

**Welcome to Packed
with Performance
webinar by
Metso Outotec and
Tracsa**

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webinar



Packed with performance – webinar purpose

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1

To stay connected and share know-how

2

For all aggregates customers: both technical and business audiences

3

Content: tips, launches, keynote presentations

4

Our goal: to help you perform to your best

Key information

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- Webinar will be recorded
- Use the question box for all questions you have during the presentation
- If you require any assistance during the presentation, please write into the question box as well. The moderator will be monitoring throughout the presentation
- Recording will be distributed post-webinar
- Questions not answered during the webinar will be answered post-webinar by email



Exit



Introducing the speakers

Oldemar Meneses

has been with Metso for the last 25 years, occupying several positions in service support, applications and distribution sales. For the last 10 years he has worked in several manufacture sand projects for several applications, utilizing also different technologies and supporting our distribution Network in Mexico and Central América.



Pedro Kelley is Crushing and screening Manager for Grupo TRACSA, Dealer with over 20 years of experience in crushing and screening equipment sales. With a sales and marketing back ground, Pedro´s is one of the most experienced person in the Mexican distribution network in the selection, promotion and sale of crushing and screening equipment, providing along with his team also support in equipment applications, plant assessments and aftermarket support to the customers.





Finding new opportunities in the sand

Presented by
Oldemar Meneses at Metso Outotec
Pedro A. Kelly at Tracsa



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Agenda

- 1. Customer questions when facing the need to manufacture sand**
- 2. What should customers look for when moving forward to manufacture sand?**
- 3. What crusher to select? Case studies.**
- 4. Manufactured sand crushing plant design**
- 5. Ultra fines <0.074 mm (200 Mesh) removal**
- 6. Conclusion**

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1. Customer questions when facing the need to manufacture sand

Why not natural sand?

Combine lack of resources with high construction industry demand

Lack of sand and natural aggregates

Resources don't cover the demand

Banned use of natural sand

Long distance to market

Natural sand quality is not steady

Loss of sea and river beaches

Expensive and complex sand treatments

High negative impact to the environment

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Then why manufactured sand?

A sustainable business opportunity for everyone

Increase of sellable product ratio in quarries

Increased demand of quality aggregates causes *more crushed fines generation: quarry waste and crushed fines*

