# Rimcor, NC.

**DESIGN – CONSTRUCTION - MAINTENANCE** 

# DRONES IN PULP & PAPER

# 2 THE NEED FOR DRONES



### <sup>3</sup> THE NEED FOR DRONES

### • TRADITIONAL INSPECTIONS:

- LACK OF VISUAL PAST 20 FT ELEVATION. SEE EVERYTHING AT ANY HEIGHT OF THE VESSEL WITHIN SECONDS.
- INSPECTIONS PERFORMED ON AN INSPECTION CHAIR WITH ELECTRIC GRIPHOIST ARE COSTLY AND TIME CONSUMING. LAUNCH A CONFINED SPACE DRONE FROM INTERNALLY OR EXTERNALLY AND COMPELTEY COVER THE ENTIRE HEIGHT OF THE EQUIPMENT IN LESS THAN 20 MINUTES WITH NO EMPLOYEE HANGING FROM A SUSPENDED CABLE.

### 4 THE NEED FOR DRONES

### • SCAFFOLDING:

- COSTLY BETWEEN 40 & 60K TO SCAFFOLD A VESSEL APPROXIMATLEY 20 FT IN DIAMETER X 80 FT TALL.
   LAUNCH A DRONE PRIOR TO SCAFFOLDING TO ACKNOWLEDGE POTENTIAL PROBLEM AREAS SO THAT THE SCAFFODLING CAN CONSTRUCTED PRECISELY. THE DRONE MAY DETERMINE THAT THERE IS NO SCAFFOLD NEEDED AT ALL AND THE LININGS ARE IN GOOD CONDITION.
- TIME CONSUMING UP TO 24 HOURS TO CONSTRUCT A SCAFFOLD IN A VESSEL OF THE ABOVE DIMENSIONS. LAUNCH A DRONE IN A VESSEL IN MINUTES.
- IS IT SAFE? SOME REQUIREMENTS OF A SCAFFOLD IS TO BE PROPERLY SUPPORTED BY STRUCTURAL MEMBERS. TAKE A DRONE IN THE VESSEL FIRST AND INSPEST THE STRUCTURAL MEMBERS THE SCAFFOLD WILL BE HUNG FROM.

### <sup>5</sup> THE NEED FOR DRONES

### • NO ENTRY EQUIPMENT:

- DUCT WORK > 16" IN DIAMETER.
- STACKS
- FALSE CEILINGS
- CONVEYOR SYSTEMS

INSPECT LININGS AND EQUIPMENT THAT HAS NOT BEEN OBSERVED SINCE IT WAS PUT INTO OPERATION.

### 6 THE NEED FOR DRONES

### • EMPLOYEE EXPOSURE:

 EVERY SCENERIO PREVIOUS TO DRONES INVLOVES A PERSON THAT HAS TO PHYSICALLY ENTER A PIECE OF EQUIPMENT AND PERFROM AN INSPECTION. THERE CAN BE MANY RISKS INVLOVED WITH THIS INCLUDING; POOR VENTIALTION, GAS OR CHEMICAL EXPSOURE, FALLS. THERE ARE DRONE INSPECTIONS BEING PERFORMED FROM OUTSIDE OF A TANK OR VESSEL AND A PERSON NEVER HAS TO BREAK THE PLANE.

### 7 THE NEED FOR DRONES

### • QUICK TURNAROUND :

- SMALL OR "MINI" OUTAGES WHERE AN ENTIRE LINE MAY BE DOWN FOR 4 12 HOURS. INSPECT UP TO 12 VESSELS OR TANKS IN A 8 HOUR DAY WITH ONE FAA PILOT & DRONE.
- NO MILL OUTAGE. PERFORM EXTERNAL INSPECTIONS AT HEIGHTS WITH THERMAL SCANS WHILE EQUIPMENT IS IN OPERATION.

### <sup>8</sup> DRONE PLATFORMS AVAILIBLE



### 9 EXTERNAL /OUTDOOR DRONE PLATFORMS

- EXTERNAL DRONE PLATFORM: TYPICALLY LOOKING AT A DRONE WITH GPS & RTK TECHNOLOGY ALONG WITH MULTIPLE FPC'S & COLLISION SENSORS.
- DJI / RMUS / PARROT LEADERS IN DRONE PLATFORMS
- BE SURE THAT YOUR CONTRACTOR IS UTILIZING A PLATFORM THAT IS DESIGNATED FOR EXTERNAL/OUTDOOR INSPECTIONS.
- OUTDOOR INSPECTION REQUIRE MORE ATTENTION TO DETAIL: FOOT TRAFFIC, AIRSPACE, NEARBY AIRPORTS, WEATHER, ADJACENT EQUIPMENT OR STRUCTURES. MAKE SURE YOUR CONTRACTOR IS FGURNISHING AN A PART 107 FAA CERTIFED PILOT WHO IS AWARE OF THE LAWS AND RESTRICTIONS WHEN PERFORMING AN EXTERNAL FLIGHT.

