POTENTIAL AND IMPACT OF SENSOR BASED SORTING ON THE GRINDING CIRCUIT PERFORMANCE FOR A POLYMETALLIC ORE

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STEINERT
MAGNETIC + SENSOR **SORTING SOLUTIONS**

nexa

OMP

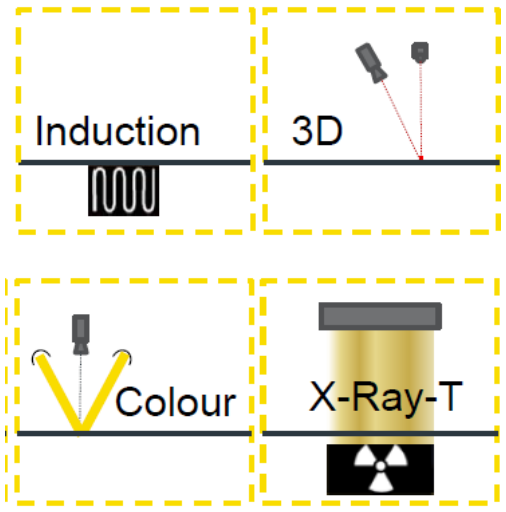
CONTENT

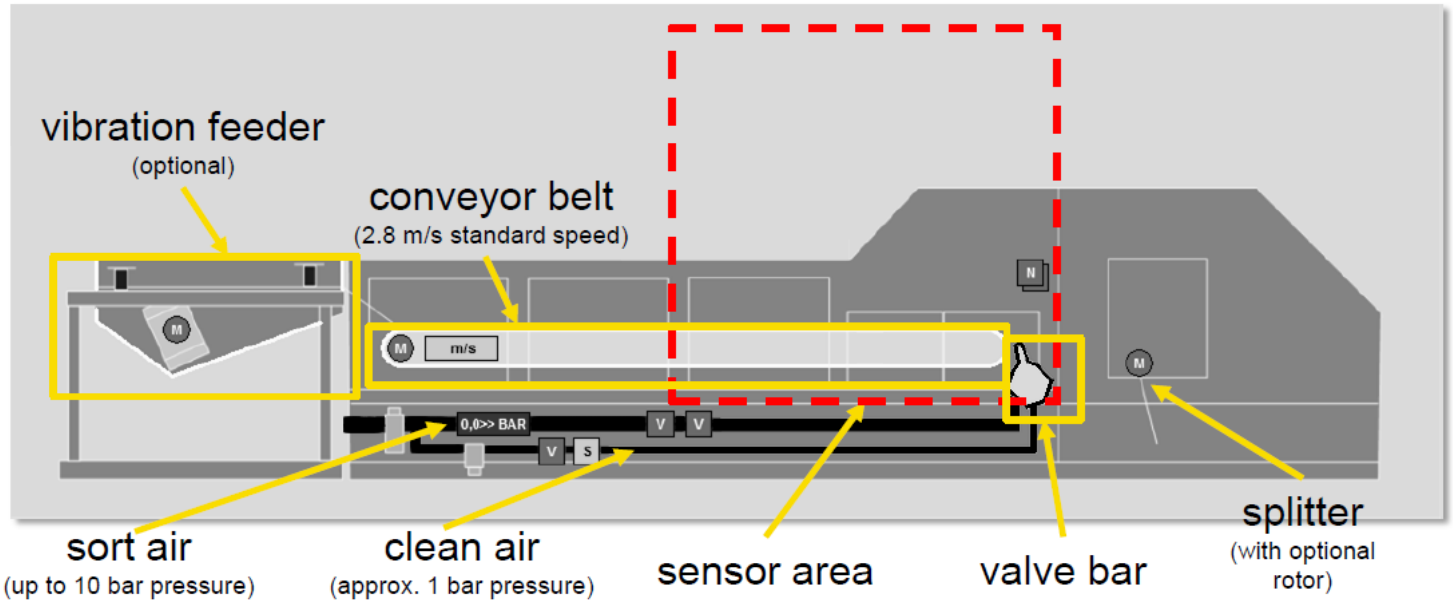
INTRODUCTION

INTRODUCTION

The presented sorting equipment (KSS CLI) utilizes a combination of

X-ray transmission, 3D recognition, Induction sensor and Colour Camera.