Lack of space for waste deposit

High quality concrete needs *good controlled quality raw material products*

Quarries are normally close to its market

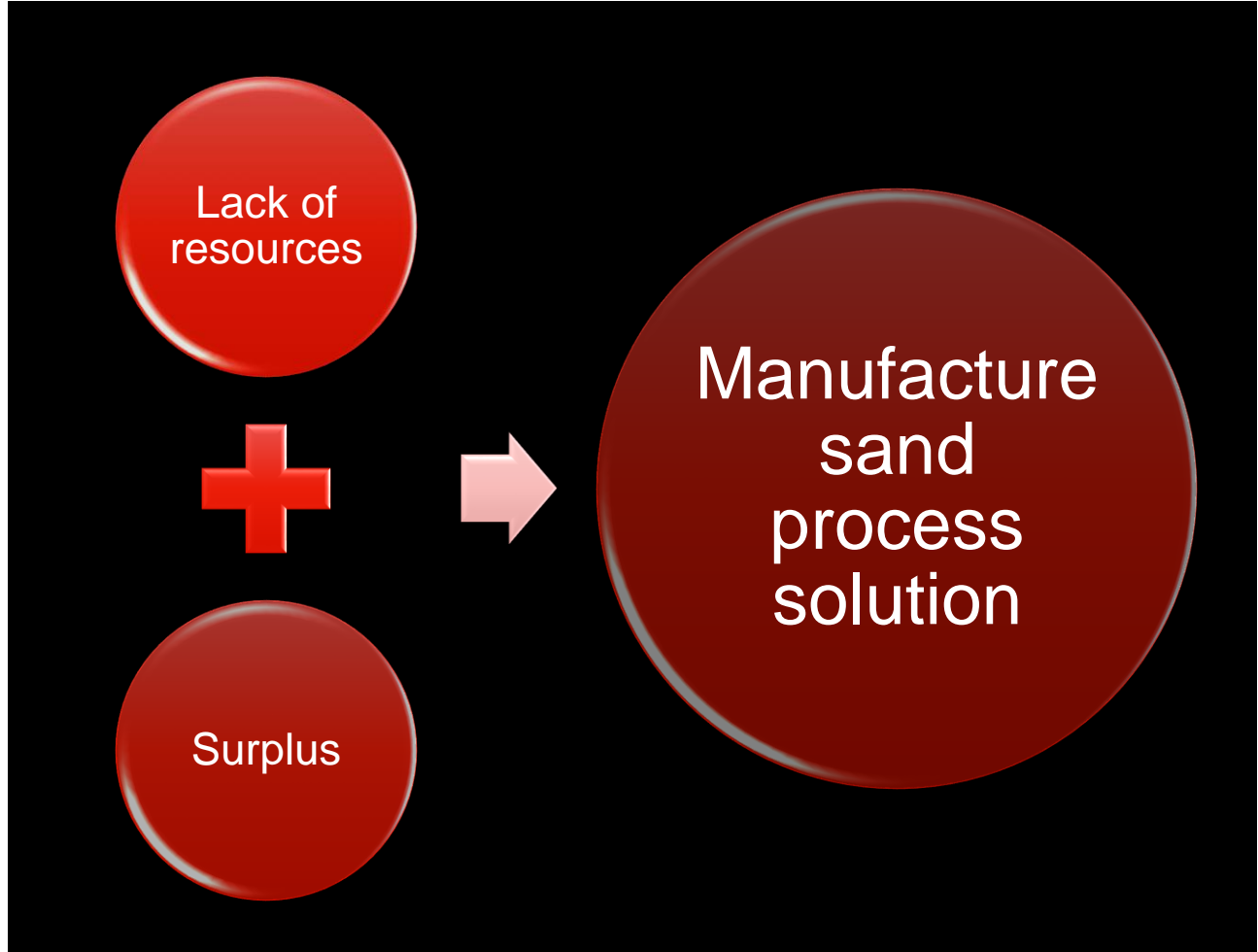
Defined bedrock leads to rock fines without unwanted impurities





Manufactured Sand, the solution

Combine lack of resources with surplus of other industries





2. What do customers look for when moving forward to manufacture sand?

Market demands for manufactured sand

Customer concerns, needs and wants

- An affordable solution
- To use as much as possible his existing resources
- Maximize his capabilities
- As much as possible a simplified solution adaptable to his existing process
- A good technical recommendation and advice to select the best solution

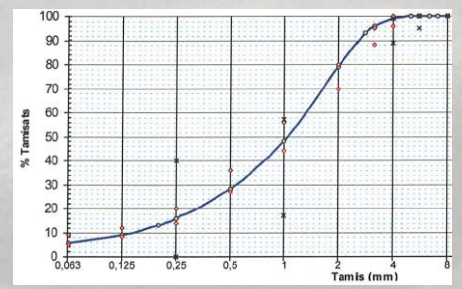
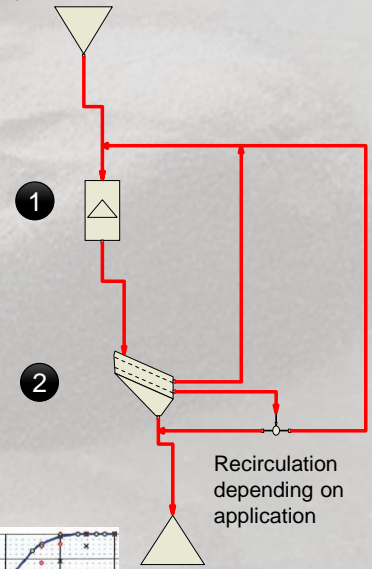
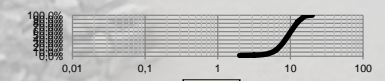
1 Crusher's selection: HRC, HP or Barmac



