REVOLUTIONIZING IRON ORE PELLETIZING: THE SCREENING PROCESS FLOWSHEET OF THE FUTURE

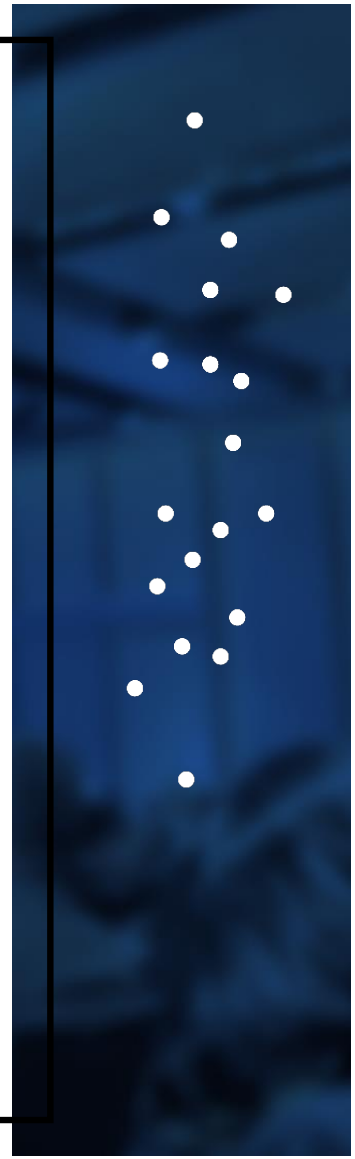
Steve Beaudin

VP Innovation at Groupe M7

The 5th SYMPOSIUM

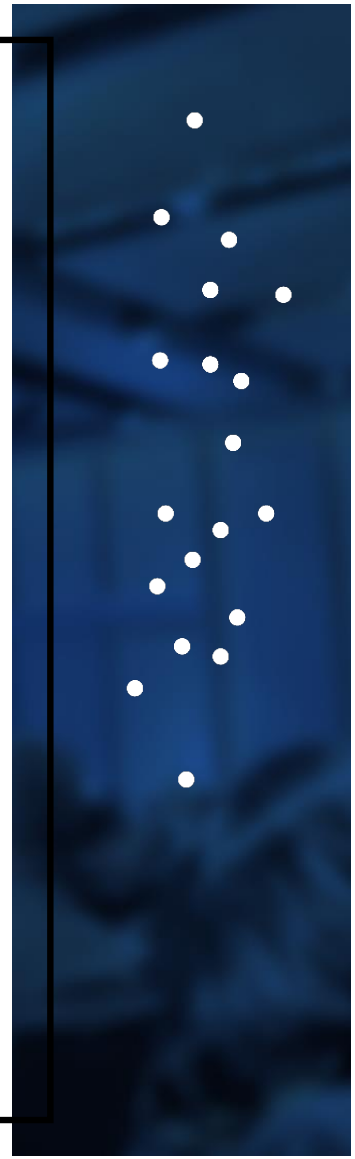
AGENDA

1. INTRODUCTION
2. NEW ADVANCES
3. CASE STUDIES
4. SCREENING FLOWSHEET OF THE FUTURE
5. CONCLUSION

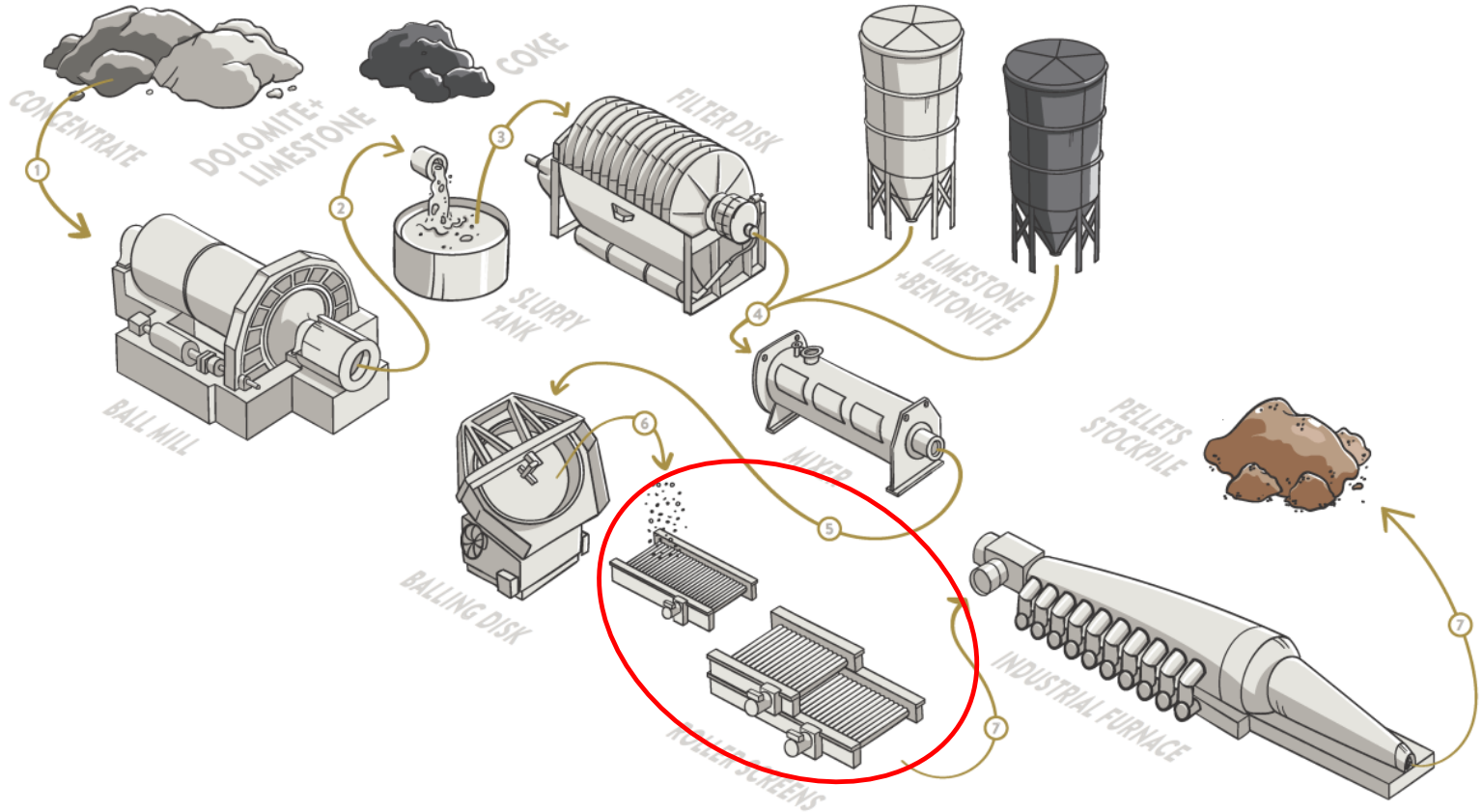


