PLANT COMMISSIONING POST COVID-19; REMOTE COMMISSIONING

Eng. Fanuel Kiwinga Mwashigadi, PE, MIEK

Abstract

The Covid-19 pandemic brought challenges worldwide; industries were looking at delayed commissioning and running of new plants or delayed repairs particularly where specialized personnel were required from manufacturers. With the travel bans and curfews, companies had to look for alternative ways to ensure that production of essential goods and services was not only maintained but increased and enhanced. Is it possible to fully commission a plant remotely? This paper gives a practical experience of remote commissioning of an industrial plant. Several steps need to be followed; the basic assumption is that the plant has been built as per the manufacturer specifications and drawings. First, there is pre-commissioning checklist; the plant owner sends photos and/ or videos to the manufacturer as proof that the plant is built as designed. After review and an approval, the next step is the testing. This heavily relies on cameras (linked to zoom for visual) and WhatsApp or any other communication platform. The SCADA/PLC should be accessible through Any desk or TeamViewer or similar platforms. This facilitates testing and actual commissioning of the plant. To the plant owner the main benefit is that the team on the ground gains experience to run the plant as they encounter and solve challenges in real-time. The manufacturer's team benefits from simultaneously viewing different sides of the machine using the cameras. With this successful commissioning, it will be difficult to justify accommodation and flight costs for Commissioning Engineers.

Key Words: Remote Commissioning; Covid-19; SCADA/PLC

1.0 Introduction

In the interest of ensuring business continuity, growth and relevance; plants and industries have attempted to grow their plant capacities or diversify in order to create new revenue streams. Such were the dreams and aspirations of most companies towards the end of the 2018/2019 financial year, as they laid plans and strategies to grow their companies.

Most plants take eighteen to twenty-four months to actualize thus the planning has to span this time and beyond. Some of these firms found themselves in this situation end 2019 and early 2020 depending on which part of the world they are situated. Corona virus (Covid 19) found people unprepared for what the pandemic was going to bring with it, this led to companies making decisions to halt their activities for what seemed like a passing cloud except for the essential services.

1.1 Problem Statement

For those who had already approved projects, the dilemma was making decisions on which was the best way forward with them. To continue with the project or abandon the growth

until after the Corona pandemic had passed. In this regard then for those who decided to hold on until the restrictions were lifted their growth was stalled with regard to plant commissioning. Those firms who decided to continue with the projects faced the challenge of how to go ahead and actualize the expansion programs with minimal losses and within allowable time frames.

1.2 Objectives

1.2.1 Main Objective

To define the methodology, systems and processes necessary to achieve successful remote commissioning of a plant.

1.2.2 Specific Objectives

1. To assess the challenges encountered in the execution of remote commissioning
2. To explore the process of access of the site to the commissioning team that is at remote location.
3. To establish the best methodologies to achieve flawless remote commissioning of plants.

2.0 Approach

2.1 Assumptions

As this paper attempts to share our experience in remote plant commissioning, the assumption is that the plant is already built as per the piping and instrumentation diagrams.

2.2 Procedure

A zoom meeting was set up to plan for actualization of the commissioning. This was to ensure that the whole team was at the same starting point. The project teams for all firms involved introduce each other and team leaders were identified. This helped to ensure that proper flow of communication was established. The project commission plan and methodology were shared.

The first activity was sharing of precheck punch-list. These are Excel sheets designed to help the person on the ground to ensure they have captured all the items or line work.
They mainly capture electrical and instrumentation items, piping and mechanical items.

For electrical and instrumentation, the checklist captured the items as installed in the plant, the termination at both field and panels see Appendix 1 for sample checklist. For the motors and panel cable meggers readings were done to ensure they are fit for purpose and the reading is within allowable range. As these cable were all new, the megger readings were infinity.

Piping checklist captured how the piping run from one point to the other. A video is taken of the whole section including all the valves, ties, branches. This was again checked against

P&IDs. The beauty of this exercise helped us to verify before forwarding the checklist to the manufacturer as you wouldn't want to share a wrong item. See appendix 2.

Mechanical checklist captured all the major equipment like pumps, tanks, vessels and all stationary equipment. Internal and external photos were taken to show condition of the equipment.

Once all this was confirmed, remote commissioning program was set. In this phase, we followed the process below.