OBJECTIVE

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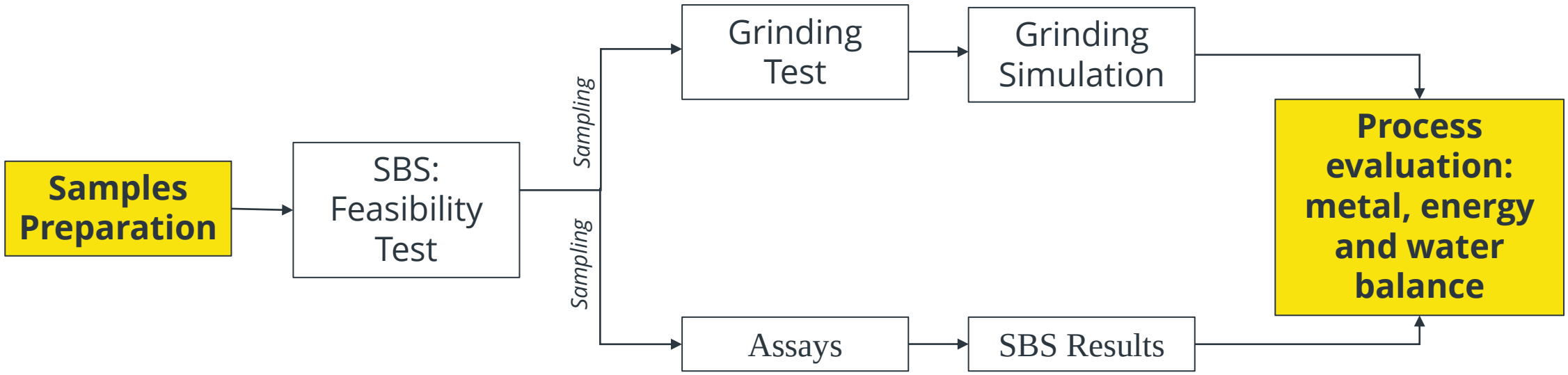
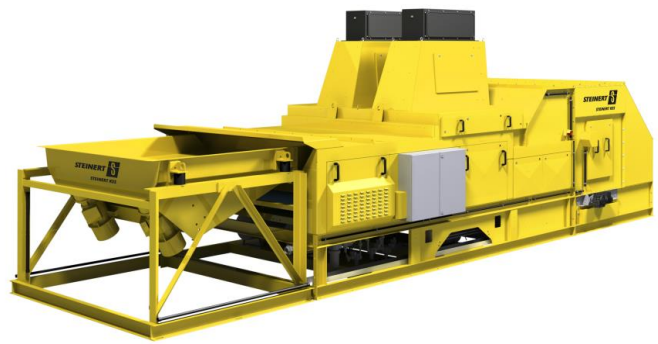
- Provide an integrated evaluation for the understanding of SBS effect in a SABC circuit;

- Calculate the effect of SBS on the energy, water and waste generation for the Aripuanã Project.