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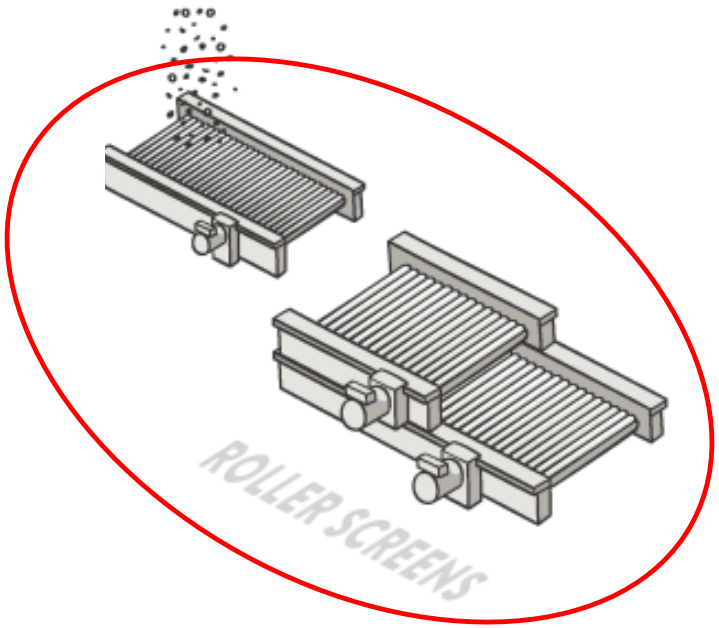


INTRODUCTION



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INTRODUCTION

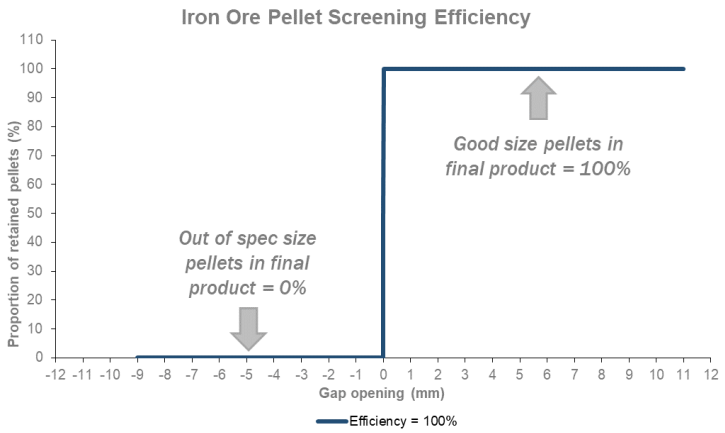


FUNCTION:
• Removal of fines pellets
• Removal of oversize pellets
• Retention of good size pellets

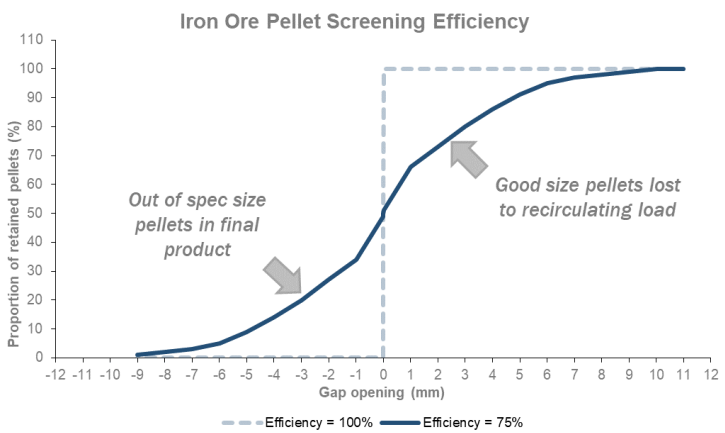
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INTRODUCTION