2.2.1. Prerequisite of pre-com

These are items that need to be dealt with before even the remote commission takes place.

a. ***Panel start-up, software/license installation, program download.*** Agreements were made on how the panel was going to be started up and any specific requirements from the manufacturer were communicated. All software's/licenses were also installed at this level and the program downloaded.

b. ***Punch list to be completed;*** The punch list helped to ensure that all instruments, machines, piping's and equipment were put in the right position and facing the right direction. Video's and photos were shared as per the prechecks template and any deviations or corrections were done before hand.

c. ***Pump flange alignment checklist to be completed;*** This checklist was revisited to ensure that all pumps were aligned properly as the flanges were opened during prechecks. This was done to ensure that the pipe and pumps are inline without the support of bolts thus ensuring no undue stress on the pump casing.

d. ***Manpower.*** The company agreed and provided requisite manpower to enable full time support during the commissioning. This was made up of both electrical and mechanical teams and more so people who were involved with the initial installation activities as they already knew the location of the equipment's.

e. ***Standard tool;*** Tools and test equipment like power-meter, wrench, etc. which are in good condition enhance safety and quality workmanship. Availability of these tools on site was ensured to facilitate faster response time.

f. ***All cables were terminated to panel & field side;*** This was further confirmed so as to remove electrical incidents once the panel is powered.

2.2.1. Commissioning times.

The commissioning times were agreed between the commissioning team due to the likelihood of time differences between the manufacturer and the on-site team in the plant. The number of hours per day are also agreed and a decision is made on whether there is justification for shift activity.

2.2.3. Start to count man-day.

All programs for commissioning have a maximum agreed number of commissioning hours/days after which the company is charged for any extra hours. The start time for counting of these man hours was agreed and which activities were considered to be outside the scope.

2.2.4 Pre-com activities:

These were activities that will ensure that the machines and equipment will perform as expected when actual production starts.

a. ***Pump rotation test / alignment:*** At this stage, pumps were decoupled and motor were run at no load to confirm that they are rotating in the right direction. Cameras were set accordingly and with the assistance of zoom (or appropriate virtual visual application), the manufacturer could see the direction of rotation. Once done and satisfied, the motors and pumps were coupled back and proper alignment done to ensure no vibrations and overload on the motors during actual run.

b. ***Instrument signal loop test:*** All instruments were tested for response and different signals were tested. Response of open, close, run, trip etcetera were confirmed during this time. Tests to differentiate between loss of signal and wire break were also carried out. Response time was checked and adjusted accordingly.

c. ***Utilities start-up:*** All utilities equipment were started and checked if they are delivering as per the required specifications. This was important as unavailability of required utilities can lead to non-conformance of the product or reworks.

d. ***Cleaning/flushing:*** Lines were then flushed or cleaned with the appropriate media. Hydro and/or pneumatic testing was also done at this point and all unnecessary leakages were repaired or plugged.

2.2.5. Estimated pre-com date.

Once all the above activities were completed, a date for feed in was agreed and the plant performance monitoring started here. The actual processing begun here as conforming products are sent to storage in preparation for packing and subsequent selling.

2.2.6. PLC Control

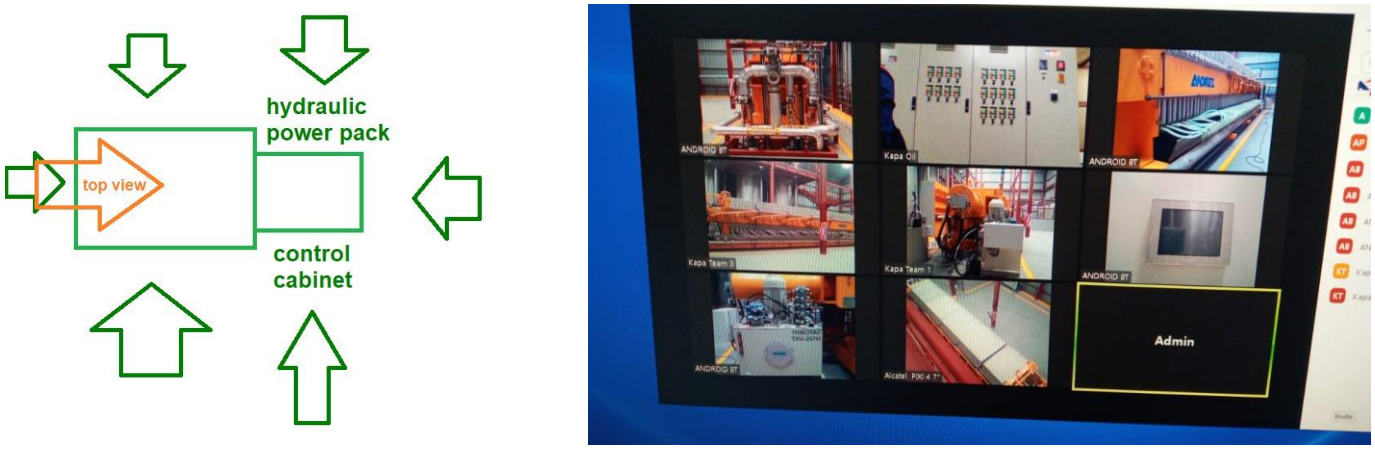
Do not control the PLC without instruction. Since the plant was ready for production, unnecessary manipulation of PLC could alter some settings thus not encouraged.

