100% ONLINE COURSE

InterMet

DIGITAL TWINS FOR PROCESS PLANTS:
INCREASING WATER RECOVERY TO MAXIMIZE METAL PRODUCTION

INSTRUCTOR: ENG. OSVALDO BASCUR

Date: August 28 - 31, 2023
Schedule: From 7:00 p.m. to 9:15 p.m.(peruvian time)

ABSTRACT

Finally, data control is super important, but we need tools to understand it.
Just as you are listening to something because you are filtering it, you are analyzing it and you are taking words that become sentences, the data we have in the plant must be cleaned from the noise, we must add context, and for that we need new tools. We have to integrate this data that is scattered and we have to unify it with the events that are happening in the plant to understand and model what is happening. You have to transform the data, you have to shape the data to understand and calculate in detail, so that users and systems can use it in a very practical way.

People change, the way we work changes, business systems change. There are a lot of opportunities that are in the way we organize our people, we can now work remotely, the technologies are there, but you have to adapt them to the people. People are not going to just take the technology. People have to adapt, and we have to increase the visibility of what we don't know. We have mines that are much more zealous and we have to adapt to this reality that we have, the laws are much lower and we will probably have to change the processes we are using. We also have to improve efficiency. I am sure you are all doing a lot of these things, but you have to improve efficiency and productivity. People can't be spending time analyzing spreadsheets, where nobody knows what's going on in a lot of spreadsheets that they don't know how they were made. This has to be transparent and it goes hand in hand with sustainability because we can save energy, water and maximize plant production.

SUBJECT

The agenda we have prepared for this course is as follows:

1. What are the secrets of digital transformation?
2. The four steps to maximize metal recovery in metallurgical complexes.
3. Let's also look today at dynamic decision support for operations using Predictive Analytics.

using Predictive Analytics.

And we're going to share a couple of examples of some companies that have been doing this over the last five years.

this within the last five years.

5. To finally define some conclusions with you.

We will learn about the following aspects:

Item 1: Secrets of digital transformation

One of the main problems today is that we have too many silos. There are different people doing different things and we are not organized in a modern way. There are many versions of the truth and management does not have adequate information from operations because the data is not adequate. So they don't trust them, and there are very few people who can do this job, because it requires a lot of knowledge of the plant to be able to define the business rules that are needed to transform the data. There is a huge opportunity in redesigning business processes and you have to eliminate some silos that are redundant in the digital age. Therefore, one of the important things is to integrate the metallurgical complex and hopefully the whole company.

Item 2: Misalignment between business objectives and operations

Here we have a great dichotomy in that the people who are operating in the plants are generally using this data in spreadsheets, with the systems they have, and they are not working or collaborating as they should do today. Today they are collaborating as we are talking about here, on the web, in the Cloud, and we have this barrier that exists between the operations people and the people who are managing the plant and also managing the company. And these people want to have information and be able to compare it, make decisions, very informed of what is happening and be able to see how the maintenance engineers, the operations people, the engineering people, have been able to transform this data to make decisions and suggest methods of improvement.

Item 3: Drastic Energy and Water Costs Operating @Cu < 0,5%

The main problem we have today in mining is that grades have gone down and energy and water costs have gone up. There is no longer the amount of water that we had before, these are very serious water problems and this was presented some time ago, when we were looking at a long-term vision in Rio de Janeiro. Here is a slide that Douglas Fuerstenau gave me and I find it spectacular because it summarizes the big problem we have in Chilean mining.

Item 4: What is meant by integrated operation?

Here the main problem is the integration of the mine with the plant, because what are we eating at the mill? at the mill? Well, we are eating what the mine throws at us and here there is a great opportunity to understand how the rock has been changing, which makes mining much more complicated than it is.
understand how the rock has been changing, which makes mining much more complicated than it was 20 years ago. That's why, today, the digital transformation starts from the drill.

Item 5: Milling Flotation Recovery

So, one of the main problems that you see also is that a lot of people don't understand that flotation cells are only made to lift particles that are between 10 microns minimum up to 170 microns. That's how most flotation cells work today because they have bubbles that are about 1 millimeter. So they can only capture particles that are released within this range. This comes from a long time ago, it was done with the results of Professor Lynch in Australia and I have always used them because if you have read some of my papers I am always with this same idea. If we are grinding too coarse, we are losing liberation and of course the particles go to the tails.

On the other side, this size distribution, not the P80, but the size distribution is what you have to shuffle, what you have to move so that it is consistent the product that is delivered by the grinding, so that it can be captured by the bubbles in the flotation. And at the same time for this to be stable we need the plant to be working consistently in a blue state (graphical). This means that it is working well. When there is a constraint it turns into an orange state (graph). And these orange states are the restrictions that exist in each of the areas and we have to see that everything is working in a coordinated system like a symphony.