2 Screen's selection : Metso CVB & ES & TS , COMPACT CVB-M & FS



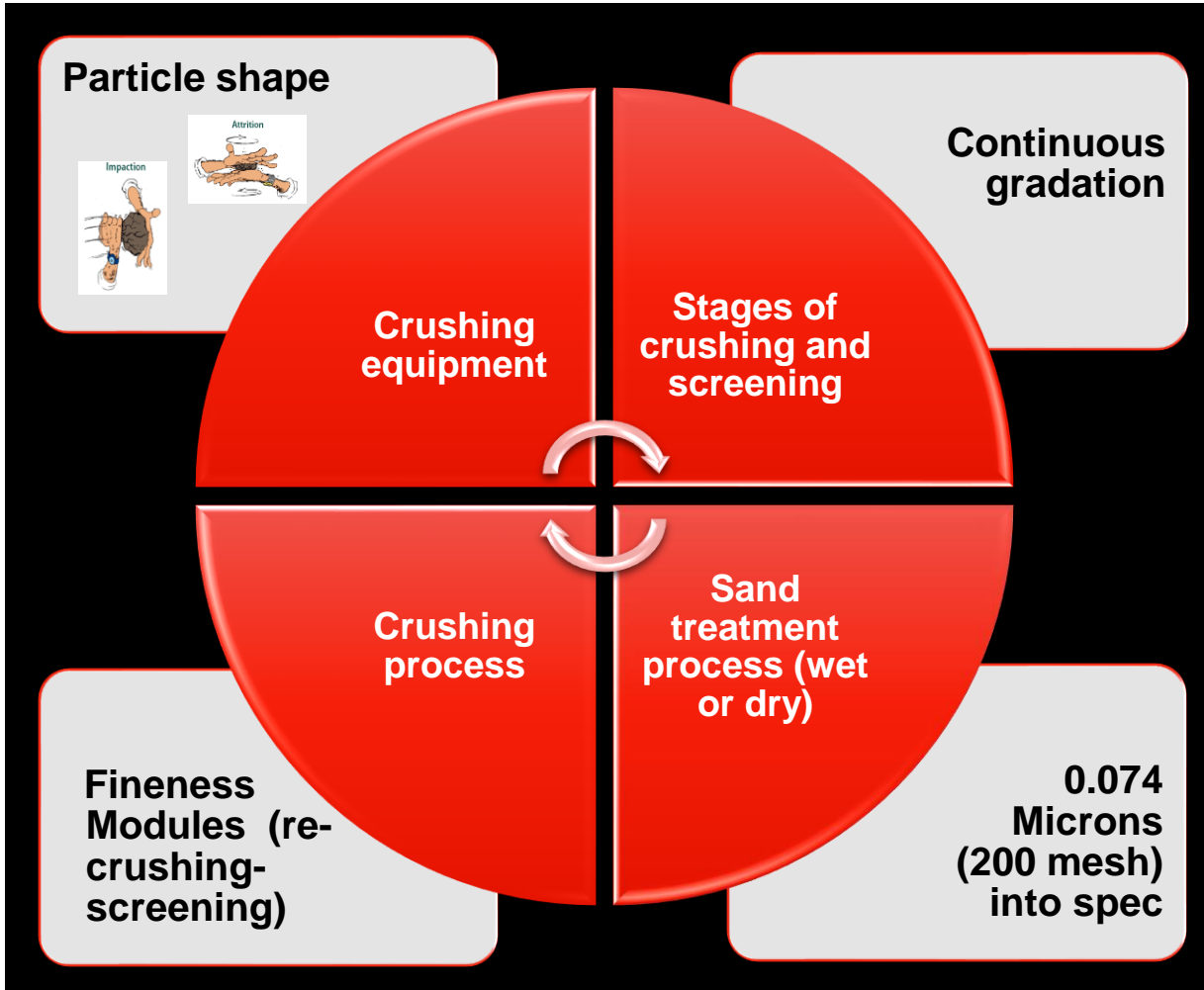
Feed 4-20 mm (Cr : 30 to 35 %)





What customers look for in manufactured sand?

Product requirements



Lowest Capex & Cost per ton

Which is the best crusher for sand manufacturing?

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Customer

- Within his budget
- Problem solver
- Available
- Reliable
- The best support
- Lowest cost/ton

Distributor

- Fastest availability
- Solves the customer's pain in the fastest and simplest way
- Customer's affordable
- Facilitate the customer acquisition

Technically

- Capable
- Coarse sand at largest volume
- Fine sand with FM control
- Hard and abrasive rock
- Soft non-abrasive rock
- With or without <0.074mm control

Salesman

- The best solution
- Easiest to sell!

