cell (we assume the overhead crane will reach this area), connecting 480VAC and air supplies to the connection points of the system.
- O. **ComTech has included 18 man days to install this System.**
- P. **Any significant wait time due to dies, furnace, DCM, etc that results in extraneous installation hours that is not the cause of ComTech supplied equipment will be billed at standard field service hours with Shiloh's pre-approval.**
- Q. **Travel and Living Costs will be billed at the end of the Project on the actual costs incurred in conjunction with the attached Field Service Rates.**
- R. ***Shiloh Responsibilities***
 - 1. *Shiloh Industries will be responsible for supplying 480V and compressed air to the main disconnects.*
 - 2. *Shiloh Industries will be responsible for the unloading of the equipment and setting it in place.*
 - 3. *No rigging costs are included in this proposal.*
 - 4. *Shiloh Industries will be responsible for the decking surrounding the DCM.*

18) Total Investment for the Above Described "Turn Key" System**\$ 229,677**

19) Add an HMI between the two New Robotic Cells**\$ 7,857**

- 1) This HMI will have all the information pertinent to these two cells plus generic status screens.
- 2) The HMI will be mounted in a remote panel same as the Main HMI that can be positioned as desired at install.
- 3) Installation for setup, programming and commissioning with system.

20) Optional Isolating the Ingot Stacks**\$ 29,367**

- A. This would require adding Three sets of light curtains to isolate the two stacks of ingots from each other, some additional fence and another Push Button Station (one for each side).
- B. When the robot is finished removing all the ingots from one stack it will initiate DCS and the inner set of light curtains in that zone and turn on a green light on that side to notify the operator that they can break the outer set of light curtains to place another stack in this zone.
- C. When the operator is finished placing the ingot stack and removing the banding, they will press a push button telling the robot they are finished in that zone so the robot cell can reactivate that zone and start on it as soon as it finishes the zone it's working on.

21) Shipment

- A. Shipment is estimated **at 32 weeks ARO**, based on current delivery of Foundry Pro Robots painted Shiloh White, If shipment is required in less than 32 weeks, painting the robots Shiloh white will cost an additional \$3,000 per robot.
- B. Receipt of machine drawings and any other pertinent information to the design process must be received 4 weeks ARO to guarantee delivery.
- C. Shipment to be made FOB to Customer, Customer pays shipping costs

22) Payment Terms

Special Machine or Equipment Suppliers: The following must appear as individual line items on the requisition.

- a) 20% paid at time of purchase order release; due net 45 from date of Supplier invoice
- b) 20% paid at Mechanical Drawing Approval; due net 45 from date of Supplier invoice
- c) 20% paid at Supplier Receipt of Robots; due net 45 from date of Supplier invoice
- d) 20% paid at time of sign-off by Shiloh on the Supplier floor; due net 45 days from date of sign-off or vendor invoice (whichever is later)
- c) 20% paid at time of sign-off on Shiloh production floor; due net 45 from date of sign-off or vendor invoice (whichever is later)

Regardless of PO terms, the above stated terms remain in effect unless Project Manager of Combined Technologies has given written acknowledgement of change in terms. Quoted delivery date is dependent upon customer providing all requested information to Combined Technologies at a time set forth by Combined Technologies. Any changes to the above quoted system after Drawing Approval may be subject to extraneous charges unless approved in writing by the Project Manager of Combined Technologies. If final acceptance is delayed due to customer, then payment will be due 45 days from date of shipment. ComTech's performance and support obligations will remain in effect even if final payment has been received. Payments outstanding of the above terms will be subject to a 21% annual interest payment billed monthly together with any court costs, attorney fees and cost of collection that Combined Technologies may incur in enforcing the terms of this agreement.

23) Warranty

- A. The system is warranted for a period of two year for parts from the time it is shipped from Combined Technologies backed by Combined Technologies and its vendors.
- B. Warranty applies only to new Equipment governed by this purchase order and not for previously supplied or reused equipment. Warranty includes defects in design, assembly, programming, or craftsmanship.
- C. Fanuc Robots will also have a two year warranty from shipping date. Any service issues with the FANUC Robots can be handled through us or you can contact FANUC directly (Dual Support).

Thank you for the opportunity to quote this system. We look forward to being selected as your automation partner for this new project. If you have any questions, please give me a call at (937) 274-4866.

Sincerely, Combined Technologies Group, Inc.



FIELD SERVICE CAPABILITIES

Combined Technologies offers Emergency Field Service as well as Scheduled Maintenance Services including but not limited to:

- Support all software versions and manipulator types for ABB, FANUC, MOTOMAN, MITSUBISHI and other robotic makes.
- Extensive background in Robotic Programming, Mechanical and Electrical troubleshooting of Robotic Systems, PLC Programming, Vision Systems and most anything related to Automation.
- Offers wide variety of scheduled services such as: periodic / annual preventive maintenance, program modifications, safety inspections and teaching software or maintenance courses at customer's facility.

FIELD SERVICE RATES

Category	Standard Work Hours	Overtime Work Hours	Sundays & Holidays
Technician	\$80	\$120	\$160
Engineer	\$120	\$180	\$240
Travel Time	\$50	\$75	\$100

DEFINITIONS:

Standard Work Hours	8:00 am-5:00 p.m. Monday through Friday or purchaser's regular first shift hours, exclusive of ComTech's Holidays.
Overtime Work Hours	After 8 hours worked or any hours worked past 7:00 pm Monday through Friday. Or all day Saturday exclusive of ComTech's Holidays.
Sundays & Holidays	12:00 am Sunday (or Holiday) - 8:00 am of next Standard Workday.

**COMTECH'S HOLIDAYS INCLUDE:**

New Year's Day
Good Friday
Memorial Day
Independence Day
Labor Day
Thanksgiving (Thursday and Friday)
Christmas Eve through New Year's Eve

Notes:

- 1) *The minimum charge is four (4) hours for all categories.*
- 2) *Fractional hours will be prorated at the appropriate hourly rate to the nearest one-quarter (1/4) hour.*

TRAVEL AND LIVING EXPENSES:

Commercial Transportation (plane, train, bus, etc.) Lodging (hotel, motel, etc.) Rental Car (car plus fuel) Meals (\$30/day) Miscellaneous (parking, tolls, etc.)	at Actual Cost
Mileage	\$0.52 per mile

PAYMENT TERMS:

- Net 30 payable upon receipt of invoice