METHODOLOGY

/ METHODOLOGY



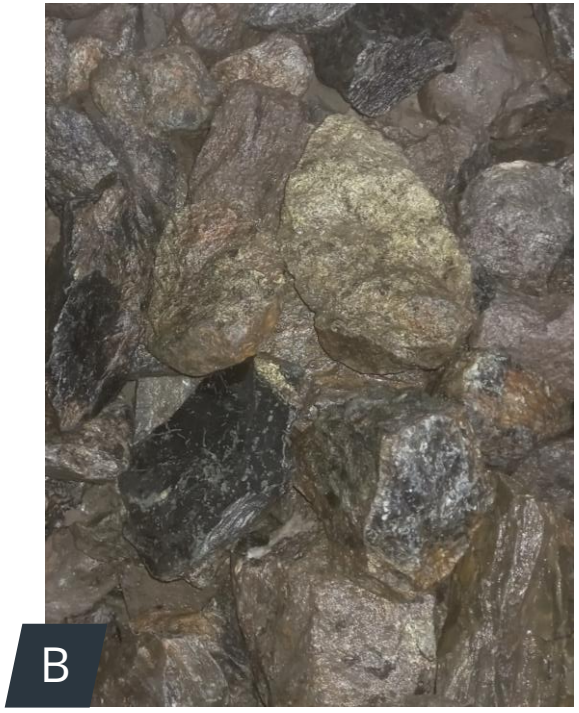


CASE STUDY:
ARIPUANÃ PROJECT

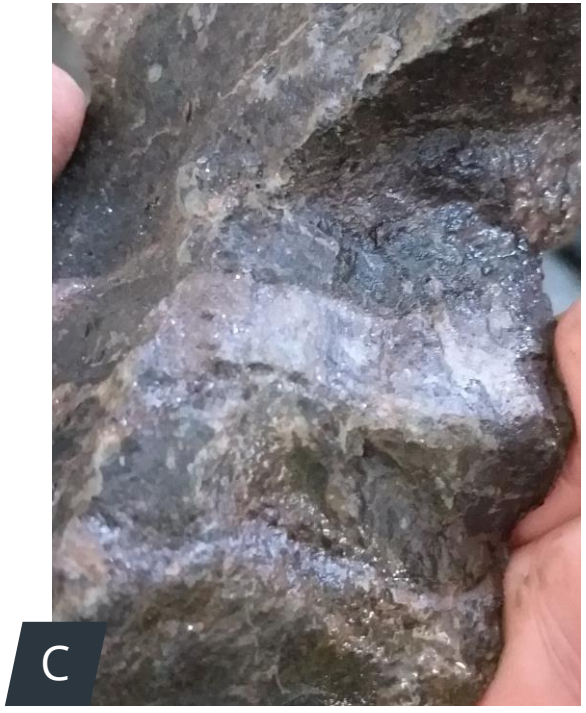
/ SBS Results

- In total, 20t of material were tested at different test setup.

