

# View on Complete Unattended Automation System for Small Hydropower Station

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'*Application Guidelines on Rural Hydro-Power Automatic Equipments*' was proposed by Chinese Ministry of Water Resources and Bureau of Power Electric in 2005, which played the part of standard role for development of the small rural hydropower automatic equipments. No more conventional facilities were used for new construction or reconstruction; it also leads the rapid development and higher level of automatization for this whole industry.

However, the tens of thousands of small hydropower stations in China still performing by manual operation. There has no real complete automatization system have been achieved even monitor operating system were installed in some of the stations. The only difference compared from those traditional stations is less workers, but not none, which actually indicates that there has no real unattended automatization system was accomplished in this field in China. We can only call it 'few on-duty power station'.

When we mentioned about unattended automatization systems in a station, it should actually refer to such situation that no workers on duty for manual operation at all. Mission like adjustment for active and reactive power, as well as running surveillance can be completed in the Control Center in the county or city, while the people works in the station only perform as security guard and handle for special events.

We realized the reasons of the above mentioned situation are various.

1. First of all, the low labor cost because of large population and employment pressure, this is a direct reason that owners of power plants do not have much requirement for better level of automatic system control.

2. Secondly, there is no clear responsibility to clarify the centralized management of water resources in the past, which led to inadequate investment and there has no guidance.

3. Meanwhile, there are some misunderstandings that between fully-unattended automatic system and monitoring equipments, which brought problems during designing, planning and management, the result makes out that most electrical and mechanical equipments are not supportive.

4. The other reason is due to the parties involved in all concerned too much about economic benefits instead of social benefits.

5. As a matter of fact the fully-unattended automatic system can be achieved technically in China. However the vicious competition in the market directly results the parties can not really purchase equipments with satisfactory functionality and performance. It surely makes the parties worried about implementation for fully-unattended idea.

6. Meanwhile, operators or workers are not qualified to operate and maintain the whole system, this makes the parties unconfident for a better high level of real automatic system.

7. Finally as we understand, in the past years, only large and medium-sized power plants are strong enough to invest and afford the advanced equipment and technology. But the fast development of computer information technology especially for monitoring and communication, already brought big cost reduce for equipment, this bringing the real opportunities for small size station now.

We understand the promotions of unattended automatization system were restricted by so many reasons in the past. As time changes, it brings the development and progress. The technology is improving constantly, the monitor and protection facilities are working stably in large numbers, quality of component and accessories are getting more and more reliable and qualified, also the whole working team includes management is progressing continuously. All of these improvements offered good sufficient condition nowadays to achieve the real unattended duty for small-sized hydropower station.

The importance to promote the technology for small-sized hydro power station and speed up to upgrade machines and equipments has been expressed many times in the report by leaders from Ministry of Water Resource and Bureau of Power Electric. According to this guideline, the first step is to make experiment for the newly built station or some reconstruction of old station, the purpose is to realize the real unattended automatization system and improve the technology. And, then the whole system can be extended and promoted duly based on successful experience.

China is the country with abundant water resource and plenty of small hydro power stations; however, the workers team is large but not efficient. It is hard to realize automation in many traditional old power stations because the equipments and facilities are not proper, also accident and fault frequently happened because of high pressure for manual operation. China is considered as the largest in the world, who owns many small-sized hydro power stations, so there have wide export business for equipments and facilities for small hydro power station. We gained very positive feedback from the market, however, we also come across a lot of problems at exporting to the developed area such as Europe and America, where the clients are not confident in Chinese products because our small hydropower automation control devices are not developed enough to meet their requirements and there is no real unattended power station for inspection and visit in China.

Rebuilt and reconstruction for urban and rural power grids was carried through since 1990's, when most transformer substation realized the unattended performance successfully. In a similar way, the realization of the unattended small hydropower station will help to not only save the labor costs, enhance efficiency, decrease the misoperation and man-made accidents but also speed the development of the small hydropower technology and the increasing of hydropower devices exports. Furthermore, the reputation of Chinese products in the small hydropower industries will be promoted in the international market. Therefore, China can become the "leading nation of SHP" from the "big nation of SHP".

The manufacturing technology for small hydropower equipment progressed rapidly in the last ten years. Many power stations installed computer monitor equipment as the technology for computer control developed and mature continuously, which brings safety, convenience and high efficiency.

The key secondary equipments and auxiliary equipments in the power station have been controlled by computer. With the development of communication technology, remote dispatch and control becomes simpler and more reliable. The new technologies ensure the feasibility to realize unattended duty at power station.

The important equipments includes microcomputer monitoring , microcomputer protection, microcomputer excitation, and microcomputer speed governor, valve (strobe), oil, gas and water should operated by PLC control system, isolating switch bodies with electrical. It requests reliable and stable performance of circuit breakers and other components. All important equipment and system should be equipped with video surveillance, and fiber technology should be used for remote communications.

In a word, technology for existing facilities and equipments are in place for unattended auotmotation system, but selection of appropriate equipments is much more important that only reliable qualified products should be considered, particularly for the sensors, automation and implementation components to achieve redundancy configuration, protection, control, communication and or wherever is necessary for a hot-standby. Even the construction cost for an unattended power station is slightly higher, but this part is a very small proportion in the total investment for power station, and what more important is this upgrade would bring a much higher economic and social benefits.

Recently, we are so pleased to learn that leadership of the Ministry of Water Resources and Bureau of Power Electric attaches great importance to guide and promote the experiment of fully unattended small sized hydro power station. This will definitely totally improve and upgrade the small sized hydro power station. With the technological progress, social development and increase in awareness, we surely believe the completely unattended automatic system is the beautiful prospects in near future for all small size hydro power stations