Item 6: The digital transformation journey

Here it is specifically shown that with the data we have, we cannot make decisions because we have to transform them, we have to aggregate them according to the functionality they are going to provide. Therefore, there are several variations that must be made, but for this we need a new environment that allows us to use advanced analysis. And this advanced analysis is done by people who understand the plant, who know what is happening, to set alerts, alarms, variations that can be transformed into Insights, into information.

Item 7: Seeq in the cloud

Here we can have this data in different historians. We can upload it to the cloud, as a suggestion. And we need a tool that allows us to clean, classify the data, and also share this with the decision-makers so that they can be collaborating with the people in the plant, if they wish, to see what things were taken on in each unit, what was the meta data to have this data that gives us a view of the entire plant, how it is working, and what are the problems that we have to see for continuous improvement.

This same information can be reused to define much more detailed models, which are much more refined and thus introduce continuous improvement in the decision and in the creation of these predictive models.

Item 8: 4 Steps to Success

The first stage, which we are going to see here (figure), is to put the house in order. The second is to establish the losses and aggregate the data so that we can make informed decisions. Then, the modeling can be done and finally it is implemented. This whole cycle is always iterating to maximize copper recovery in this case, whether we are talking about copper, or iron, or zinc or any metal of interest. And of course reducing or getting ahead of not having awkwardness of violating operational constraints which, of course, cost quite a bit of money.

Item 9: Process flow diagram for concentrator model

And this is the first activity that we are going to see in detail, in which we make a flow model of the complete plant. Here in the crushing we will create the size distribution that passes to the Stock Pile and here we homogenize so that the Sag Mill can give us in the grinding, with its cyclone system, a size distribution suitable for flotation and thus obtain the greatest possible amount of copper. Then we clean it of course, you know this stage very well, and reduce the amounts of copper in the tails. So also, sometimes there are restrictions in the thickening and we have problems with the treatment of the tails. This often happens when we have problems in the mine, when we have contaminants that make the flocculation not work well.

And, above all, I always see that flotation is suffering or we have a recovery problem, but that has to do with what comes from the mine and how the work of "chewing" the ore has been done so that we do not have indigestion.

Item 10: The digital plant follows the money strategy.

We have tools that allow us to visualize all the states that are or are not contributing to the profit and then do a Paretto for each unit to tell us what is going on. And in turn, they allow us to aggregate information appropriately for informed decision making. We go from data to information, these bars (graph) are the averages, the standard variances, the minimums, the maximums, all these time-derived variables. This is in my book, you can study it, you can read it. All this comes from historians but very few people take the trouble to do this work.

Item 11: Access to mine management through the cloud

And here, the most important thing is what is called the organizer of information, data and know-how. This is where everything that is happening is documented and these reports are made. I can show them to you in real time whenever you want. Since we do not have much time, I will continue.

Item 12: Hidden losses at the mine due to ore variations

Here we can see that we have the whole plant modeled, with each of these units, and we can see the contribution that each of them has in the increase in production. When we have problems, in the orange trees (in the graphs) we can see the energy and water losses that exist. The latter have a great influence on the geo-reology, on which depends the fluidity in the mill, in the cyclone, in the grinding, in the flotation, in the thickening, which depend on these impurities that are in the ore. These must be characterized in a new science that we are developing.

Item 13: 4 steps to success

And here we have then, once we understand the above, we can model.

Item 14: Collaborate across the organization

And we can model with appropriate tools that take the data from the historian. We can clean it, characterize it, and then we have information to report immediately and in real time to people who want to visualize and make decisions. Also, this information that is generated can be reprocessed with much more advanced models that can give us more details on how to include and interpret other types of parameters.

Item 15: Kroll Institute of Extractive Metallurgy

Here you can see for example (graph) that the size distribution coming out of a cyclone has a P80, but this P80 is balancing, and this variability that exists is captured today in real time and allows us to estimate the viscosity that we have in the milling circuit and also in flotation. This is one of the most sensitive problems that occur when we have impurities, which did not occur before because we were extracting the top part of the "quequeque", but now as we are extracting from below, there are many variations that are being measured, but people do not know how to use them because other technologies are needed to be able to visualize what this data is telling us.

Item 16: Optimization of integrated copper recovery

This is how it is possible to see the size distributions that are entering the mill and those that are leaving the mill. Here we have a simulator that shows how this varies and how this influences to be able to understand with the operational data how to maximize the recovery in the Rougher part and then we clean of course, always with new ideas that are included in this new way of operating these plants.