XRT + 3D LASER:
Inclusions + High density

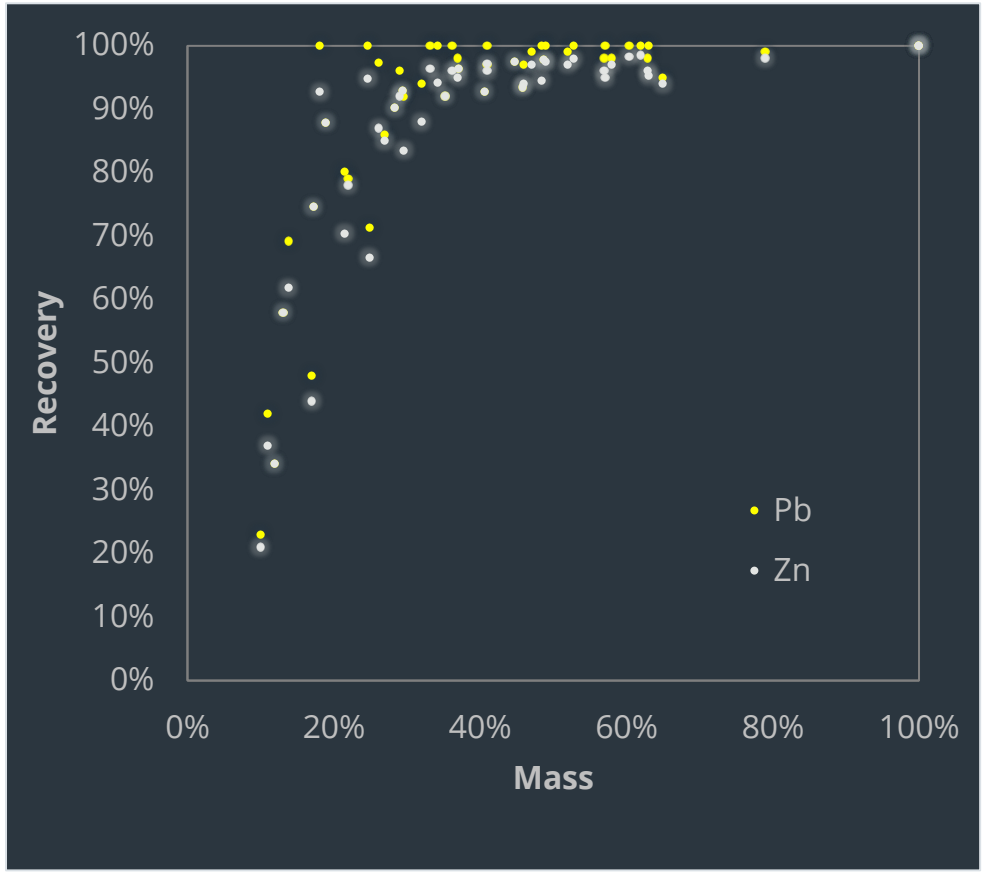


INDUCTION:
Pyrrhotyte + Chalcopyrite



XRT:
Low density

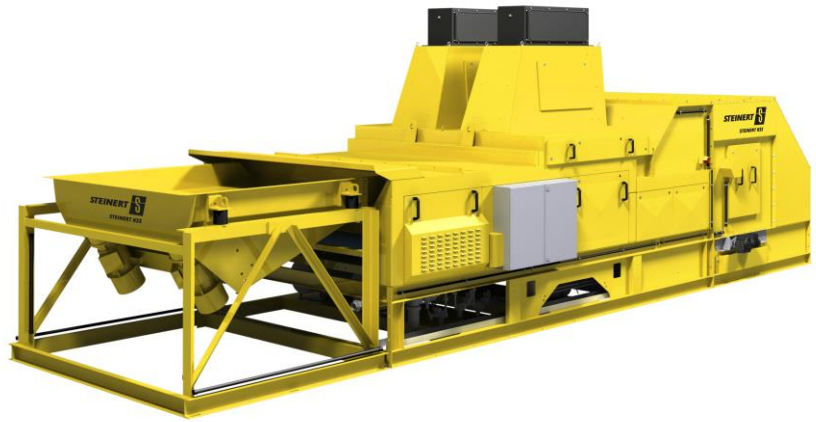
SBS RESULTS



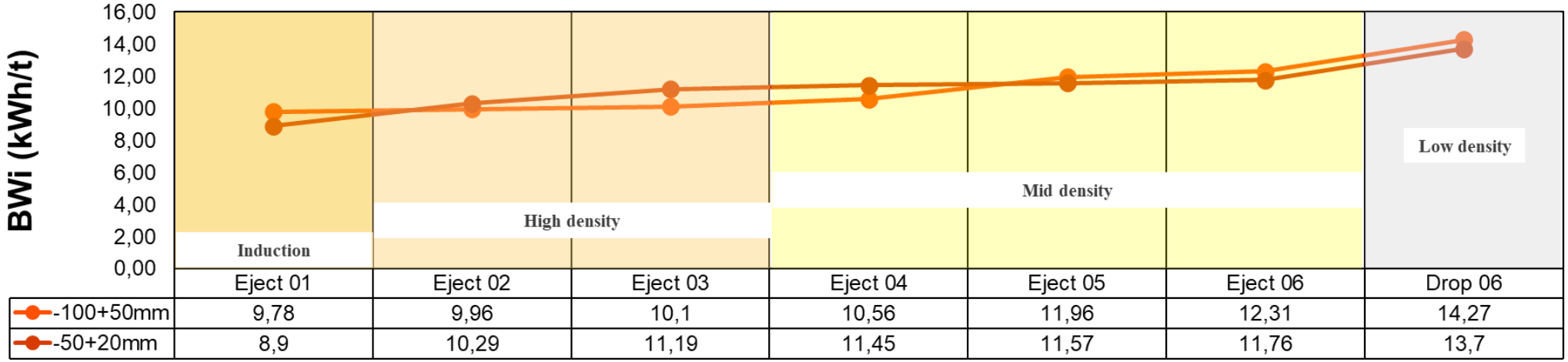
Feed property	Min	Max
Pb (%)	0,26	1,83
Zn (%)	0,95	3,81
Size (mm)	20	150