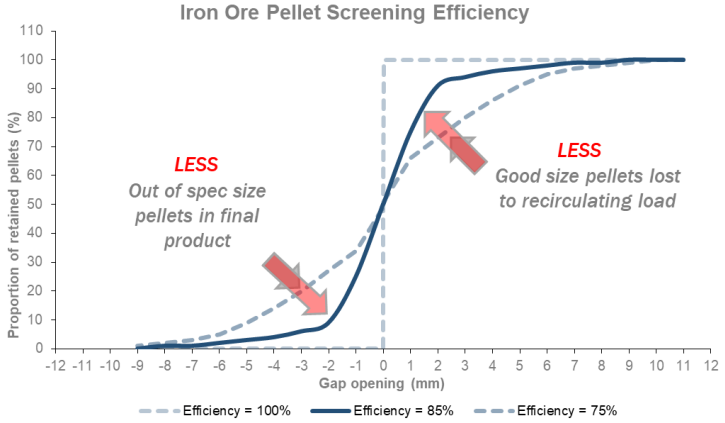
THEORICAL EFFICIENCY CURVE

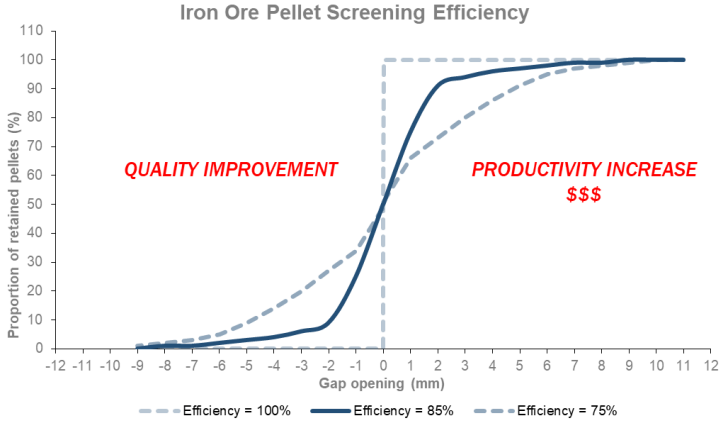


75% EFFICIENCY CURVE

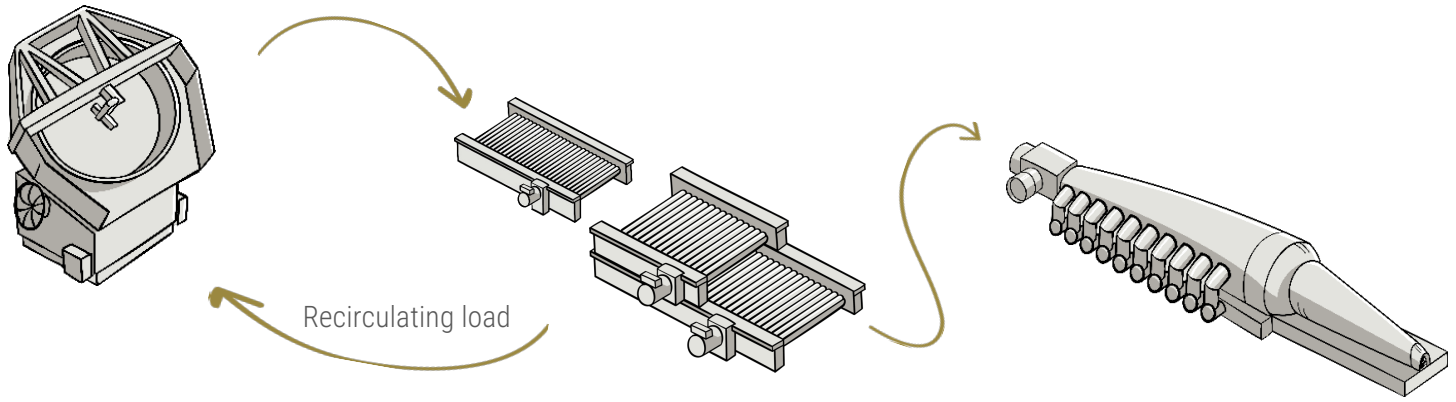


85% EFFICIENCY CURVE





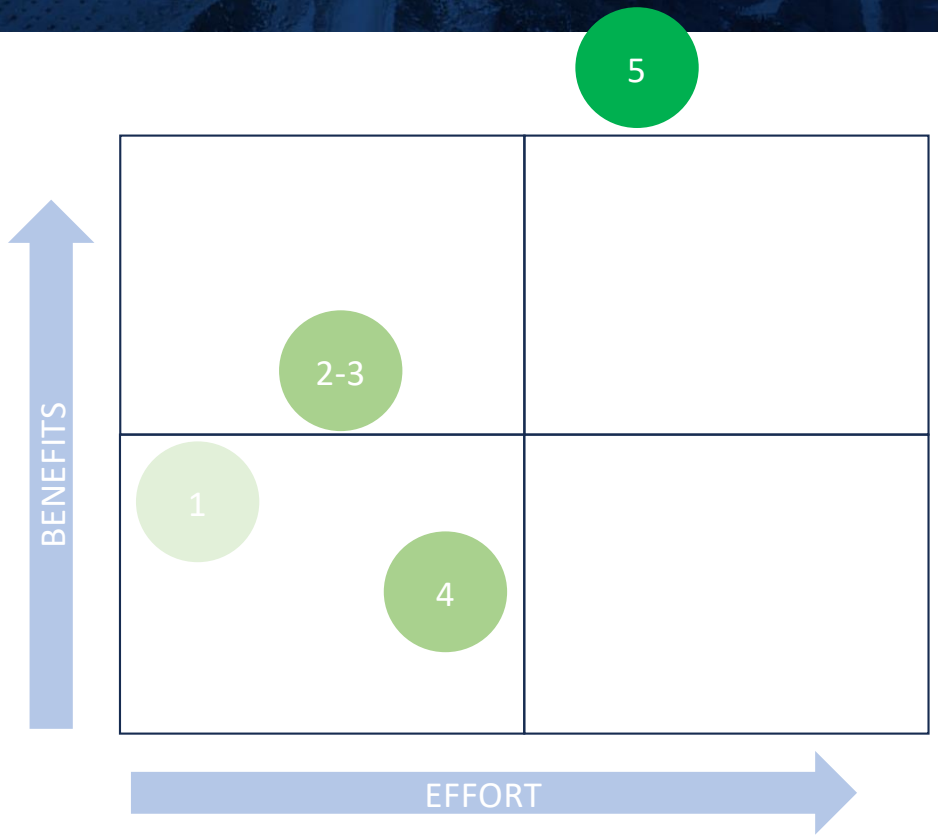
INTRODUCTION



AGGLOMERATION UNITS	ROLLER SCREENINGS	FURNACE
○ Reduction of recirculating load; ○ Operation of balling unit with lower charge; ○ Higher balling efficiency;	**Higher screening efficiency**	○ More uniform pellets size distribution ○ Better bed permeability; ○ Better firing efficiency

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INTRODUCTION



HOW TO IMPROVE SCREENING EFFICIENCY?

1- Improve Gap uniformity

2- Improve Rolls Straightness

3- Improve Pellets Transportation

4- Optimize Screen Angle

5- Reduce Screening Ratio (↑ Area, ↓ Load)

