

**Tunneling****Reference Details:**

**Owner** Jaiprakash Industries Limited, New Delhi, India +++

**General Contractor** Jaiprakash Industries Limited, New Delhi, India +++ **Consultant** Lahmeyer International GmbH, Bad Vilbel, Germany

**DSI Services** Supply of a total of 7,720 DYWIDAG Rock Bolts in single section lengths between 6 and 10 meters; Technical support.

**Innovative solution using DYWIDAG Rock Bolts for cavern construction in India****Baglihar Hydro Electric Power Station, Jammu & Kashmir, India**

At the request of Jaiprakash Industries Ltd., Delhi, DSI developed a specialized DYWIDAG Rock Bolting System that was successfully used for the construction of several hydro caverns in Northern India. The new system was developed in close cooperation between DSI Germany and DSI UK. From initial consultations it was clear that the client required an efficient fast track solution to facilitate urgent power station construction. Within short time an appropriate concept was developed by DSI UK and successfully tested and demonstrated in site trials in Chamera.

The development of the specialized DYWIDAG Rock Bolting System is based on DYWIDAG Prestressing Steel THREADBARS<sup>®</sup>, utilising mechanical expansion shell anchorages. Fast setting bearing pads and head arrangements were designed to suit the application. The system proved its efficiency on site and met the client's need for rapid installation and virtually immediate stressing using hydraulic jacks. Grouting after stressing provided the required corrosion protection.

The ability to apply the design working load to the DYWIDAG Rock Bolts so quickly enabled cavern excavation to continue without delay.

During the period January to April 2001, DSI forwarded 12 shipping containers from Germany to India with a total of 235 tons of the newly developed DYWIDAG Rock Bolting System to satisfy the customer's urgent program. A total of 7,720 rock bolts in single section lengths between 6 and 10 meters were supplied as follows:

- 2,390No. rock bolts 20 mm dia., grade 900/1100, THREADBARS<sup>®</sup> - ultimate load 345 kN
- 5,330No. rock bolts 26.5 mm dia., grade 900/1030, THREADBARS<sup>®</sup> - ultimate load 586 kN.

The DYWIDAG Rock Bolting System has been very successful and continued use of the system is expected.