Different customer options

Process must consider efficient screening

Soft rock non-abrasive:

- Hammermills
- HSI
- VSI
- HRC

Soft rock abrasive:

- HSI with special configuration
- Rock on rock VSI
- HRC
- Cone crusher

Hard rock, low abrasion:

- HSI
- Rock on rock VSI
- Cone crusher
- HRC

Hard rock abrasive:

- Rock on rock VSI
- HRC
- Cone crusher

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3. What crusher to select?

What crusher to select in manufacturing sand?

Usually a combination of crushers is required

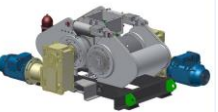
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		Barmac VSI	HP Cone Crusher	HRC High Pressure roll crusher
<u>Operation</u>	Installation	+++	+	+
	Maintenance	+++	+	+
	Feed size	+	+++	+
	Humidity	+	+	+++
	Fines in feed	++	+	+++
<u>Performance</u>	Fine feed (20 mm)	+	++	+++
	Coarse (30 mm)	+	+++	-
	Reduction ratio	+	++	+++
<u>Quality</u>	Shape	+++	+	+
	Extra fines	+	++	+++
	Cubicity	+++	++	++
<u>Cost</u>	Energy efficiency	+	+++	+++
	Wear	+	++	+++
	Investment	+++	++	+