AGENDA

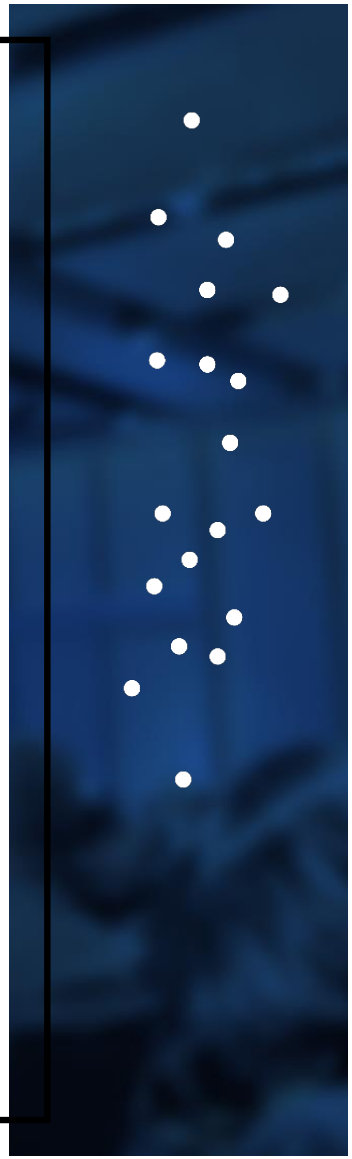
1 INTRODUCTION

2 **NEW ADVANCES**

3 CASE STUDIES

4 SCREENING FLOWSHEET OF THE FUTURE

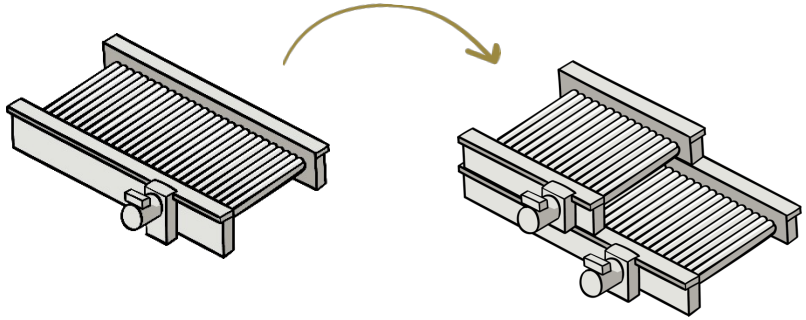
5 CONCLUSION



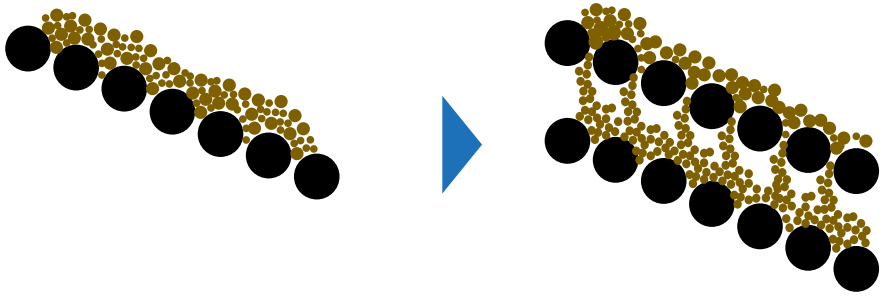
NEW ADVANCES

BALLING SCREEN

NEW!



DDRS

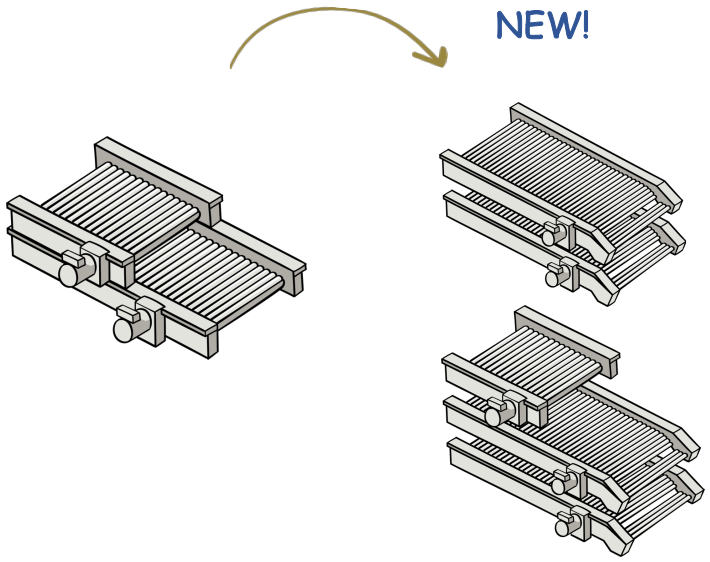


- Spliting feed to reduce load in the fines screening zone, improving screening efficiency.
- Keeping more near-size pellets (goodsize pellets) in the final product, lower recirculating load.
- Resulting in increase on plant throughput.

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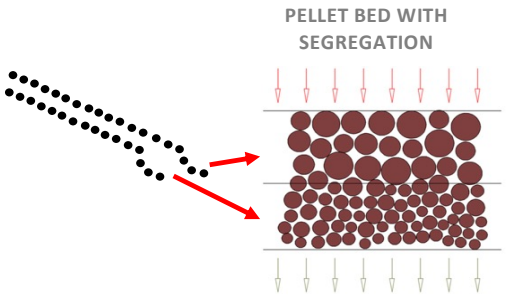
NEW ADVANCES

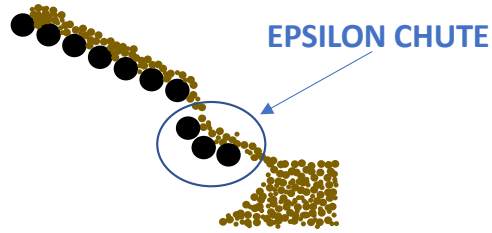
FEEDER SCREEN



SEGREGATION

EPSILON CHUTE





- Efficient technology that promotes pellets segregation inside furnace
- Epsilon chute design to reduce pellets velocity and keep pellets sphericity.
- ↑ Productivity, ↓ Energy and ↑ Quality
- Proven technology with industrial applications and solid results.