/ CASE STUDY: SCENARIOS

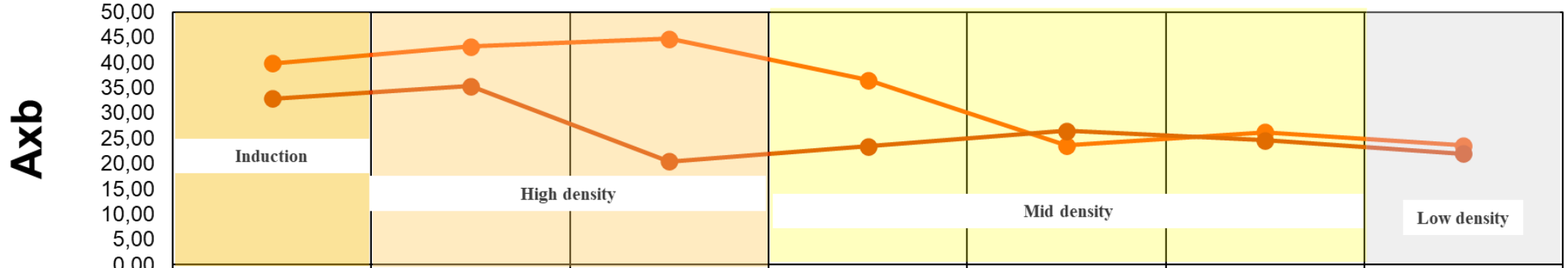
Scenario	Size fraction for SBS	% of feed material for SBS	SBS: mass recovery	% of ROM for the beneficiation plant	SBS capacity	Sorting power (per unit)
A	-	0%	0%	100%	-	-
B	+20mm	76,20%	50%	62%	115 t/h	315 kW
C	-150+20mm	60,41%	50%	70%	98 t/h	330 kW