Cone Crusher



HRC

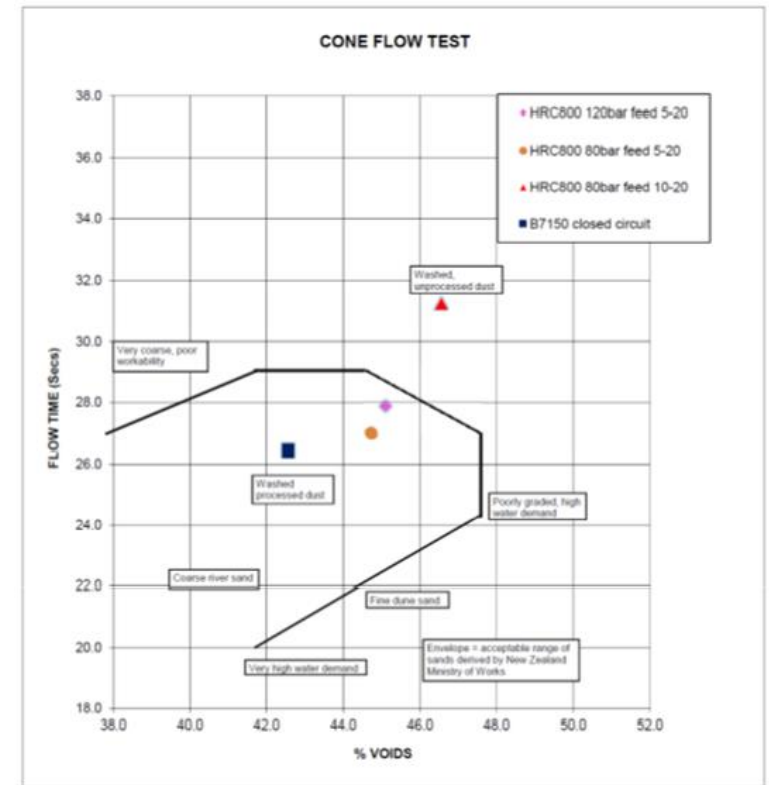
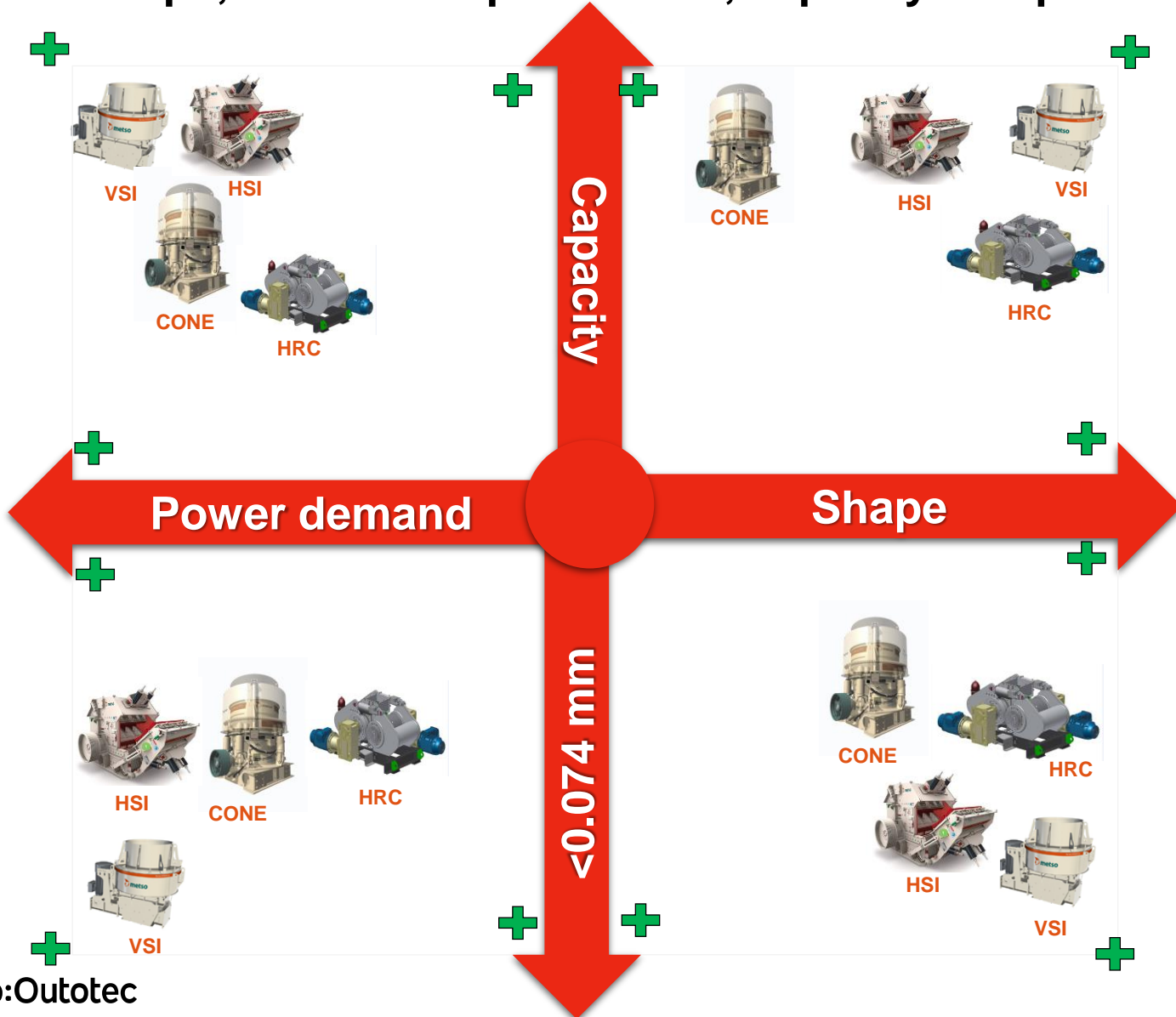


VSI



Crusher selection, 6 mm coarse sand (1/4"X0")