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AGENDA

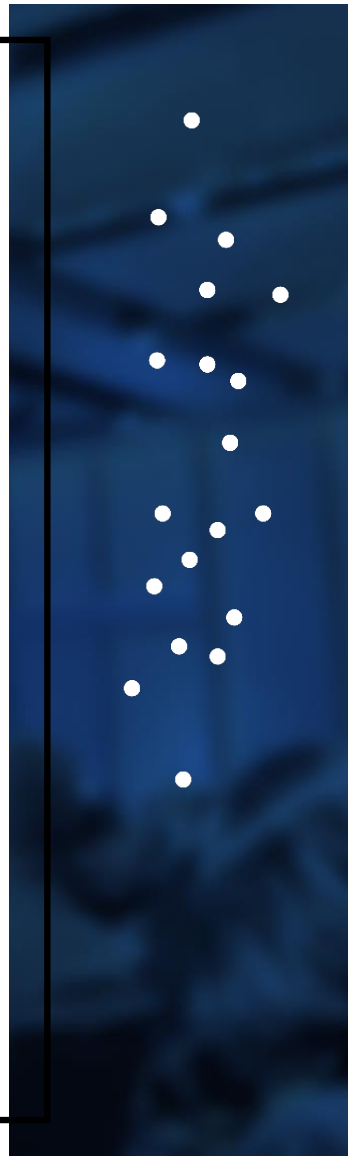
1 INTRODUCTION

2 NEW ADVANCES

3 **CASE STUDIES**

4 SCREENING FLOWSHEET OF THE FUTURE

4 CONCLUSIONS



CASE STUDIES

METHODOLOGY

MASS BALANCE SIMULATIONS

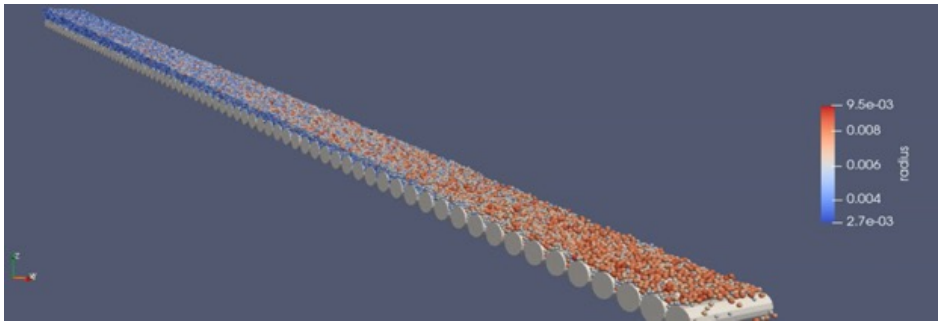
- M7 empirical model
- Validation using DEM from Woodem

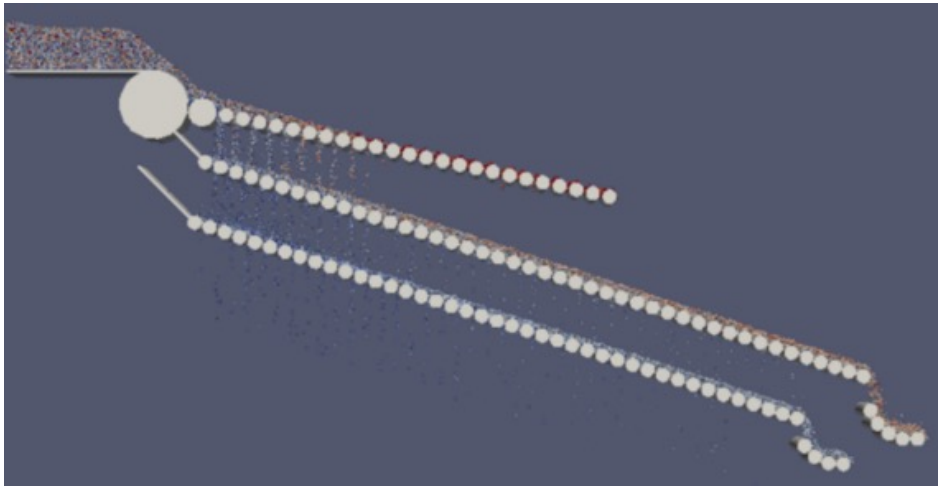
PERMEABILITY SIMULATIONS

- Corem Permeability Calculator

INDUSTRIAL RESULTS

- AMMC L1
- AMNS Paradeep PP2

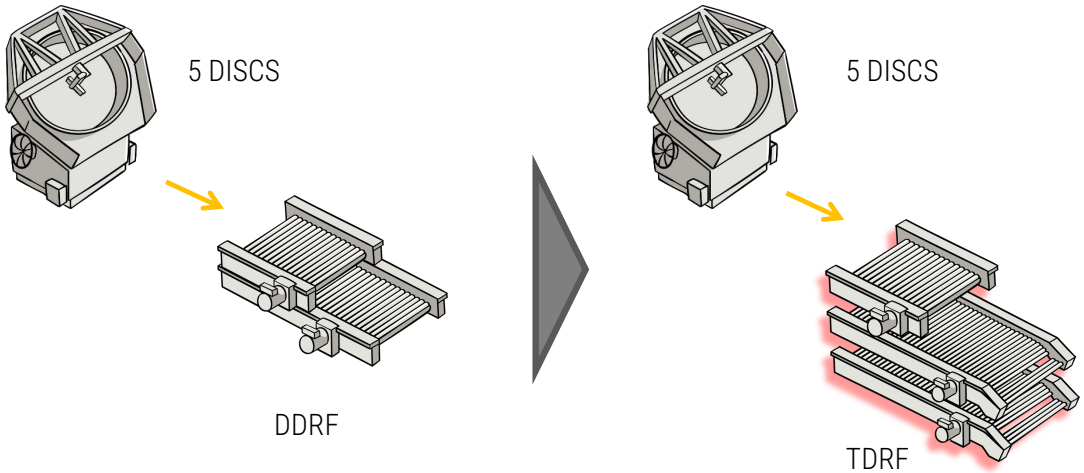




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CASE STUDIES

CASE STUDY 1: AMEM L2 – 5 MTPY



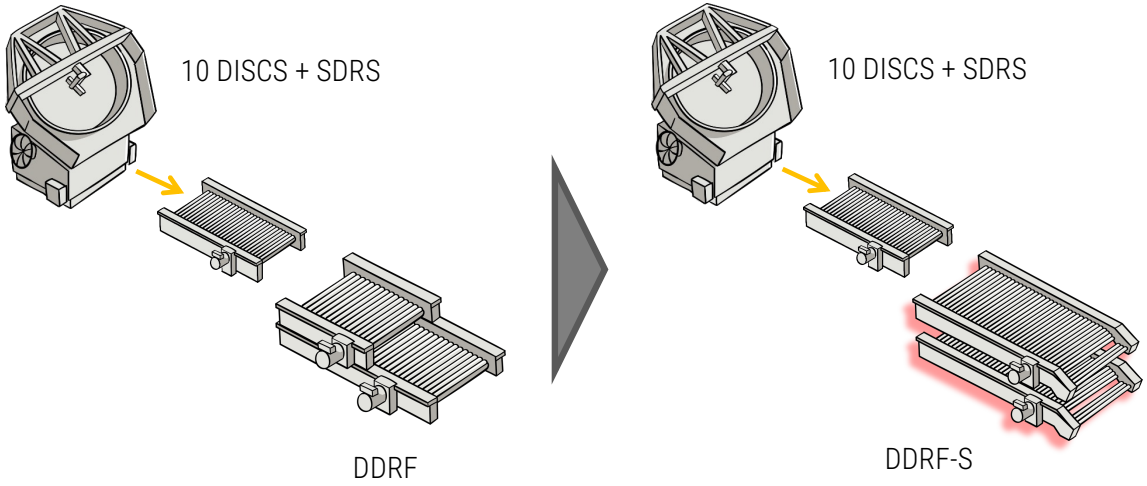
BASE CASE SCENARIO | **IMPROVED SCENARIO**

