Advantages and Disadvantages of using different types of AWS systems

Introduction:

 Before 1998 all of surface weather osbserving stations in Egypt were depending on traditional sensors so it wasn't easy to collect data from various stations and watch their performance specialy those located in remote areas so it was very important for Egyptian Meteorological Authority to transform to depend on Automated Weather Observing System (AWOS), from this year (1998) the number of AWOS increases to become 54 stations at the end 2013 in Egypt. During this period the AWOS maintenance team in Egypt treated with various types of AWOS and faced many problems due to the variety of types and got a good experience in this field we call it "The Egyptian Experiment."

The Egyptian Experiment

We began in 1998 with 10 American AWOS stations (ARTAIS) deployed in various area and for these stations we formed our maintenance team in this phase there were only one type of spareparts for each item of autmatic stations these spareparts were convenient for any station. Then these stations followed with two stations from another American company (qualimatrecs) and 5 Finish stations (Vaisala). In this moment; we have 3 different types of autmated observing system we recognized some facts that are: now we are aware of 3 different techniques of three different technologies but some problems began to appear such as some spares of certain type ran out while another type reduntant so we tried to use the reduntant spares for different station type but we couldn't so when ATAIS stopped their activity and when any item of this station type needed to replace for any defection we forced to stop this station hence we stopped them one after one.

Then the next type of stations were 7 German stations (Theodor Friedrichs) and realy it was agood jump in this field because the channels of AWOS data logger could be configured to receive input from different types of sensors via data base of sensors in it.

By this way we could use different types of sensors for these stations.

Then we purchased 10 American AWOS stations (Campbell Scientific) with CR1000 data logger which enabled us to configure

each channel to receive a lot of different type of sensors so many problems related to sensors have been solved.

Also anothr problem appeared that was the operators (observers) treated with different application software so we needed to train them for each type of application they will treat with. It wasted a lot of times and efforts.

Recently we contracted with MFI to unify the application software for 18 AWOS existed already of different types beside brought 15 French AWOS stations with the same application software so if the obsrver transmited form one place to another he would treat with the same software.

There are some notes I would like to state:

Components of Surface AWOS:

Basicly any surface AWOS consists of:

   1- Group of weather sensors (Sensors)

   2- Data collection plateform (DCP)

   3- Communication Interfaces

   4- Application software or central data processing unit

   5- Display units

And if we study some items in details we would find that

- **Weather Sensors** we should be a ware of their inputs and outputs to connect them to datalogger safely or to configure its channel.

There are many weather sensors of different operation theories depend on which phenomenon that we nead to measure also they are of different outputs (analog – digital – pulses – serial) beside bridge sensors

1- Analog sensors may be configured as:

   a- single - ended : in which the output of sensor measured with respect to ground

   b- Differential : in which the output of sensor measured with respect to the low output

2- Digital Sensors where the output of sensor is a binary output

3- Pulse sensors where the sensor generates a series of voltage waves. The sensor couples its output signal to the measured phenomenon by modulating wave frequancy.

4- Serial output where the sensor has its own processing unit and can communicate with datalogger or its output may be displayed directly on PC screen via hyperterminal

5- Bridge Sensors: many sensors use a resistive bridge to measure phenomena such as a change in resistance in a wind vane potentiometer correlates to a change in wind direction.

- **Data Collection Unit (Data logger):** some of them restricted its channels to receive outputs of particular sensors and you couldn't to change its channel configuration and other of configurable channels and we recommend to treat with second one if you have a good idea for the inputs and outputs of different sensors.

- **Communication interfaces** where it depends on the distance between the datalogger and PC or display units so we may use RS232 or RS485 or lased line or UHF but in general it must be ended with RS232 to connect with PC.

- **Application Software** it is the software resposible for receive the datalogger messages and decode it to represent the output of sensors and make some clculation to represent some weather variables also to restore the data and retrive it and we recommend that for each country try to has its own Software to make it easily for observers to deal with.

Conclusion

It seems that to treat with one type of AWOS System would solve many problems. But in fact there are some disadvantages of using one type of AWOS system also vice versa for using different types of AWOS.

We can state some of advantages and disadvantages of using different types of AWOS systems as:

Advantages of using different types of AWS systems

- 1-Get the cheapest price

- 2-Regognize the different Technologies.

- 3- Comparing between different systems

- 4- Spare parts redundant for maintenance and calibration

Disadvantages of using different types of AWS systems

- 1- Observers need to treat with different applications

- 2- Maintenance Team need to be aware of different systems

- 3- Problems concerning about spare parts and calibration.