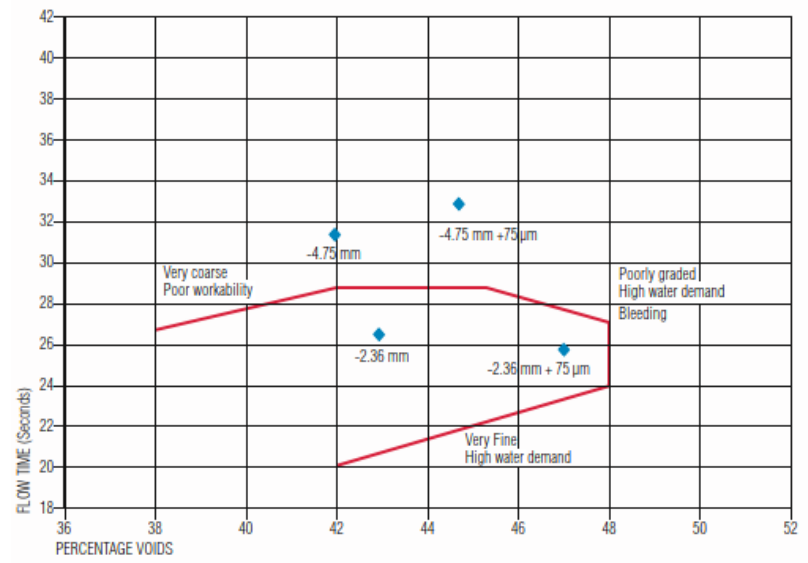
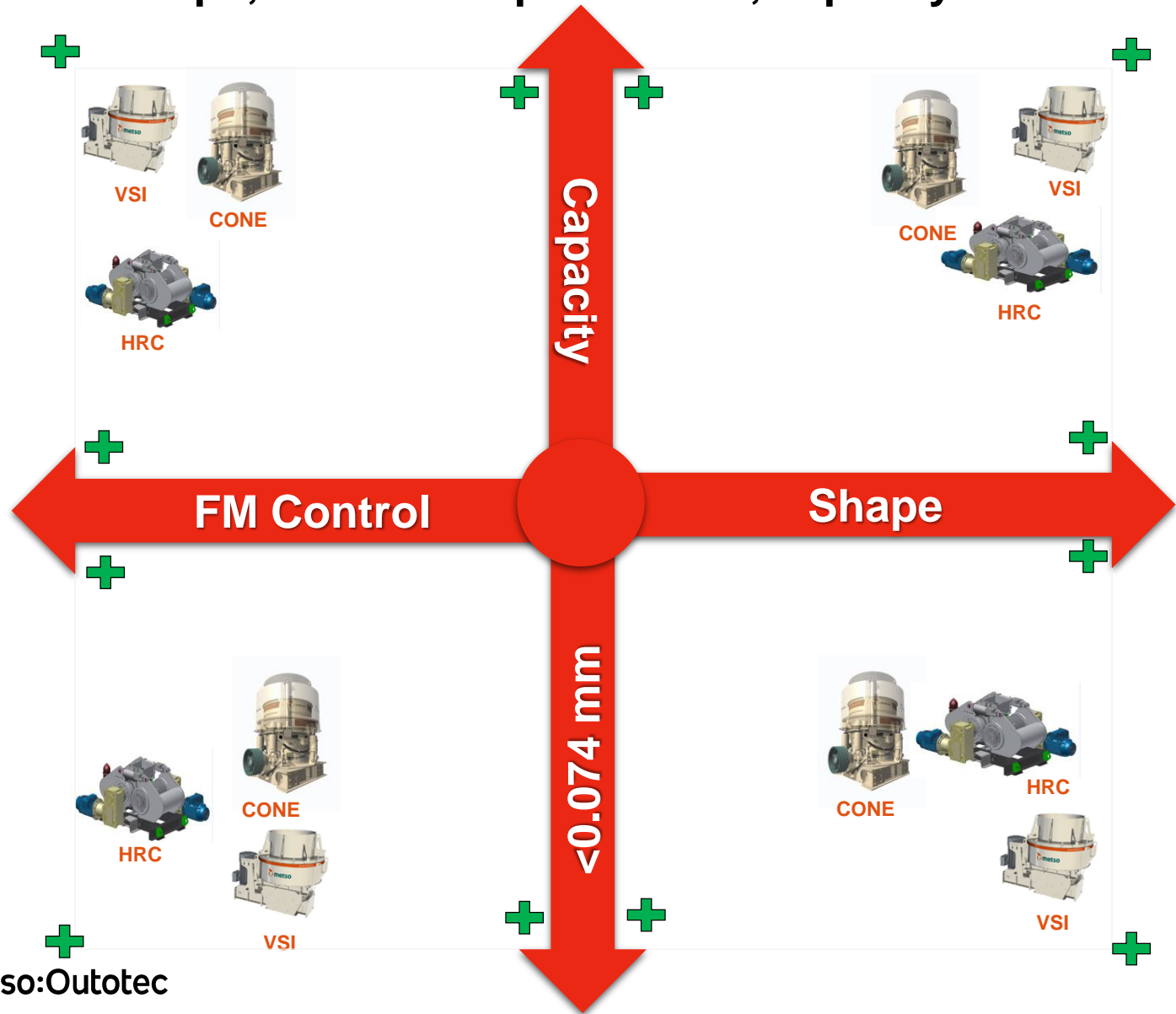
Particle shape, <0.074 mm production, capacity and power demand