	SIMULATION	ACTUAL
PRODUCTIVITY	↑ 4%	↑ 2,8% (limited by pellet feed)
BED PERMEABILITY	↑ 13,8%	NA
ENERGY	↓ 5% 16,911 tCO_2e	↓ 3.0% Fossil 9,443 tCO_2e
QUALITY	NA	↑ CCS (2%) ↑ LTD (3%) ↑ R40 (5%) ↑ 9 to 16 (2%) ↓ ABRASION (18%)

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CASE STUDIES

CASE STUDY 2: AMNS PARADEEP PP2 – 6 MTPY



BASE CASE SCENARIO | **IMPROVED SCENARIO**

	SIMULATION	ACTUAL
PRODUCTIVITY	↑ 6%	↑ 6% (limited by pellet feed)
BED PERMEABILITY	↑ 11,9%	↑ 15%
ENERGY	↓ 5% 22,400 tCO_2e	↓ 15% Electricity 67,200 tCO_2e
QUALITY	NA	↑ CCS (6%)

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AGENDA

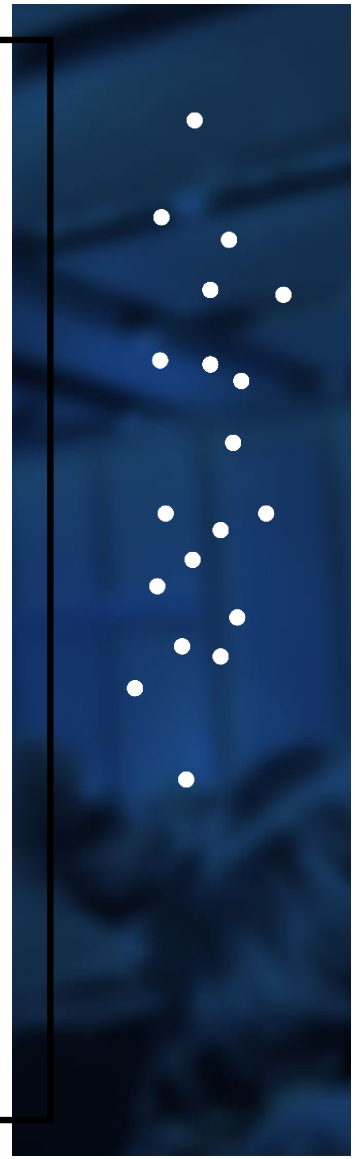
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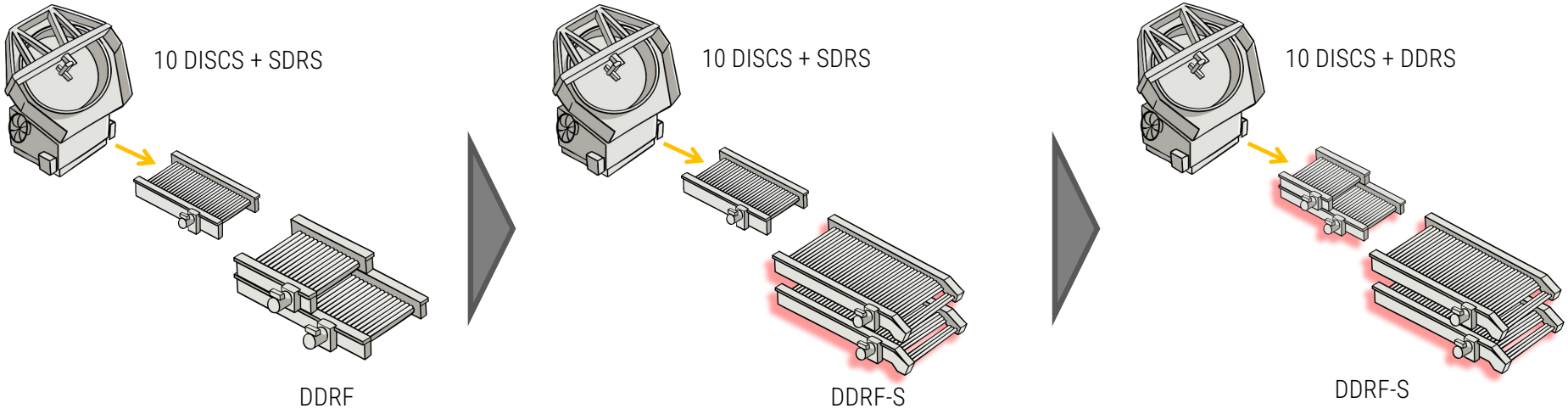
4 **SCREENING FLOWSHEET OF THE FUTURE**

