

Revitalization project of HPP "Djerdap 1" , the report

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Even the best plans and the most precise terms are bound to be spoiled by some sorts of imperfections such as imperfect contracts, unforeseen tasks, unreliable suppliers and their delays, inadequate equipment...

- Although with a delay, the revitalization of the Europe's largest HPP fourth power unit is now looming up.

Together with Mr Ivan Knežević, a machine planner, I am standing at the fence of long concrete "finger" of the lock, waiting for the opening of the bottom outlet, at which I have no idea of what to expect. Despite the fierce cold Košava (*strong and cold southeastern wind*) that is battering like a whip from the Romanian side, there are at least another fifty gawkers standing around and staring intently into the water below - some of them are next to us, on the "finger", some are on the plateau with transformers that is in line with the machine hall. When I noticed Mr Ljubiša Jokić, an engineer and Director of HPP "Djerdap 1" and an old acquaintance of mine, hanging around, clad in a blue work uniform with a helmet on his head, I realized that something important was to happen. Across the spot, the Danube River is pouring the streams of water down the spillway, while the mist is soaring above. I wonder to myself how many kilowatt-hours are being spilled over and compare them with the acres that somewhere upstream are not going to be flood. It is the eternal paradoxes of the "gain and investment" (*never sure which one is greater*)

- I've been working with "Djerdap" for almost three decades, but have never attended this event - Ivica consoled me when I admitted that I couldn't grasp what was going on. - The last time they opened the bottom outlet in 1999, I was not there, so I cannot not tell you what we're waiting for or what it looks like. But they say it is a magnificent sight.

He explains to me, the ignorant, that the Danube River can negotiate the dam in three ways: through the turbines, over the spillways or through the bottom outlet, located at the bottom of Europe's largest hydroelectric mastodon. While anticipating, he starts talking about the

huge tasks, which, although not related to the revitalization of power units, are equally important. Not necessarily, but one of these tasks is certainly the bottom outlet opening.

In my loud imagination the outlet becomes a plug on a bathtub full of water, which draws his laughter but also a confirmation that it is something like that. And I cannot hide that I am proud of my "knowledge".

All of a sudden the river below starts boiling and muddling up, while sparkling bellies of catfish stunned by the strike of water that ambushed them in the winter slumber are popping up on the surface. The water has gushed through, getting instantly more and more turbulent, offering a very convincing picture of the Danube power, revealing how much strength lies in the slow and seemingly placid river. Made silent by the extraordinary spectacle, I cannot help regretting those who once again fail to witness the great show that lasted whole ten minutes.

- They will empty the lake! - I have cried outright, again drawing laughter.

The winter was passing by, marking the farewell with rare snowflakes.

Tons in millimeters

It all started the day before in a small office of the engineer Dragan Belonić, deputy Chief of the Revitalization Service. Dragan is a young man, but I liked him at first sight. Well, at the "first word"! Because when we suggested him to put the helmet on and join us on the way down to the machine hall, so that a colleague of mine could photograph him there in the "working environment", stone-faced, he refused the offer in a seemingly non-hospitable manner!

- I have no time - responded he surprising us, but then explained: - My work environment is here. Perhaps the ambient down there is more colorful and more favorable for the camera, but the tasks performed in offices, on the computer, are also equally important ones. I'm not alone here; in fact there are fifteen of us working in the Revitalization Service. There are things that should be more interesting for camera than me.

(Well, I almost offered him my sincerest congratulations for being so modest!)

He explained that they were at the end of the "most cumbersome" jobs, when tens and hundreds of tons of all kinds of equipment must be installed with virtually impeccable precision.

- We're going to lower the pre-mounted bearing - he explains, but realizing that he deals with an outsider, added: - This bearing shall carry the rotor, shaft and - and to withstand the water pressure in the turbine. All in all, it is about 3,000 tons! The next thing to do is the rotor lowering, which is itself the most dramatic phase of this work that should be over until the end of this week. What we are talking here about is a part weighing more than six hundred tons!