DWT and BWi

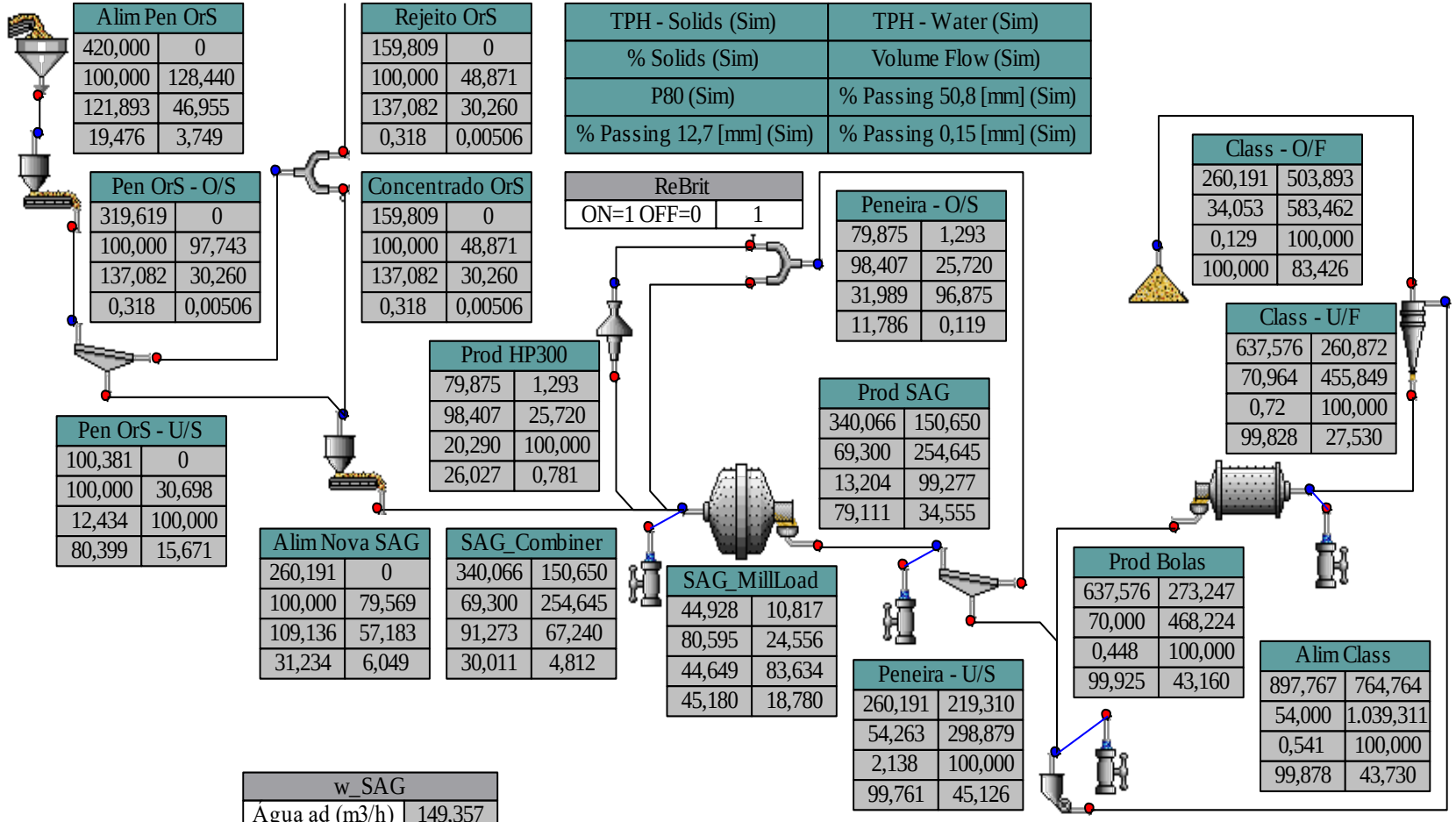


	Eject 01	Eject 02	Eject 03	Eject 04	Eject 05	Eject 06	Drop 06
-100+50mm	9,78	9,96	10,1	10,56	11,96	12,31	14,27
-50+20mm	8,9	10,29	11,19	11,45	11,57	11,76	13,7



	Eject 01	Eject 02	Eject 03	Eject 04	Eject 05	Eject 06	Drop 06
-100+50mm	39,83	43,14	44,69	36,53	23,63	26,28	23,6
-50+20mm	32,91	35,34	20,45	23,45	26,47	24,62	22,02

