



Students' Diary

Computational Methods in Materials Science

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We all know the importance of the computer and the way it has simplified many otherwise complex tasks! Computers were so rapidly evolving in the last century and at a much faster pace, particularly in the last three decades. Today, we have high-performance supercomputers working towards the quantum computing future! With all the robust processing capabilities of modern high-performance computing machines, we can solve such complex problems by building mathematical models and simulations and predicting the result without even physically doing it, which not only cuts cost and development time but helps us study a different set of conditions at a fraction of time. Even vaccine development is accelerated these days with this! The coursework, Introduction to Computational Methods in Materials Science during my last Semester under Dr Saswata Bhattacharya provided me with the necessary training, tools, and motivation to explore and realize the possibilities the computational field can offer to find solutions to complex problems in the industry.

I work in Hindustan Copper Limited, where we mine copper ore, produce copper concentrate, smelt, and refine them, produce anode copper, copper cathode, and continuously cast copper rods at our various production units.

Some of these processes are very complex in nature and optimization of any of that using these computational tools by mathematical modelling and simulation might help us improve our business. Modelling the ore beneficiation process would help us improve the efficiency of the copper ore recovery during the floatation process and would lead to a reduction in the copper loss in the tailings. Modelling the continuous casting process (as shown in Fig. 1) could be used to optimize the different stages using these tools and techniques which was also my project work during the coursework.

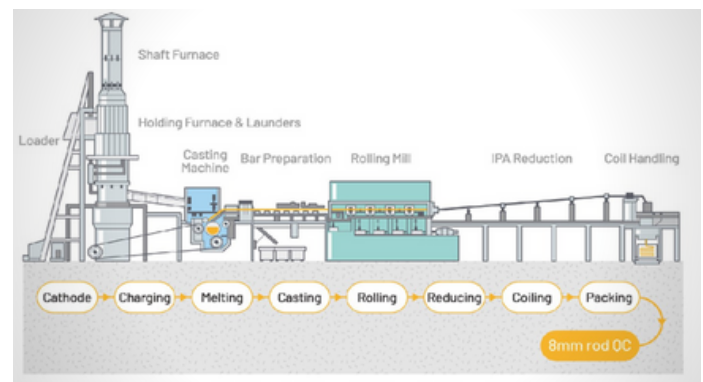


Fig. 25: A Typical Southwire Continuous Cast Copper Rod Production System



As this branch is new, I was a bit nervous about the opportunities that I could get in the future. But this branch involves all the other branches in its curriculum, which is itself a great thing. So, being in an IIT and studying about all the branches in just one course was kind of a WIN-WIN situation for me. As I read about the curriculum, it involved the usage of computational applications in various industrial processes that were also fascinating. And also, being one of the only ten students in the whole country, that too in one of the premier institutes in India was something that caught my attention. And after all, I'm very happy to be a part of this program at IITH.

My experience @IITH in the recent past

It was good, could have been better if we were at the campus. I interacted with a lot of my batchmates and seniors through social media. However, the clubs did a wonderful job till now. I played the mini-cryptex game and that was a wonderful experience. Also had a debate competition and some comedy shots by RangDeManch which was a great treat to be a part of. Our seniors never made us feel alone and isolated even when they were at the campus and we were at our home. Coming to the online classes, they are not as good as compared to if they were offline, but looking at the current situation, they're good. We had a lot of video calls unofficially and made a lot of friends in just a month which was a great thing. And later on, I was elected as the Class Representative of my branch which was a very big moment for me in just a month @IITH. But deep down, I'm waiting for us to be called at the campus and enjoy our college life which we're missing at our home.

Why Computational Engineering???

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India's 1st BTech in Computational Engineering

Program Benefits & Future Prospects

- The course aims to provide a holistic approach that will integrate the principles of engineering disciplines.
- Students of Computational Engineering receive an interdisciplinary education where they gain expertise in state-of-the-art numerical methods and algorithms, modelling and simulations of engineering systems and processes, high-performance computing, process control, and optimization, data analytics, and machine learning.
- In the first five semesters, the student acquires in-depth knowledge in mathematical methods, state-of-the-art numerical techniques, development of mathematical models, computer simulations, optimization, high-performance computing, data analytics, and machine learning.
- In the remaining three semesters, the student can choose from a large number of electives to acquire knowledge that is more specialized. The electives cover a wide variety of subjects covering advanced manufacturing, structural design, process engineering, materials design, chip design and biomedical engineering

Course Core & Calibre

Aim & Scope

For more details visit: www.iith.ac.in

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