Assel And Piercing Mill Setting Using Ac And Dc Drives Control Panels

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Abstract- *In Assel and Piercing mill setting we are using AC and DC Drives. Drives are serving in industries with their efficient motion control ability. These Drives can operate in Local Mode as well as in Remote Control mode. In Local Mode the Drive is controlled by its control panel where as in Remote Control mode, it can be controlled remotely by a Programmable Logic Controller (PLC). This PLC based control of Drive is essential for process control in industries like Steel mill. Further, this control can be employed using any of the industrial communication protocols which reduce the wiring complexity. Profibus is Siemens standard protocol which is open, robust and widely used in industries because of its simplicity. Therefore the same protocol has been implemented in the presented work. This paper depicts initially about configuring a DC Drive (DCS800 of ABB) and AC Drive (ACS550 of ABB) for Profibus communication and communicate the Drive with PC using Drive RPBA card. This paper consist of three control panels namely MTB, MBDO, MBI. The main two applications of panels are Assel (To find inner diameter) and Piercel (Boring of a pipe).*

Keywords- Control panels, AC and DC Drives, Profibus protocol, Assel, Piercing.

I. INTRODUCTION

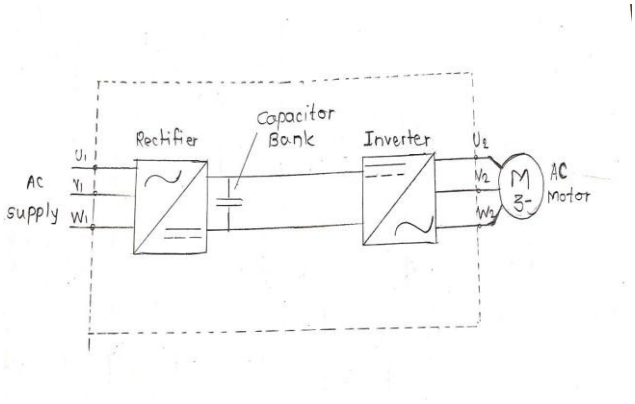
Electrical Drive is an electromechanical device which imparts motion to different machines and mechanisms for various kinds of process control. Out of their many advantages, the higher efficiency is an attractive feature which brings energy savings and there by cost savings in industrial applications.[1] Motor runs on electricity, in order to do their work providing Torque and Speed they required electric energy motor consumes electricity to provide speed and torque needed. If speed or torque is high or low the mechanical control are used to slow down shift or control. Results inefficiency, there will be wastage of energy and as well as materials. In this paper ACS550 and DCS800 drives and other components are enclosed in MBI, MTB, MBDO PANELS. DC Drive is a type of Electrical Drive which is very common in industries because of its suitability to high torque applications. AC Drive is commonly used for variable speed (V/f) application. In process industries, initial level (or level-1) of automation comprises of Programmable Logic controller (PLC) which actually controls and monitors the process. The advanced controller or an expert system handles the next level (level-2) of automation taking feedback from PLC [2]. Also, Because of cost effectiveness, durability and simple control logics, the PLCs are very common in industrial automation [3]. In a PLC based process control, the PLC monitors/controls all the other devices. Hence, to utilize an electrical Drive in process control, it has to be controlled by PLC. Further, it will be very advantageous in terms of cost and system reliability, if the PLC and Drive interface is carried out using field bus communication protocols [4]. The field bus is a family of industrial computer network protocols used for real time distributed control as per IEC 61158 standards. Some of the fieldbus protocols are Modbus RTU, Modbus TCP, PROFIBUS, PROFINET, Ethernet IP etc. Among all, considering all the advantages the PROFIBUS has been adopted. Hence PLC and PROFIBUS protocol can also be employed for complex application where precise control is essential.

II. THEORETICAL REFERENCES

AC DRIVES:

ACS550 Drive combines a sophisticated microprocessor with advanced IGBT power switching technology to deliver V/F, close loop flux vector and sensor less vector control of AC motors .Its intuitive control panel offers numerous benefits making it most user Friendly panel in Drive industry. This Drives can handle the most demanding industrial applications in an efficient, dependable and economic manner [5].