5 CONCLUSION



FLOWSHEET OF THE FUTURE

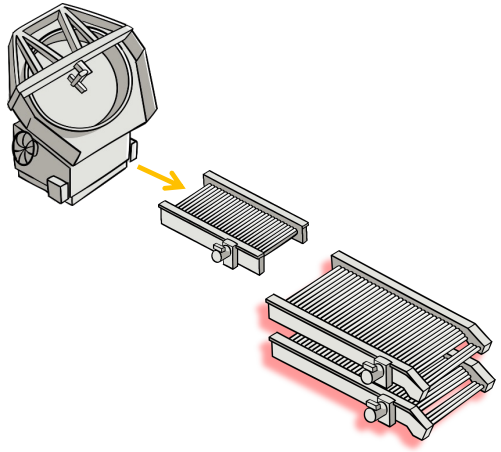
PELLET PLANT WITH DISKS - 6 MTPY

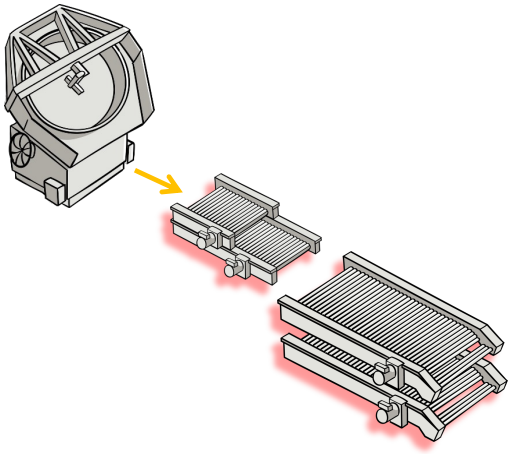


BASE CASE SCENARIO | **IMPROVED SCENARIO** | **NEXT GENERATION**

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FLOWSHEET OF THE FUTURE



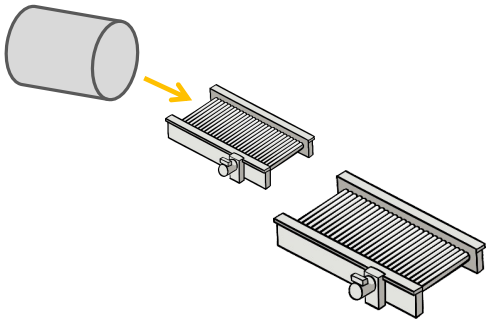


PRODUCTIVITY	↑ 6%		↑ 13.6%	
BED PERMEABILITY	↑ 11,9%		↑ 14.9%	
ENERGY	↓ 5%	↓ 22,400 tCO_2e	↓ 8%	↓ 35,800 tCO_2e
QUALITY	NA		NA	

FLOWSHEET OF THE FUTURE

PELLET PLANT WITH DRUMS - 3 MTPY

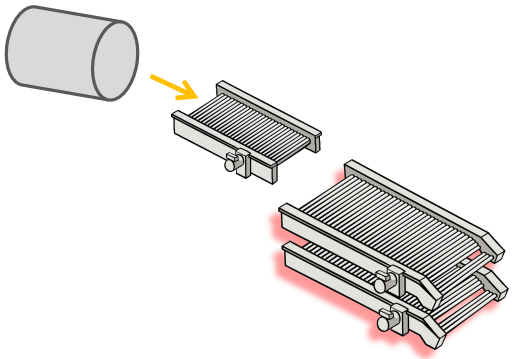
6 DISCS + SDRS



SDRF

BASE CASE SCENARIO

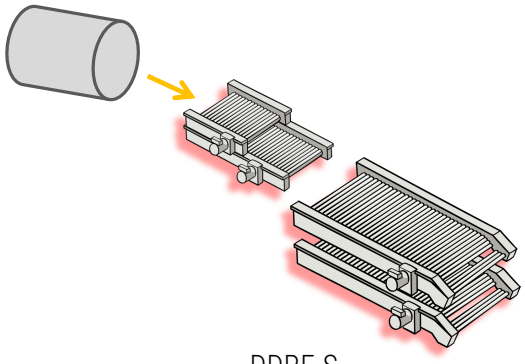
6 DISCS + SDRS



DDRF-S

IMPROVED SCENARIO

6 DISCS + DDRS

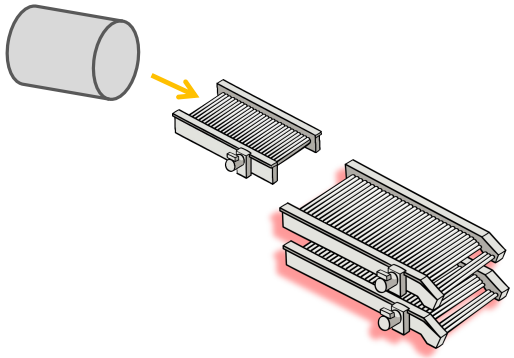


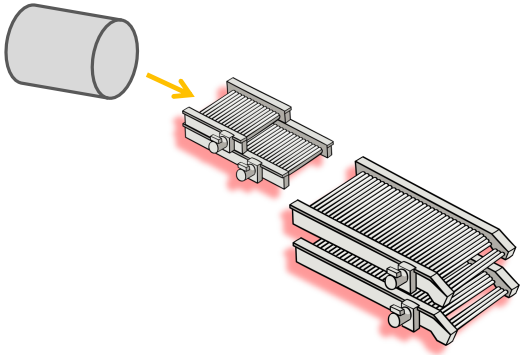
DDRF-S

NEXT GENERATION

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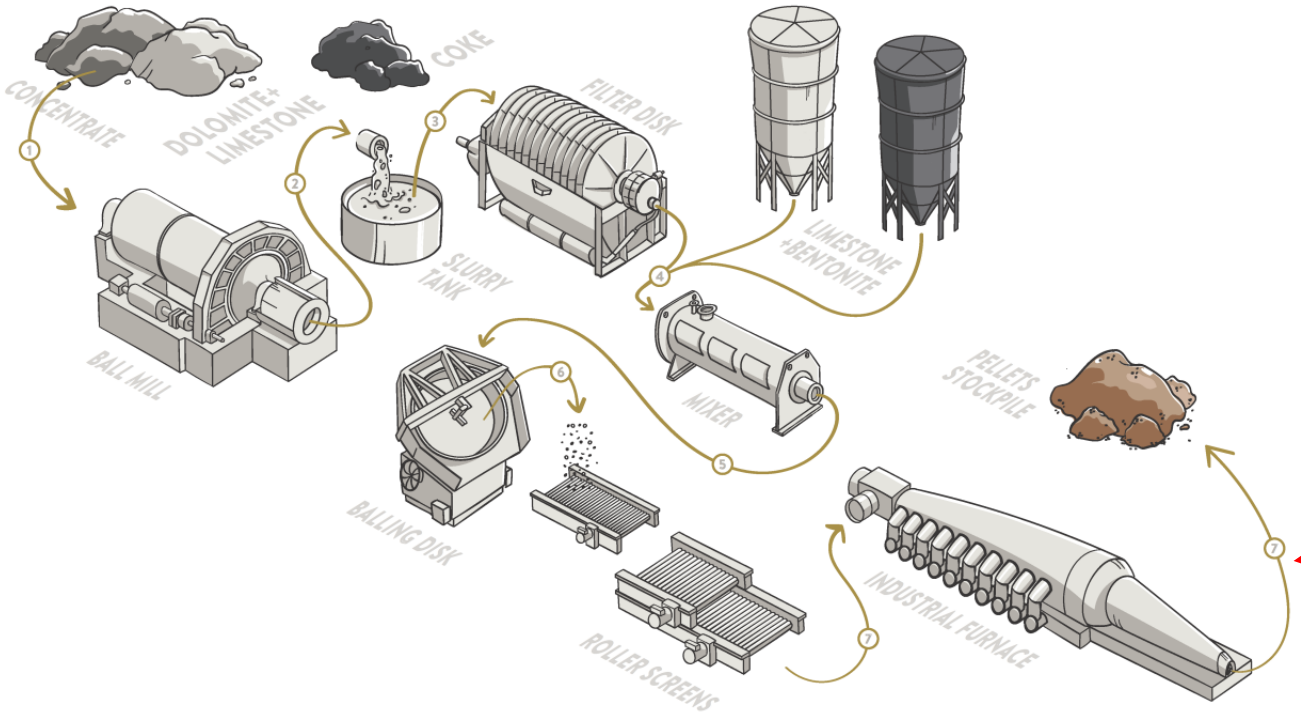
FLOWSHEET OF THE FUTURE