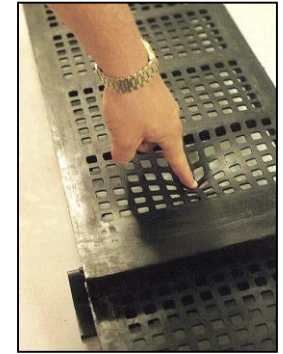
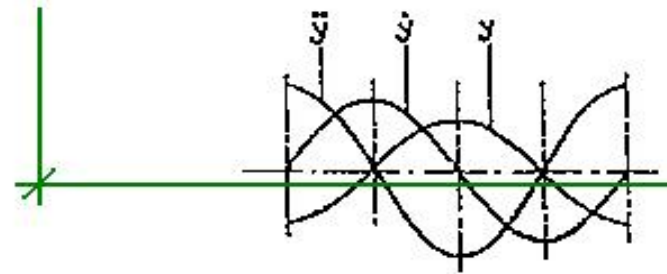
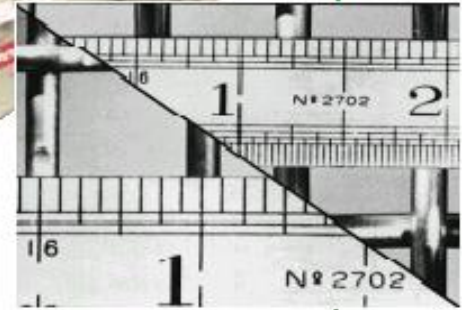
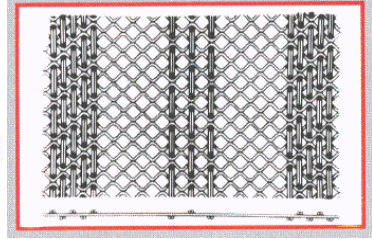
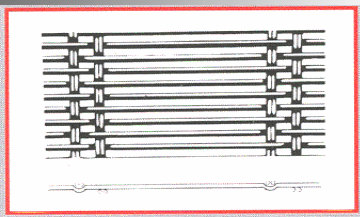
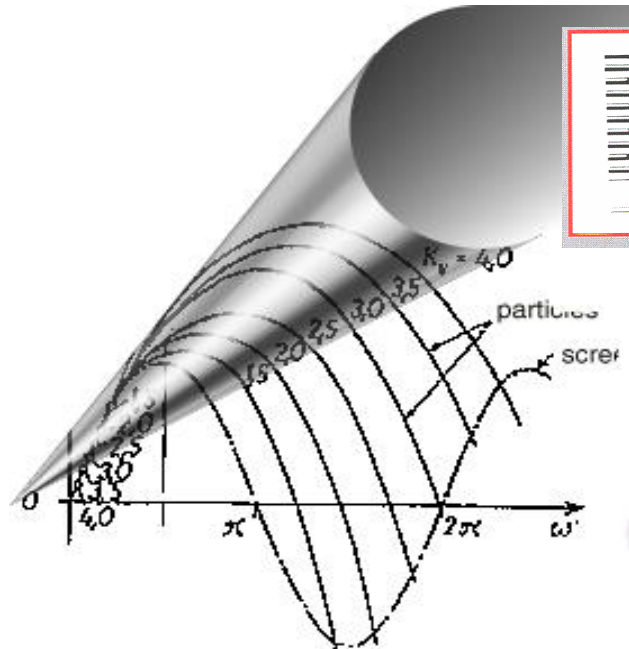


Crusher selection 4.75/2.4mm sand (3/16/#8"X0")

Particle shape, <0.074 mm production, capacity and FM control



Classifying equipment will also be determining factor to achieve a continuous product gradation