### EXTERNAL /OUTDOOR DRONE PLATFORMS



- 55 minute MAX flight time (no payload) RMUS technicians clocked MAX time at 38 minutes with H20T payload
- Handoff One pilot can "handoff" drone to another pilot to help keep drone within line of sight
- Battery Hotswap Drone does not power down when changing out batteries, which improves turn
  around time between missions.
- IP45 Rated Able to fly in light rain
- Self-Heating Batteries
- Operating Temperature Range from -4°F to 156°F
- Airsense ADS-B Receiver
- Smart Pin & Track Advanced tracking of moving objects and the pin point of their geo-location
- RTK compatible with existing D-RTK 2 Basestation for Phantom 4 RTK or M210 RTK
- 9 mile Max Transmission
- Smart Inspection with drone position and camera settings saved to get repeat imagery for routine
  inspections.
- 6 direction sensing and positioning

DJI MATRICE M300 – EXTERNAL PLATFORM

### EXTERNAL /OUTDOOR EQUIPMENT

- CL02 Storage Tanks, CL02 Upflow Towers & Tubes, Chip Silos, High Density Storage, Conveyor Systems. There can be high resolution photography performed as well as infrared external thermal scans.
- Volumetric calculations on Chip Piles, Log Piles, Coal Piles, etc. There are software's that will load a flight around ground control units and upload 3D maps with the ability to measure volumes of piles on the ground.

### OUTDOOR FLIGHTS - SURVEYS



#### Crane Pile

Created by Blake Gillikin on 04/03/2019 12:12 PM

VIEW IN PROPELLER

#### https://rimcor.prpellr.com/p/viewer?share=9jXR8JGjFDexca



FROM DATASET	RFP - 4/2	
TO DATASET	smart volume level	
SMART VOLUME FILL	248.139 yd <sup>3</sup>	
SMART VOLUME NET	-19 030.1 yd³	
SMART VOLUME CUT	19 278.2 yd <sup>3</sup>	
MATERIAL	Logs	
UNIT VALUE		
DENSITY VALUE	0.37 t/yd3	
TONNAGE (CUT)	7 193.12 t	
		-

### OUTDOOR FLIGHTS – AIR QUALITY

#### ENVIROMENTAL FLYING LABS: DR2000 FROM SCENTROID

TAKES AIR QUALITY MEASURMENTS THAT INCLUDE FUGITIVE EMMISIONS, FLARE EMMISIONS, LEAK DETECTION, METHANE FROM LANDILLS, ODOUR EMMISIONS, URBAN SCANNING

AND MORE





### **14** OUTDOOR FLIGHTS – AERIAL INSPECTIONS



Conveyor system inspected from distance with 30x zoom camera.

## **15** OUTDOOR FLIGHTS – AERIAL INSPECTIONS



Overhead view of a Lime Kiln with Thermal XT Camera.

### INTERNAL DRONE PLATFORMS

Elios 2 is the industry leading platform in confined space.

Internal or Confined Space Platform will typically have no GPS (this has been a failure in the past with drones & electromagnetic interference).

Range sensors/ spot locks/ IR cameras / bump cages, propeller guards, etc.



### INTERNAL / CONFINED SPACE EQUIPMENT

 CL02 UPFLOW TOWERS & TUBES, CL02 STORAGE TANKS, BLACK LIQUOR STORAGE TANKS, HIGH DESNTIY STORAGE TANKS, BLOW TANKS, DIGESTORS, BOILERS, FURNACES, SURGE TANKS, CHIP SILOS, STACKS, DUCT WORK, CAUSTIC TOWERS, ETC.





## <sup>20</sup> INTERNAL / CONFINED SPACE INSPECTIONS









Black Liquor Internal Inspection while level was at 40% capacity.

### 24 DRONES IN PULP & PAPER

- Costs reductions of up to 90% utilizing a drone.
- Reduced downtimes during inspections.
- Reducing employee exposure by 95%

We now have the option to send a robot into a potentially hazardous environment in lieu of humans at a fraction of the price.