Item 17: Predictive model for recovery of metals from raw materials

Here we show an example in which we have the recovery and all the variables that are associated with what we can make different types of models that give us predictions and tell us what is the effect of the water variable for example, what is the effect of the size distribution, what is the effect of the Air Hold Up, what is the effect of the power we have in the flotation profiles, what is the amount of air we need to use, what is the amount of frother, what is the amount of reagent we are using, all of that is included here. The first step, of course, is in the grinding part, the comminution, because once we have done it we cannot go back and the product either goes to the concentrate or to the tails. And this is where we have been developing these dynamic models for many years, and these are the ones that are now used with data.

Item 18: Identification of plant processes for their optimization

Here we have for example a screenshot where this information is taken and you can understand the variability and the effect that each one of the variables have in the complete flotation, in the recovery of the metal that we are trying to maximize its extraction.

Item 19: Preventing assets from slowing down

Here's another case where you can see all the things that are running.

Item 20: The challenges of data in a global organization

Decisions can be made here, Data Science is being used, digitization of plants is being used, work is being done in the Cloud, and the people in the plant work with the support of the information obtained by using these new technologies.

plants, we are working in the Cloud, and the people of the plant work with the support of the information obtained with the use of these new technologies. This has been done for several years in Chile with Endesa, Enel and has been a resounding success. It has also been done in South Africa, in Anglo American, and now I am going to show you one that has to do with ArcelorMittal in Canada, there are also other places in Canada where they have been working in this way for quite some time. We have for example this plant of the company Lonza, which is in Germany and is working and supporting various plants, not at a local level but at a totally international level.

Item 21: 4 Steps to Success

This is how we can now move on to some results.

Item 22: AcelorMittal - Presentation Videos

Here we have Michele Plourde, who is the head of the ArcelorMittal group, who is being the director of the mining system, which starts from the Drill, Blasting, Loading, Trucks, Crushing, Ore Beneficiation, Transport in trains, Pellet Plant, the movement of materials that occur here with the Stakers. All these teams are working and are observed as a whole by a system like an umbrella, which is watching how we are working, protecting us by having a complete view from raw material to product delivery.

They have been able to increase capacity and make savings.

Item 23: Heavy equipment logistics

Here I have another slide showing a couple of results. You can see the data in detail with additional revenues of $120 million. It is incredible how they have been able to transform their way of thinking, their way of executing this digital transformation, and moving forward with these new technologies that they have been adapting.

Item 24: Integrated mining and mineral processing (future)

Here we have what is being done. We are taking the size distributions and we are seeing, by analyzing them, the variability of these size distributions, not of the P80, but the variability in the size distribution that is entering flotation, the SAG product, the Crushing product, the Crushing product and so on.

Item 25: Power generation Latam

All these plants throughout Latin America have this center, this brain, which is here like firemen, always ready to fix things that are detected in time.

Is here like a firefighter, always ready to fix things that are detected in real time.

real time.

INSTRUCTOR

ENG. OSVALDO BASCUR

CONSULTANT IN OSB DIGITAL
AND SEEQ CORPORATION USA

- I work for OSB Digital and also work with Seeq as a consultant.
- I just finished writing a book and it is published. Here I put many of my ideas and concepts that I have worked on after 25 years with OSIsoft. Now I have dedicated myself to work to help the people, the engineers that are in the plants, because I realized that the main problem is that they are not using their talent with the information and data that is available.
- I have advised that they must have a data infrastructure and to work with the people, change the process businesses because that is an opportunity that exists in the digital transformation and, of course, work with the left side of the brain of the plant, which is the control system, but we need the right side of the brain to be able to understand what is happening and use the time with the data in the right context. This way you can add information in a clear and concise way to the management people so that the decision making can be done in a much more effective way and so you can redefine the plant planning by having reliable data.

INVESTMENT : USD 100

UNTIL 24 JULY

PAYMENT METHODS

- Bank transfers (commissions are not included)
- Payment link
- Western Union (request data)
- Money Gram ((request data)

TRANSFER

- **Deposit at Bank:**
  BANCO DE CRÉDITO DEL PERU
- **Beneficiary:**
  INTERNATIONAL METALLURGICAL CONSULTANTS S.A.C.
- **Account Number in Dollars :**
  193-1872625-1-12
- **SWIFT code :**
  BCPLPEPL
- **Inter- bankcode:**
  00219300187262511219
- **Bank Address :**
  Jr. Lampa 499. Lima , Peru

PAYMENT LINK

https://pagolink.niubiz.com.pe/pagoseguro/INTERMET/1134820

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