JKSimMet



w_SAG	
Água ad (m3/h)	149,357

w_Peneira	
Água ad (m3/h)	69,953

w_Class	
Água ad (m3/h)	272,207

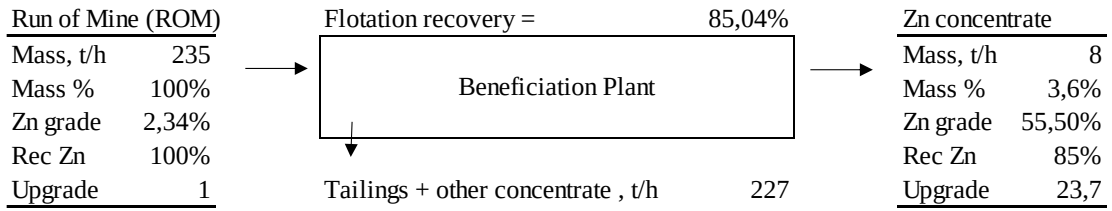
w_Bolas	
Água ad (m3/h)	12,375

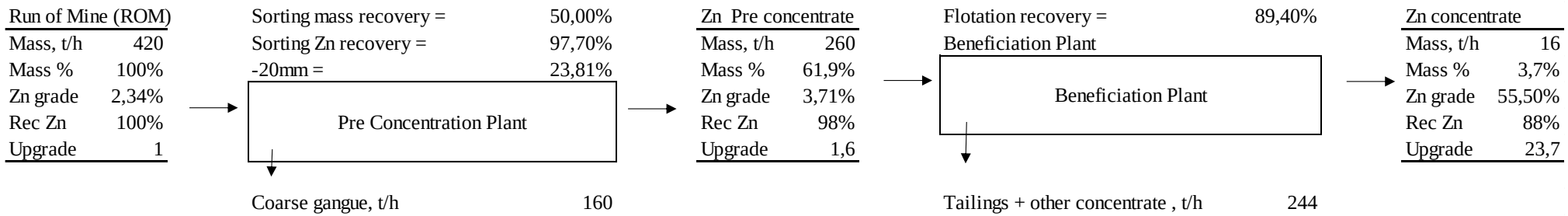
SAG	
Potência (kW)	2.284,979
Fração VC	0,75
G.E. bolas (%)	12,000
G.E. bola+min (%)	25,663
Bola top size (mm)	152,000

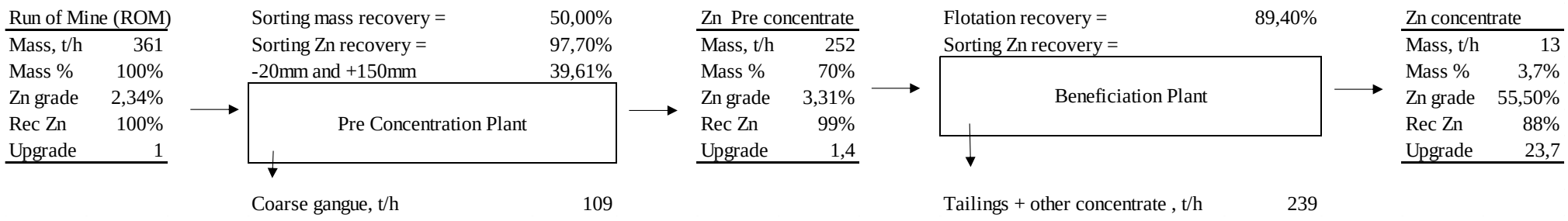
Bolas	
Potência (kW)	2.499,836
Fração VC	0,75
G.E. bolas	0,33
Bola top size (mm)	65,000

Class	
Pressão (kPa)	67,601
Unidades operando	3
Vortex(m)	0,2
Apex(m)	0,127
Água p/ OF (%)	65,889

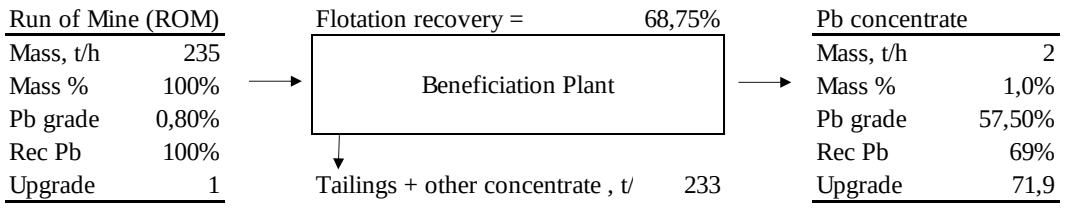
Metal Balance (Zn)

