Dynamic Operational Management and Sustainability Strategy

Course - Online Workshop 100% in real time

Basic process control is an integral part of most manufacturing plants in metal and mineral processing. Its great popularity is a result of how it helped many operations reduce costs and increase productivity and performance (management).

The development of process control in the mining-metallurgical processing industry has been greatly influenced in recent decades by new measurements, advances in computing power, software, communications, and the internet / technologies in cloud. A third and very important factor has been the selection of strategies to link control actions tailored to the process in order to develop global control and a plant management system. These three components, such as measurements, process control strategies, and computer hardware; form a triangle integration element, as can be seen in Figure 1. The knowledge of workers, such as operators and process engineers, is at the center of these elements. They are the ones that will operate the process units, and who will learn about the process, design, and maintenance of the control strategies process. These control strategies are integrated with an operational management support system that gathers any type of information in a mineral processing plant. To obtain operational excellence, the organizational culture is required to be innovative and present continuous improvements. Here is a control triangle describing process control and operational management technologies in the digital era (Figure 2). It is currently known as Industry 4.0 and refers to the digital revolution era that we are currently living in.

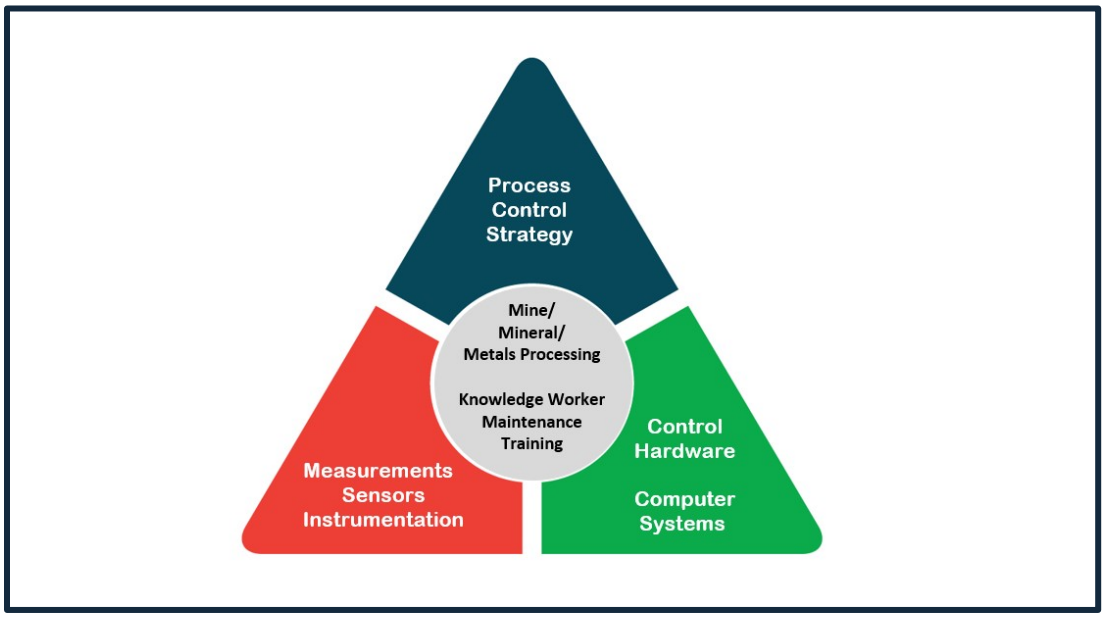

Figure 1. The Control Triangle - Basic Components and Interactions in Automatic Control.

