

However, there are some inherent problems associated with HVDC:

- expensive converters. Expensive Converter Stations are required at each end of a DC transmission link, whereas only transformer stations are required in an AC link;
- reactive power requirement. Convertors require much reactive power, both in rectification as well as in inversion;
- generation of harmonics. Convertors generate a lot of harmonics both on the DC side and on the AC side. Filters are used on the AC side to reduce the amount of harmonics transferred to the AC system. On the DC system, smoothing reactors are used. These components add to the cost of the converter.
- difficulty of voltage transformation. Power is generally used at low voltage, but for reasons of efficiency must be transmitted at high voltage. The absence of the equivalent of DC transformers makes it necessary for voltage transformation to be carried out on the AC side of the system and prevents a purely DC system being used;
- absence of overload capacity. Convertors have very little overload capacity unlike transformers.

Conclusion

The most common reason for choosing HVDC over AC transmission is that HVDC is more economic than AC for transmitting large amounts of power point-to-point over long distances. High power HVDC transmission scheme generally has lower capital costs and lower losses than an AC transmission link, when used over long distance routes.

Even though HVDC conversion equipment at the terminal stations is costly, overall savings in capital cost may arise because of significantly reduced transmission line costs over long distance routes. HVDC needs fewer conductors than an AC line, as there is no need to support three phases. However, thinner conductors can be used since HVDC does not suffer from the skin effect. The above mentioned factors can lead to large reductions in transmission line cost for a long distance HVDC scheme.

Depending on voltage level and construction details, HVDC transmission losses are 3,5% per 1,000 km, which is less than typical losses in an AC transmission system.

References:

1. <http://en.wikipedia.org>.
2. <http://www.cleanlineenergy.com/technology/hvdc/how>.
3. Alfred Still, Overhead Electric Power Transmission, McGraw Hill, 1913 page 145.
4. Arrillaga, Jos; High Voltage Direct Current Transmission, second edition Institution of Electrical Engineers.

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Soft skills for successful professional career

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Sometimes the importance of human skills for every workplace is underestimated. Nowadays challenging economic situation means that it is no longer sufficient for new graduates to have knowledge of an academic subject and it is necessary for a student to gain the skills which will enhance their prospect of employment. And future engineers must learn and develop in the classroom some knowledge and skills during studying. Because undergraduates may not be aware of the importance of human skills for their future employment and professional development. They can meet the question like this: Beyond technical skills, what

added value can you bring to our company? Therefore all your human skills are critical for you.

There are two types of human skills, the first type is soft skills and the second one is hard skills. Primarily the hard skills should be considered. The hard skills are identified as specific, teachable abilities that may be required in a given context, such as a job or university application. Hard skills can be defined and measured. And usually they are acquired by getting through different trainings and life experiences. They can be: facility with spreadsheets; typing; proficiency with software applications; operating machinery; software development; speaking a foreign language; data and text processing and etc.

And the second type of human skills is soft skills. They are personal qualities and attitudes. Honesty and respect; positivity and responsibility; creativity and teamwork; adaptability to change; attendance or timeliness; leadership skills; making decisions, effective communication and etc. are all included in soft skills. Below some of them are taken a look at [1].

Honesty and respect. It is really important to be honest and show respect with people. If you are respectful and honest with people, they will be honest and respectful with you too. Therefore your virtues will work for you and you can govern your success in your social and business life. And definitely you will be able to expect positive responses from the others by giving respect and consideration because they determine how well and peaceful you will relate with family, friends and people at large [2].

Positivity and responsibility. Denis Waitley said “You are responsible for your life, and your ultimate success depends on the choices you make”. Usually people are irresponsible because of their simple laziness or a fear of failure, through a sense of feeling overwhelmed by the scale of a problem or a situation. All the causes of the irresponsibility are important it might be failure in their job or their team or even they can fail to grow as individuals. There are several signs when people are shirking their responsibilities. They can be such signs as lacking interest in their work, blaming others for mistakes and failures, not taking risks, avoiding taking initiative and etc. That is why it is necessary to provide people with skills and resources needed to do their job by creating comfortable environment where it is easy to take responsibility for their actions and decisions. If there is an irresponsible person some steps can be taken to change him or her. These steps include talking with individual; ensuring adequate resources; explanation of the role of the person; re-engaging; help to take control and etc [3]. And undoubtedly the positivity is also significant part of the soft skills. People often are predisposed to think negatively. Stress and depression make people think negatively. Studies have shown that positivity, or optimism, is linked to longer life, increased pain tolerance and better overall health. Thinking positively allows people to see the bigger picture and make better decisions under duress. Ultimately, they make more money and are more likely to get promotions. The difference between optimistic and pessimistic is that when adversity has happened the optimistic will begin thinking of solutions and the pessimist will think of despair. And the main way to change your mind and think positively is concentration on good and perspective things [4].

Creativity and teamwork. Doubtless the creativity and the team working are inherent parts of the work process especially in a big team. Effective team must have common elements: clear goal; a results-driven attitude; competent team members; unified commitment, which means that all individuals must be directing their efforts towards the goal; a collaborative climate; high standards that are understood by all; external support, encouragement and principled leadership [5]. The productive team working includes effective communication. For useful and productive work people should use rounds. One of the major problems

relating to working in a team is that it can be easy for the powerful to dominate the weak. Using “rounds” enables the leader to manage the group in a democratic way, so that the weak can be as powerful as the strong. Any participant can stop the discussion and ask for a round. Each participant must then state his or her view on the subject, without fear of being interrupted. Additionally working in the team you can also stimulate creative thinking. We are all creative by nature – we just need to develop our internal creativity. Three easiest ways to jump-start creativity are: keep a journal with you and you will be able to write your creative ideas down; relax and take time to absorb your thoughts; create a thinking place that encourages a positive and relaxed mood that will stimulate your creativity.