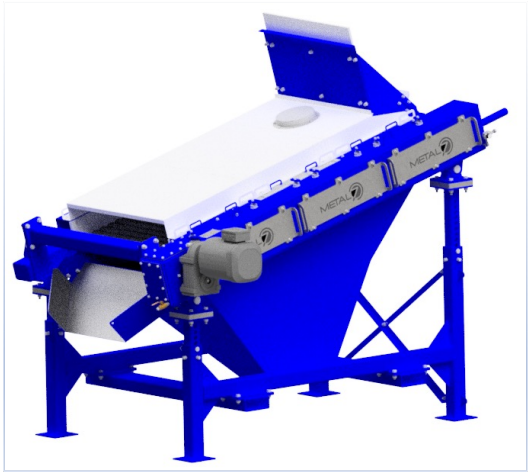




PRODUCTIVITY	↑ 5.3%		↑20.3%	
BED PERMEABILITY	↑ 11,1%		↑15.4%	
ENERGY	↓ 5%	↓ 11,200 tCO_2e	↓ 8.5%	↓ 19,000 tCO_2e
QUALITY	NA		NA	

FLOWSHEET OF THE FUTURE





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FLOWSHEET OF THE FUTURE

NEW TECHNOLOGY TO SCREEN FIRED PELLETS



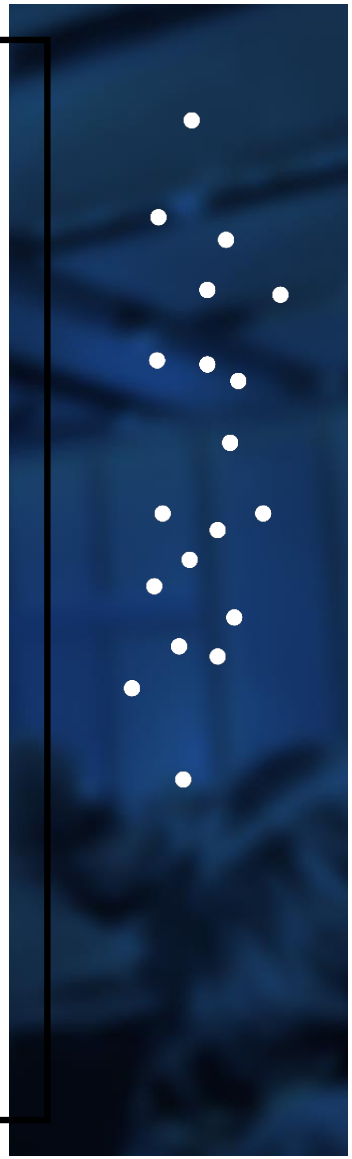
FEATURES COMPARED TO VIBRATING:

- Better Screening Efficiency – 80 to 92% (vs 50-75%)
- No vibration
- Less dust
- Reduced noise

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AGENDA

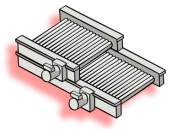
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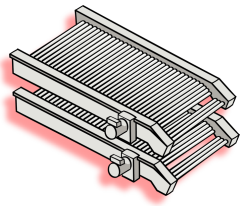
CONCLUSION

TOGETHER, WE CAN SHAPE A PROMISING PELLETIZING FUTURE

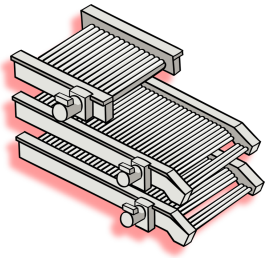
DDRS



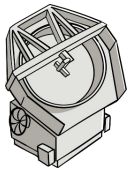
DDRF-S

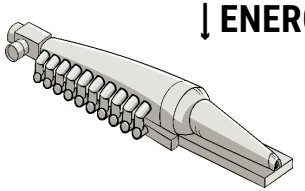


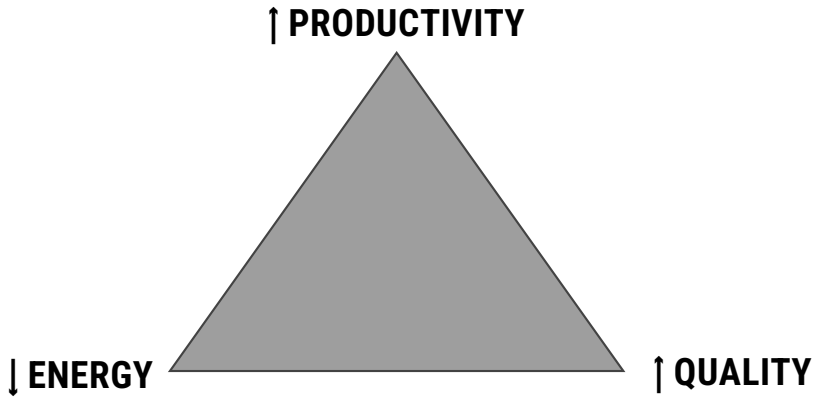
TDRF



Better split	More efficient AGGLOMERATION
Better sizing	
Less recirculation	
Better permeability	More efficient FIRING
Segregation	
Epsilon Chute	








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Thank you!

Steve Beaudin
VP Innovation

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Cell +1-418-965-3344

The 5th SYMPOSIUM on IRON ORE PELLETIZING and its sustainable development