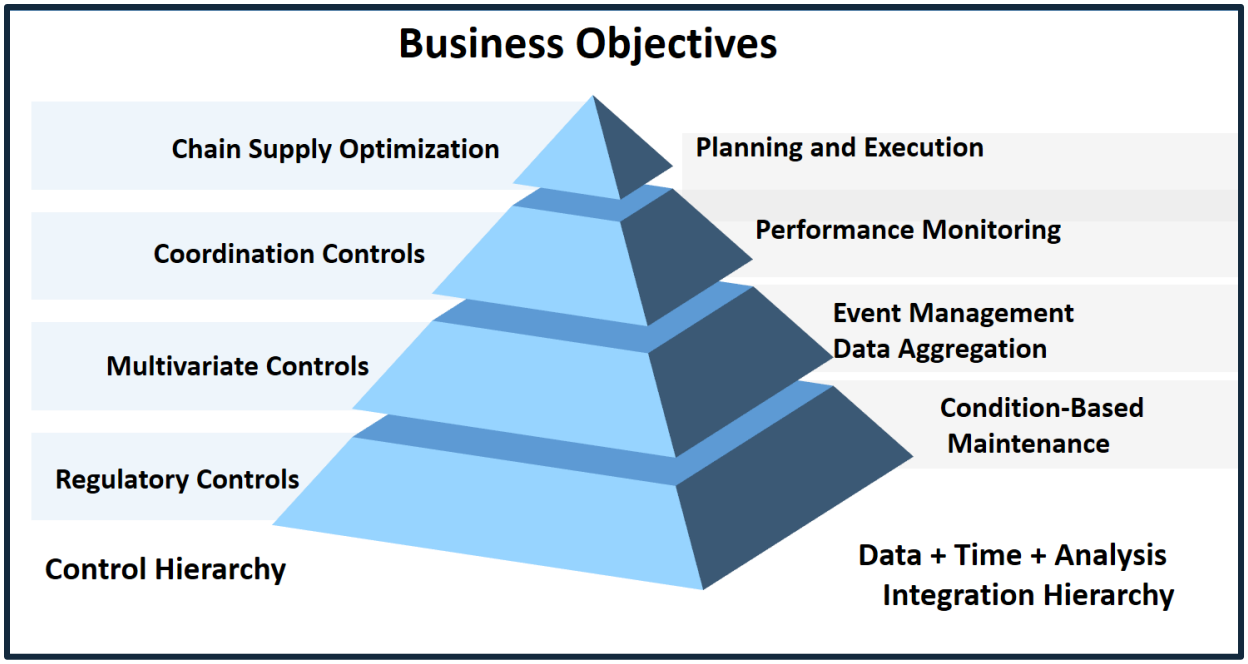

Figure 2. Process Control and Management of Dynamic Performance in the Digital Age.

AGENDA AND SCHEME OF THE COURSE

DAY 1

1. Introduction (10 minutes)

2. Fundamentals of Process Control (120 minutes)

Why do we need controls?

Process control loops.

Process control documentation.

3. Measurements in processes

Sampling systems.

Specialized online analyzers.

Softsensors.

Instrumentation, devices and networks.

4. Process control strategies (120 minutes)

Table of knowledge of operations for mineral processing.

Process control algorithms.

Primary regulatory controls.

Multivariable process controls.

Holistic coordination of integrated processes.

DAY 2

Process control examples (120 minutes)

Examples in mineral processing:

Model Predictive Control Controller (MPC) for Ball Mill and SAG Mill Circuit.

Copper Float Rougher and Scavenger Circuit Controls.

Multivariable thickening controller.

Example in hydrometallurgy:

Implementation of the MPC in Cyanide Gold Leaching.

Example in pyrometallurgy:

Integrated controls for ferro-nickel electric arc furnace.

5. Management of dynamic operational plants in a company (140 minutes)

Collaborative operational management monitoring of all functions.

Integrated planning and operational intelligence for production.

Monitoring of critical equipment using predictive models.

Quality monitoring of process control loops and mechanical actuators.

Integration of Mines, Mineral Transportation, Processing Plants and Dispatches.

Optimization of the iron supply chain: from plant to port.

Optimization of gold and copper recovery.

Nickel and copper recovery optimization.

Enterprise mining, mineral processing energy management and extractive metallurgy.

Concentrate production monitoring centers of competence.

Enterprise power generation monitoring and diagnosis.

Mass balances and data reconciliation.

DAY 3

6. Industrial Internet of Things, digital disruption in automation (60 minutes)

Remote team and support in process recovery optimization.

Process control and business operational management in the Digital Era.

Preparing computers to work with people in plants and skill centers.

New benefits in the Digital Age.

7. Live Examples of Minerals Processing and Extractive Metallurgy Plants (120 minutes)

Data transformation to a Digital Processing Plant using PI systems and other historians with Seeq and PowerBI.

Dynamill II, Dynamic Process Simulation for Process Control Alternatives.

Dynafloat, Dynamic Flotation Simulation Model for Control Alternatives.

DynaThick, Dynamic Thickener Model for online identification of your inventory.

Optimill, Grinding Circuit Diagnostic Model to find the optimal tonnage for the operation.

*** They will be shown in a PI environment in a complete example of data source design and in Seeq Advanced Analytics / Modeling and PowerBI (Operational Management and Artificial Intelligence) how data is transformed into information.**

8. Model of Operational Management of the Plants of the participants (60 minutes)

***5 Participants who want to share.**

Participants Presentations. **(10 Minutes per Participant)**

Questions and answers.