BLOCK DIAGRAM:



In above AC drive the input power is run through rectifier that converts AC power to DC power. The DC power is feeded to capacitor inside the drive to smooth out the DC power, which provides a clear supply for next step. Then the power flows to the inverter which then changes DC power to AC power that goes to motor. This allows the drive to adjust frequency and voltage that is supplied to motor based on current process demand.

BENEFITS:-Maintenance, cost reduces, reduce ambient noise, low cost, reduce scrap.

DC DRIVES:

DCS800 Drive gives us reliability and performs with flexibility to meet requirements. This drive is build in three phase exciter. It is build in mode bus with whole range of optional communication options. It is also build in control for shared motion , double motor operation, field reversal and classic 12 pulse installation [4].

BLOCK DIAGRAM:-

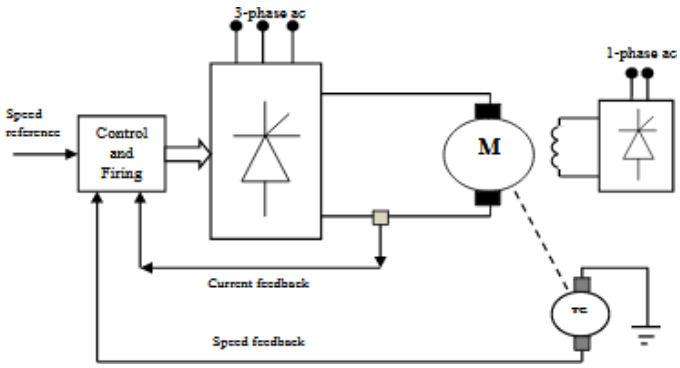


Fig.2 Block diagram of typical DC Drive.

In above block diagram DC drives consist of operator controller and drive controller DC motor. Operating controller provides altering the speed. The drive controller will regulate the input by the means of phase control device or pulse width modulator (PWM). In this DC motor is an electrical device that needs to be adjusted to perform at a various speed.

TYPES OF PANELS

A. MBI

This panel consists of 16 AC drives (acs550) and 1 DC drive (dcs800).

B. MTB

It consists of one DC drive (dcs800).

C. MBDO

It consists of one DC drive (dcs800).

COMPONENTS:

CONTACTOR -The Contactors are used by electrical equipment which frequently turned off and on by opening and closing circuit. The contactors function is to make and break all the power supply lines running to a Load or to repeatedly establish and interrupt an electrical power circuit.

RELAY - Overload and other faults on electrical lines are detected by electromechanical relays, by opening and closing circuit breakers. Relay is an electromagnetic switch which is operated by a relatively small electric current that can turn on or off a much larger electric current. The heart of a relay is an electromagnet (a coil of wire is a temporary magnet when electricity flows through it) [5].

CHOKE - VFD input used input choke as filter. Output choke is used when cable length is longer then few metres.

INCOMER - All basic components are connected to this incomer. It also known as SFU (Switch Fuse Unit). It has one handle with fuse unit. When it is turned ON the supply will pass to the next stage through fuse if any major fault occurs in side panel board, it will trip and it isolates supply.

BUS BAR - A Busbar is a simple metallic strip or bar which is made of (typically copper, brass or aluminium) it conducts electricity within switchgears and other apparatus. Conducting a substantial current is its main function.

RATING OF THE DRIVES AND COMPONENTS:

TABLE 1. RATING OF THE MBI PANEL COMPONENTS

NO.	SR DRIVE AMP RATING	MOTOR RATING	MCCB/MCB	RELAY	APPLICATION
1.	DC(450amp)	125 kw	400 amp	24,24,230	CT2
2.	AC(45amp)	15 kw	63 amp	230	AM Roll gap adjustment
3.	AC(23amp)	7.5 kw	32 amp	230	Shell pusher ht adjustment
4.	AC(45amp)	15 kw	32 amp	230	Spare drive
5.	AC(45amp)	15 kw	63 amp	230	Spare drive
6.	AC(3.3amp)	0.37 kw	10 amp	230	Feed angle adjustment at top
7.	AC(3.3amp)	0.37 kw	10 amp	230	Feed angle adjustment bottom
8.	AC(4.1amp)	1.1 kw	10 amp	230	RRC-1height adjustment
9.	AC(4.1amp)	3 kw	1.6 amp	230	Guide shoe adjustment left
10.	AC(4.1amp)	7.5 kw	10 amp	230	Guide shoe adjustment right
11.	AC(8.8amp)	3 kw	16 amp	230	Roll gap adjustment top
12.	AC(23amp)	7.5 kw	32 amp	230	Roll gap adjustment bottom
13.	AC(12amp)	3.7 kw	16 amp	230	TRG height adjustment
14.	AC(12amp)	3.7 kw	16 amp	230	AMB height adjustment
15.	AC(45amp)	15 kw	63 amp	230	CT1
16.1	AC(125amp)	11 kw	125 amp	230	RRC1
16.2	AC(125amp)	11 kw	125 amp	230	RRC2
16.3	AC(125amp)	11 kw	125 amp	230	RRC3
16.4	AC(125amp)	11 kw	125 amp	230	RRC4
16.5	AC(125amp)	11 kw	125 amp	230	RRC5

Table 2: Ratings of MTB Panels

Sr. no	Components for DC DRIVE (680 amp)	Ratings
1.	Contactor	9 amp (3)
2.	MPCB	4 to 6.3 amp (1)
3.	Relay	24,24,230
4.	MCCB	600 amp
5.	Fuses	900 amp
6.	Choke	490 amp
7.	Transformer	1.5 KVA
8.	Step down transformer	415/230 V

Table 3: Ratings of MBDO Panels

Sr.no	Components of DC DRIVE (1500 amp)	Ratings
1.	Fuse	1250 amp (3)
2.	MPCB	4 to 6.3 amp (2)
3.	Contactors	9 amp (3)
4.	Relays	24,24,230
5.	Air circuit breaker	2000 amp
6.	Transformer	5 KVA

CENTRALIZATION:

Drives are used to control speed and torque characteristics of motor. Motor are used for performing various operation. The parameter of motor can be controlled through Drives. These drives are operated locally by remote. In industries there are so many workers who are changing parameters of the motor whenever it is needed but the other is unknown of the changes that are made. Hence it became necessary that all the panels are centralized [6]. The control panels are centralized by Siemens PLC S71200. Since they are centralized for the following reasons:

1. Safe operation
2. To reduce time for setting
3. Reduce man power

PLC –Drive communication: Profibus consists of several variations which are designed for use in special applications. The two Profibus versions most commonly used are Profibus-DP (Distributed Peripherals) and Profibus-PA (Process Automation). Profibus-PA was developed to connect directly into Profibus-DP and may be used in intrinsically safe applications. DP uses the RS485 physical layer while PA uses the IEC 61158-2 physical layer designed primarily for process applications.

The RPBA-01 PROFIBUS DP Adapter module is an optional device for ABB drives which enables the connection of the drive to a PROFIBUS network. The drive is considered as a slave on the PROFIBUS network. Through the RPBA-01 PROFIBUS DP Adapter module,
it is possible to:

- give control commands to the drive (Start, Stop, Run enable, etc.)
- feed a motor speed or torque reference to the drive
- give a process actual value or a process reference to the PID controller of the drive
- read status information and actual values from the drive
- change drive parameter values
- reset a drive fault [7]

III. CONCLUSION

Initially, the PROFIBUS communication is implemented between PLC and DC / AC Drives, It contributed in sending commands from PLC to DC / AC Drive. Later the fiber optics is used for the parameterization of drives and for Real time tracking, online monitoring purpose. The communication between plc and drives is productively verified considering the application of steel mill. The tests confirm a speed control and torque control operation with simple wiring connections. Thus the exploitation of drives profibus communication feature makes it very much suitable to serve for process application.

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