

# *Economic aspects and procedure for refurbishment of Bassi HPP*

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*Abstract -Age of Hydro Electric Plants in India is considered to be about 25 to 30 years. After this age, it is necessary that hydro electric plant should be refurbished, so that we can increase its Generation and efficiency. With the age some parts of the Electric plants are not giving full efficiency due to bear and tear. Generation capacity of the Hydro Electric Plant can be increased by replacement of some of crucial parts and by reducing losses.*

*It is also important to note here that the increasing demand of electric power can be achieved by establishing new Electric Power Plants or by upgrading the old electric Power Plants. Some of the electric plants in India and Hydro Electric Power Plants in Himachal Pradesh particularly are crossing their maximum age limit and it is very important that such Electric Generation Plants should be upgraded.*

*Modernization of electric plants is also a very important aspect to increase the generation capacity of the old power plants. With the passage of time new developments in the technology are taking place. A lot of research and development is being done. Modern machines and equipments are being introduced. By introducing these new developments into the old power generation plants , we can achieve higher level of efficiency and by this way generation capacity of the power plants can be increased. "Bassi" Hydro Power Plant is situated in Himachal Pradesh In India. This Plant is on the river "Uhal" in Joginder Nagar Distt Mandi, (H.P. India)*

## **I. Essentiality of refurbishment upgradation and modernization**

It is very important to discuss here that why we need to refurbish, upgrade and modernization of Hydro Electric Power Plant. Need may be understood as follows:

### **A. Ageing**

Hydro Power plants are subject to many natural calamities, bear and Tear of mechanical parts with the use. The HPP in Himalaya ranges have a major effect of silt on the blades of Turbines. Hard particles of sand are flown with water and they strike blades of turbines regularly and hence erosion of blades took place, this reduces the surface area of the blades of turbines. And hence it reduces turbines rpms. Bear and tear of mechanical parts took place as being used for years together. Such old parts reduce efficiency of the plant and hence Generation is effected badly. These parts are to be replaced for higher generation.

Some of the electrical parts are also affected by ageing and regular use. Among these parts the major is

Generator parts. Among generator parts major is stator winding and rotor winding.

### **B. Improved Equipments to be introduced**

Research and development in technology and science has to be implemented to Old Hydro Power Plants. Scientist and engineers are working for the improvement of equipments which are more efficient and economical. These all developments in technology if introduced in existing plants then it can increase power production.

### **C. Economic Aspect**

To establish a new Hydro Power Plant is very costlier affair and it is not feasible to all together install a new hydro power plant, bur with RUM we can achieve more power generation from the existing HPP

### **D. Environmental Issues**

For the establishment of a new Hydro Power Plants a lot of environmental clearances are required from ministries of Environment. There are certain law which restrict us from installing a new Hydro Power Plant. Following a major losses are caused if we install a new Hydro Power Plants

- Ecological imbalance
- Cutting of a number of trees cause bad effect on environment
- Displacement of Habitats from the Dam area
- Rehabilitation of people is a major issue

## **II. Economic Aspect**

Refurbishment, up gradation and modernization should be cost effective. Replacement of whole Hydro Power Plant will cost very heavily. To be economical the parts which have lived their life and are not advisable to run. Parts like AVR, Stator winding, rotor winding are particularly less life and these parts are required to be upgraded. Therefore it is advisable to replace or modernize only those parts which have completed their efficient life. Those parts which are giving trouble time and again are specifically be replaced. Replacement and refurbishment of such parts involves only 40% of cost as compared to complete replacement and modernization of HPP. Below Table 1 Shows the Installed Capacity of all the Generators at Bassi Power House

S.NO.	Generator No.	Installed Capacity	Remarks
1	GEN 1	15 MW	Required RUM
2	GEN 2	15 MW	Required RUM
3	GEN 3	15 MW	Required RUM
4	GEN 4	15 MW	Required RUM

The Bassi Hydro Power Plant was established in year 1970 with installed capacity of 60 MW.

The salient features of Bassi Power House are as shown in Table 2

	Salient Features	
1	RESERVOIR CAPACITY	85000 C.METRES
2	PENSTOCK LENGTH (INCLUDING BRANCHES)	1163 METRES
3	SIZE (DIA)	1.75 TO 1.52 METRES
4	BRANCH SIZE / DIA	9 mm TO 41mm
5	QUALITY OF STEEL	ASTM -A285 -57 T. GRADE - C FIRE BOX
6	HULAGE WAY CAPACITY	10 TONNS
7	HULAGE WAY TRACK	COVENTIONAL TYPE 60lbSIRS RAIL
8	HULAGE WAY TYPE	ELECTRICALLY DRIVEN
9	GROSS HEAD	349.91 METRES
10	TYPE	RCC FRAME STRUCTURE
	OVER ALL SIZE	55 X 21 X21 METRES
8	POWER HOUSE CRANE	
9	TYPE	ELECTRICALLY DRIVEN
10	CAPACITY	50 TONNS
11	POWER CHANNEL TOTAL LENGTH	4111 METRES
12	LENGTH OF TUNNEL & COVERED FLUME	3883 METRES
13	LENGTH OF OPEN CHANNEL	228 METRES
14	MAXIMUM DISCHARGE	25.47 CUMECS
15	TUNNEL SECTION	HORSE SHOE TYPE -DIA- 3.36
16	RESERVOIR CAPACITY	8500 C METRES

### III. Procedure for refurbishment, Up Gradation and Modernization:

The extent of refurbishment included the following plant and equipment.

- Generator Rewinding and Updating.
- Replacement Runners
- Refurbishment of Turbines and Main Inlet Valves.
- Replacement of Control and Protection Equipment.
- Replacement of Unit and Station Plant Items.
- Replacement of Cabling.
- Replacement of Drainage and Cooling Water Pumps and associated pipe work.
- Modification to the Governors.

The above said are refurbished, modernized and upgraded after conducting following set of tests on various parts of the Power Plants:

- Assessment of present condition of machines
- History of machines
- Parameters of the machines
- Electrical Tests
- Metallurgical studies on mechanical parts

Conducting all these tests and diagnostics on machines and various parts of the Hydro Power plant an extensive planning for refurbishment can be carried out.

### Conclusion and discussion

In the present scenario when power demand is very high and resources are very limited it is very essential to renovate the existing Hydro Power Plants. Bassi Hydro Power Plant In Himachal Pradesh, India is required Refurbishment, Up Gradation and modernization so that power generation may be increased to fulfill the increasing demand of power. In this paper a major consideration is given for economical refurbishment, up gradation and modernization of the Bassi HPP. It is emphasized that every unit of power lost due to outlived part of the Power Plant needs a thinking of same units generation.

### References

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