Conclusions. **(15 minutes)**

How would you like to proceed?

EXPERT INSTRUCTOR

DR. OSVALDO A. BASCUR

Curriculum Vitae: https://www.osbdigit.com/about-us/cv/

Dr. Bascur is currently Principal Digital Transformation at OSB Digit, LLC and he is Consultant Fellow for Seeq Advanced Analytics. He worked as a principal at OSISOFT for 25 years. He was a staff engineer for Pennzoil and before he was process control engineer working for Duval Corporation, Tucson, Az (now Freeport McMoRan).

He has recently designed a template for the digital transformation of Plants for dynamic operational management, quality, asset and energy/water optimization. Today, the Digital Plant Strategy transform sensor data into Operational Insights (Data + Operational Events) to enable Overall Production Effectiveness and Predictive Analytics. The strategy identifies the Hidden Production/Energy/Water Losses in an Industrial Plant enabling Production Maximization while eliminating losses. This template strategy enables the transformation of huge amounts of unusable data into InFORMation to generate additional Operating Insights, Predictive Models, and integrates with Business Intelligence Tools such as MS PowerBI, Seeq Advanced Analytics, and AWS Quick sight.

He states: *"Now more than ever, the remote work strategy with support in the construction of new forms of value creation in operational management is vital. It is also imperative to implement predictive models to avoid energy and water loss, as well as prevent environmental contamination in the process of production. Working remotely with a coach helps develop operational analysis in real-time, anticipating issues such as approaching restrictions or leaving the optimal production bands contained in the history of effective production."*

Dr. Bascur wrote the chapter on Process Control and Operational Intelligence for the SME Mineral and Extractive Metallurgy Processing Handbook in 2019. He contributed with a chapter Measuring, Managing and Transforming Data for Operational Insights for the Smart

Manufacturing Concepts and Methods led by the University of Texas and Drexel University. He edited the Latin American Mining Perspectives: Exploration, Mining and Processing for the SME. In addition, he has written more than 95 technical papers and contributed to numerous chapters in several books. He is editor of the MEI and IFAC publications.

He received the most prestigious SME Antoine Gaudin Award in 2014. He is a member of the AIChE, SME, AIST, IFAC MMM and the IMPC.

He is a Chemical Engineer and Metallurgical Engineer from the University of Concepción. He received his PhD in Metallurgical Engineering from the University of Utah, Salt Lake City, USA.

Selected References and Video with Links

Digital Transformation in the Process Industries: A Road Map.

Google Books Link:
https://play.google.com/store/search?q=osvaldo%20bascur&c=books

Amazon Link:
https://www.amazon.com/-/e/B07XV5HXX9

Marketing Digital Transformation in the Process Industries Book Trailer with Subtitles:
https://youtu.be/VrBeTLuH_7g

EMEA PI World. Presentation recording:
https://youtu.be/BQUinTS14Xk

Chapter 6. Measuring, Managing and Transforming Data into Operational Insights, in Smart Manufacturing: Concepts and Methods
https://www.elsevier.com/books/smart-manufacturing/soroush/978-0-12-820027-8

Chapter 2.6 Process Control and Operational Intelligence in SME Mineral Process and Extractive Metallurgy Handbook published by SME last February 2019:
https://books.google.com/books?id=4hKGDwAAQBAJ&q=process+control&source=gbs_word_cloud_r&cad=4#v=snippet&q=process%20control&f=false

Grinding Flotation Strategies in the Digital Age:
https://link.springer.com/article/10.1007/s42461-018-0036-4

Metallurgy Analytics: Transforming Plant Data into Actional Insights

https://www.researchgate.net/publication/327619102_Metallurgy_analytcs_Transforming_Plant_data_into_actionable_Insights

Advanced Process Control and Information Systems for the Process Industries:
https://www.amazon.com/gp/product/0884152391/ref=ox_sc_act_title_1?smid=A3CDQ5DYKFSSMN&psc=1

You might want to include the Barry Wills Interview:
http://min-eng.blogspot.com/2017/07/in-conversation-with-osvaldo-bascur.html

Case Studies and Customers Presentations

ArcelorMittal Implementation of the Digital Plant Template:
https://www.youtube.com/watch?v=_m6xEA_YB90

Barrick Gold Presentation:
https://www.osisoft.com/Presentations/Metallurgy-Analytics--Transforming-Plant-Data-to-Actionable-Insights/

AngloAmerican Platinum Presentation (we have several from Michel Halhead):
https://www.osisoft.com/presentations/improving-data-validation-with-pi-af/