I saw the rotor near the entrance of the machine hall, and it did not help me understand how

it would be transferred to the fourth unit, let alone how it would be put into the position, especially considering how small gap (measured in millimeters) must be observed! The answer to this question I would receive later, from the engineer Ljubisa Jokić, the Director of HPP:

- Despite our plans, I doubt that we will lower the rotor before next Tuesday – he said grimly.
- The engineer from "Silovye machine" who is in charge for that part of the job cannot come earlier from St. Petersburg, as he got in some trouble with the visa. And this Russian company shall perform supervision according to the contract. As for the issue of rotor transporting, even considering its weight of 680 tons should be no problem. We have experience with it. Two cranes, each of which with carrying capacity of 400 tons shall be harnessed in couple and then operated step by step...

To the question how many people are engaged in the revitalization, he simply replies that he doesn't know. Because, he says that much of the work is performed by "Djerdap" employees who are organized in two, or more often in three shifts; the jobs are intertwined, and there are also workers from the "Djerdap Services". And to better understand the work regime – all the involved are available on request, at any time of day or night. Their working day officially lasts 12 hours, but sometimes it is prolonged up to 16 hours!

About the people and horses

My old friend Čeda Dragišić, told me an interesting story, actually a comparison. Owing to the fact that my fellow comes from the "old school" I had no problem to understand the measuring units used.

- Each power unit has 250,000 horsepower – he opened up. - So, the six power units have a total of one and a half million horsepower at their disposal. And if you remember, we were taught that one horsepower is equivalent to seven human powers! This means that "Djerdap 1" have a total of 10.5 million "human powers"! Which is Serbia and a half (*by size of the population*), dude ... provided all of them actively work! Imagine them working round a clock for 365 days a year, not just eight hours for five days a week (if even so much). Well, that's the "Djerdap".

Mr Jokić gleefully laughed at the story, remarking that it was not quite accurate.

- If we could only have all the power units in continuous operation - he explained. - However, they stop sometimes either for reasons including that of "force majeure", or due to application of a rule that we introduced when our HPP first time started operation, and according to which every year we apply so-called "low care" to one of the power units. And that is why, although the projected working life of the power units is 30 years, we entered their revitalization after almost 40 years! And what this means can best testify our neighbors, Romanians ... Kaplan turbines, each of which of 190 MW capacity, have been operating for four decades whereby receiving the water inflow that is for each one equal to that of entire Drina River, or about 800 cubic meters of water, a feat for Guinness.

It is true, he says, that the contract for the revitalization between EPS, as Purchaser, and the

"Djerdap", as Investor of the one part and "Silovye machine" of St. Petersburg as the Contractor of the other part, was signed in 2003, but the negotiations between the governments of Serbia and the Russian Federation that ensued thereafter took a time. Without intention to bother the reader with the "compensation" of clearing debts, the contract was "heavy" almost 168 million dollars: 100 million dollars in compensation for the debt, and the rest to be paid from the accounts of EPS and the Company "HPP Djerdap".

- This delay did cost us, but less than the delay of about nine months in the delivery of equipment - engineer Jokić says. - In addition, just when we started the dismantling on 1st September of 2009, we realized that the scope of work will be significantly greater than that projected. That's why we were in delay with the revitalization of power unit 6, which should have been completed in one year, but was over only after 21 months. And all the subsequent had to be delayed, the least due to our fault, so the works instead of the agreed 72 months need to take longer.

Namely, the Russians have entrusted the job of manufacturing new blades to the Slovenian company "Litostroj", but because of the terms being broken they reassumed all the works, the result of which is a delay of nine and a half months!

- Learning from this experience, we have built a repair workshop for storing all the equipment that is revitalized, and bought a special lathe for the revitalization of blades, so they would not have to be sent somewhere else anymore. And apart from the benefit we will draw from the fact that the lifetime of electromechanical equipment will be extended by another thirty years, our people gained the experience through this invaluable school - says Jokić.

Then we rushed to the machine hall and from that further to the "bowels" of the HPP to see on the site what to do. I almost got dizzy from what I heard including a whale of different jobs, tools the names of which I don't even know, let alone their use, in addition to dimensions of individual pieces of equipment and from the "unbearable ease" with which good and experienced fitters carry out seemingly most complicated procedures.

I was truly amazed at the incredible sceneries. As for my hosts, I bothered them for sure, but they were patient. I would like to thank them for being so patient and for not dumping me out.

Source;EPS KWH