2.2.7. Video camera set-up and testing

One fixed camera was located permanently in control room and a minimum of one flexible camera handled by the on-site plant personnel to check field side equipment. The camera requirements might change depending on the activity being undertaken. Camera setup varied

depending of the activity to be untaken. See Figure 1 below for how several cameras were set up to achieve required visibility to operate a filter press.

Figure 1: Camera setup plan and how it was actualized



2.2.8. Discussion/ implications

The process of remote commissioning is one of the innovations that plant engineers are able to utilize in order to enhance continuity and growth in their organizations. Through this process firms can continue their plans and not halt their growth projections.

The challenges encountered and solved as described in this paper show that it is possible for plants that have been built as per the manufacturer's instructions can be commissioned remotely. The process of remote commissioning brings with it substantial financial savings in the air fare and hotel expenses for the commissioning team. The local team also gains a lot of confidence as they get to solve all the issues that arise during the commissioning.

The commissioning team on the site has to adjust their timelines in order to meet the working hours of the remote commissioning team in cases where there is a time difference. The firm needs to take note of that and adjust the staff working hours and enable them to get to the plan within good time in order to meet this requirement and also release them from work early enough to compensate for their timings. Also, the network has to be fast and reliable as a delay in response may lead to incidents considering the equipment's are controlled from remote.

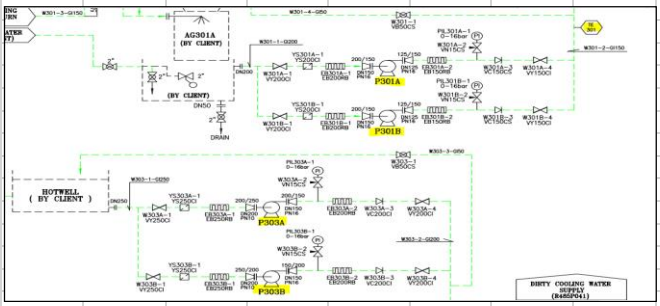
Going forward firms can invest in video and communication facilities for the remote commissioning and provide their teams with the opportunity to learn the plant well and therefore enhance their trouble shooting abilities and management of the plant.

3.0 Conclusion/Recommendations

Challenges and problems provide humankind with opportunities to find creative solutions. Such is the situation that Covid-19 has brought to the human race. Engineers provide solutions and here an opportunity for creative solutions that enhance growth and savings for firms. The future opportunities lie in the remote supervision of plant construction built as per the piping and instrumentation diagrams.

Appendices

Appendix 1: Sample Electrical checklist



Step to add photo:

1. Click on the "Add Image Icon"
2. Select "Format" (Picture Tool)
3. Select "Change Picture"
4. Select "Browse" (From a File)

Revision:

Revision	Date	Remark
0	11.08.20	Issue of punch list to client.

Tag No.	Item Photo	Terminal Wiring Photo	Panel Terminal Wiring Photo	Remarks
P301A				DONE OK
P301B				DONE OK
P303A				DONE OK
P303B				DONE OK
TE301				DONE OK

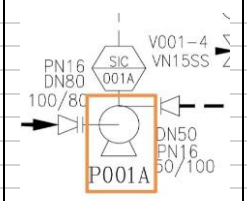
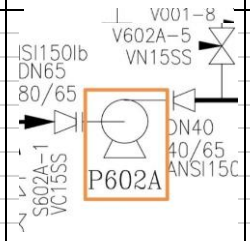
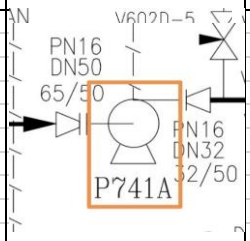
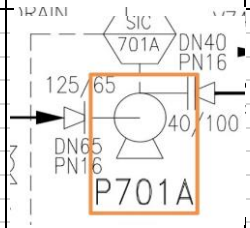
Appendix 2: Sample pump alignment checklist

CHECKLIST FOR PUMP ALIGNMENT

Project no:

Client name:

Pre-check date:

No	Pump Tag	Photo of coupling above	Photo of coupling side	Pump support (suction side)	Status
1					
2					
3					
4					

Note:

Please fill up COMPLETED in the space of 'status' (no.1-4) .If the pump alignment and add support has been completed.Thank you.

Attention: *After completing pump alignment ,please FILL IN lubricant oil to the pumps.Thank you.*

Inspect by: _____ **Date:** _____

(Client)