Adaptability to change. Adaptation is more than a merely attitude; it is a behavioral skill which improves individual and organizational productivity. The most successful individuals in negotiating and adapting to changes can see and embrace change as a catalyst for positive results. The most useful activities in adaptation are: recognize that change does happen; be aware of your surroundings; communicate with others; do a self-assessment and be flexible [6].

Attendance or timeliness. Every employer expects you to be at work on time. Of course there are some acceptable reasons for absence: illness; family sick leave; vacation and personal leave. Thus, employer pays you for a specific number of hours per day and expects that you arrive at your assigned area on time. Therefore absence from work will mean that the job, which you have to do, does not get done and somebody else has to perform your work. No one of your coworkers will approve of waiting for you. Therefore, when you arrive to workstation and appointments on time, you have an essential career soft skill. **Making decision.** You must review all ideas and choose more optimal for an assigned task, advisable to listening to different thinkers. For decision-making you can also use “round”, which help discuss the best decision.

Effective communication. There are several ways for developing effective communication skills. Individuals' communication skills are a basis for an effective dialogue, and involve both verbal and nonverbal communication skills. One of the main verbal communications is listening. Listening is probably the most used skill in everyday communication. It involves hearing and paying attention to the speaker. Not everybody is a good listener – some people prefer to talk [7]. Everybody knows the main rules: pay attention to the speaker, first of all, in order to show you are involved in communication. Respond both verbally and nonverbally, showing that the message is being comprehended and followed. It should not interrupt the speaker in the middle of a speech. Ask questions and confirm your understanding of the message [8]. And the second no less important verbal effective skill is speaking. Because though everybody speaks every day, not everybody can do it well. Some people are difficult to follow, some explain their thoughts in a complicated manner, and some are simply boring to listen to. To make a fascinating statement plain and simple word should be used unless the audience is specialized in the subject area. Use complete simple sentences for the message to be easier to comprehend. Of course, one shouldn't speak too fast. For a more expressive speech one should make pauses. Structure and connect ideas. Major points should be presented in a logical manner. And one should support ideas not only with words, but with intonation and nonverbal means of communication as well.

Not all soft skills are presented in this paper, but the main soft skills. Every soft skill can lead the worker to promotion and recognition by the coworkers. Thus, hard and soft skills are often referred to when applying for a job. For most jobs, while the hard skills are essential to getting the interview, it's the soft skills that will offer the job because employers want

someone who won't just perform their job function, but will be a good personality fit for the company and make a good impression on clients [9].

References:

- 1 What are the 'soft skills' employers want? [<https://nationalcareersservice.direct.gov.uk/aboutus/newsarticles/Pages/Spotlight-SoftSkills.aspx>].
- 2 Why Is It Important to Treat Others with Honesty Respect and Consideration? [<http://www.ask.com/question/why-is-it-important-to-treat-others-with-honesty-respect-and-consideration/>].
- 3 Helping People Take Responsibility [<http://www.mindtools.com/pages/article/taking-responsibility.htm>].
- 4 Soft Skill: Positive Attitude [<http://jobs.aol.com/articles/2014/02/10/soft-skill-positive-attitude/>].
- 5 Teamwork in the Classroom [<http://www.ndt-ed.org/TeachingResources/ClassroomTips/Teamwork.htm>].
- 6 10 tips for dealing with change in the workplace [<http://www.techrepublic.com/blog/10-things/10-tips-for-dealing-with-change-in-the-workplace/257/#>].
- 7 Boulden, George P. Thinking Creatively / G. Boulden. – London : Dorling Kindersley, 2002. – 72 p.: il. – Index: p. 70-71.
- 8 5 Ways to Stimulate Creative Thinking.
- 9 Hard Skills [<http://www.investopedia.com/terms/h/hard-skills.asp>].

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Investigation of radiation by Geiger- Muller counting tube

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At the moment there is a problem with radiation monitoring of the environment. For this purpose, there are different technical devices such as dosimeters, ionization chambers, scintillation counting-tube and Wilson chamber, solid-state device, bubble chamber. But the most procurable and prevalent method for monitoring radiation situation is Geiger-Muller counting tube, which allows to register the elementary particles and electromagnetic rays.

Radiation has no colors, no smell and can be detected only by special devices. This work is devoted to the method of registration of elementary particles by Geiger -Muller counting tube.

As it is known, effect of radiation was invented by Becquerel in 1896 year. Radiation is spontaneous emission of elementary particles which cause the electromagnetic rays. There are three radiation components: alpha-, beta – and gamma -rays. Alpha rays represent the flow of nuclei helium, beta rays represent a stream of fast electrons and gamma rays represent electromagnetic rays. Beta and gamma rays are more dangerous. Quantity of radiation for people is 5 mSv in years.

Registering apparatus is macroscopic system, which is in unsteady condition. Depending on purposes and conditions of experiments, different register apparatus is used. Register apparatus are notable for efficiency factor, minimum time of register, sensibility.