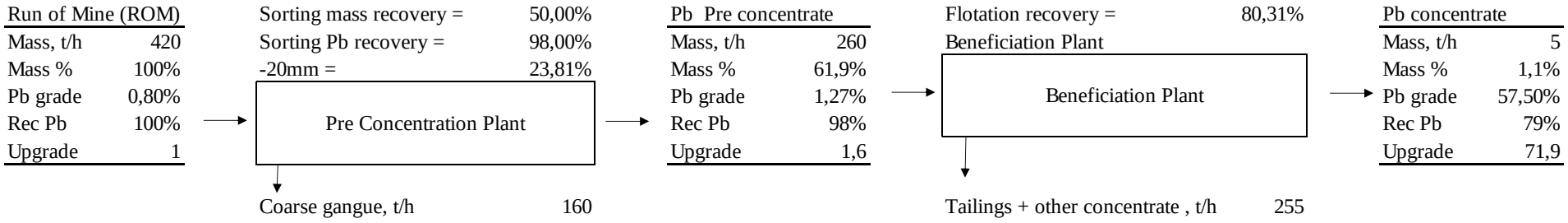


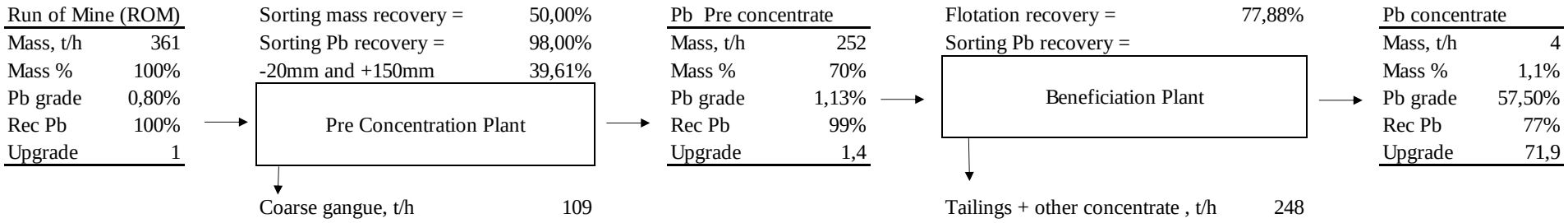




Metal Balance (Pb)







/ Integration: Simulation and Metal Balance

Parameter	Unit	A	B	C
Preconcentration feed	t/h	235	420	361
Number of SBS		-	4	4
Preconcentration Plant: Power	kW	-	1260	1320
New feed SAG	t/h	235	260	252
Measured power SAG (motor)	kW	2292	2285	2287
Measured Power BALL (motor)	kW	2500	2500	2500
F_{80}	µm	121893	109136	134880
P_{80}	µm	139	129	128
Total water consumption	m3/h	476	504	478

Resources quantification to generate 1t of Pb and Zn concentrate

Parameter	Unit	A	B	C
Water usage	M3/t	45	25	28
Energy usage	kWh/t	464	308	363
Tailings	t/t	21	12	14
Coarse gangue	t/t	0	8	6

CONCLUSION

/ CONCLUSION

- **“Sensor-based-sorting”** test indicate that the preconcentration of the Aripuanã ore can be performed with a **50% mass rejection**, resulting in Pb and Zn **recoveries greater than 97%.**
- Considering the material PSD, this represents a **37% mass reduction** at the processing plant.
- The addition of a preconcentration stage also presents a direct effect on feed plant **PSD**, **BWi** and **Axb.**
- JKSimMet simulations indicated that the combination of those effects resulted in an **additional 10% capacity** for the grinding circuit.
- The upgrade on plant feed material presented an impact on flotation stage, thus increasing the overall metal recovery.

/ CONCLUSION

- The addition of a preconcentration stage trough **“Sensor-based-sorting”** technology, resulted in:
  - 56% water usage;
  - 66% energy consumption;
  - 57% fine waste generation.

CONTACT

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THANKS.
Questions? I am available.

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