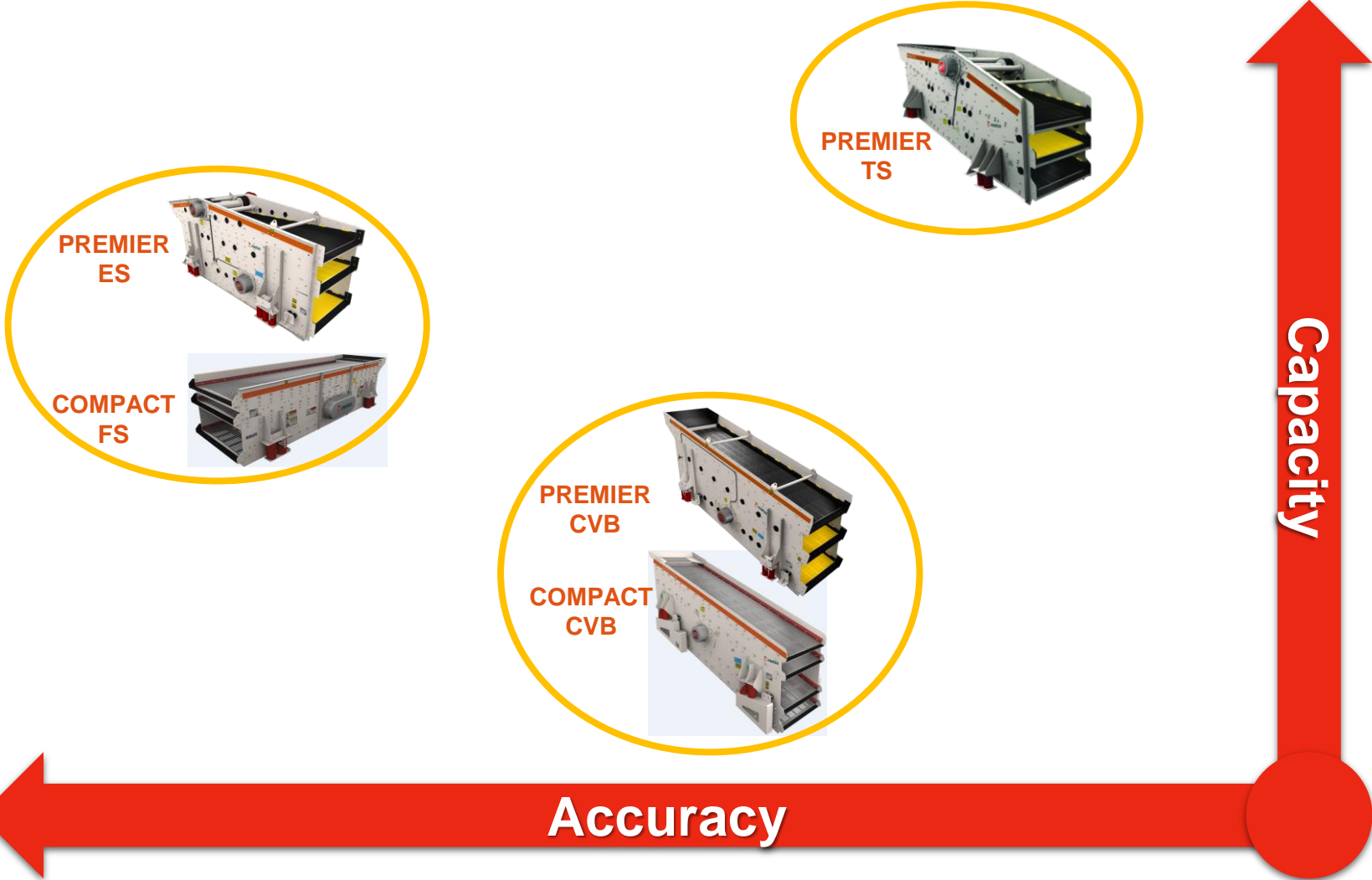


Screen sizing calculations, screen and screen media selection will play a very important role to achieve an expected sand gradation and a process efficiency



Screen selection

Capacity versus Efficiency



- 1. Solutions:** Metso is the only screen manufacturer proposing such a wide screen offering
- 2. PREMIER ES:** The ES kinematic is the only unique model offering a gearless elliptical motion high energy flat screen
- 3. PREMIER TS:** Thanks to three slope design high amount of sand goes through the 2 first slopes and then allows to get +30% production for same area vs inclined screen
- 4. PREMIER CVB:** Angle parameter allows selecting between accuracy (15°) or high capacity (18°) for sand production

Energy efficiency

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Quaternary crushing stage

80% of maximum power

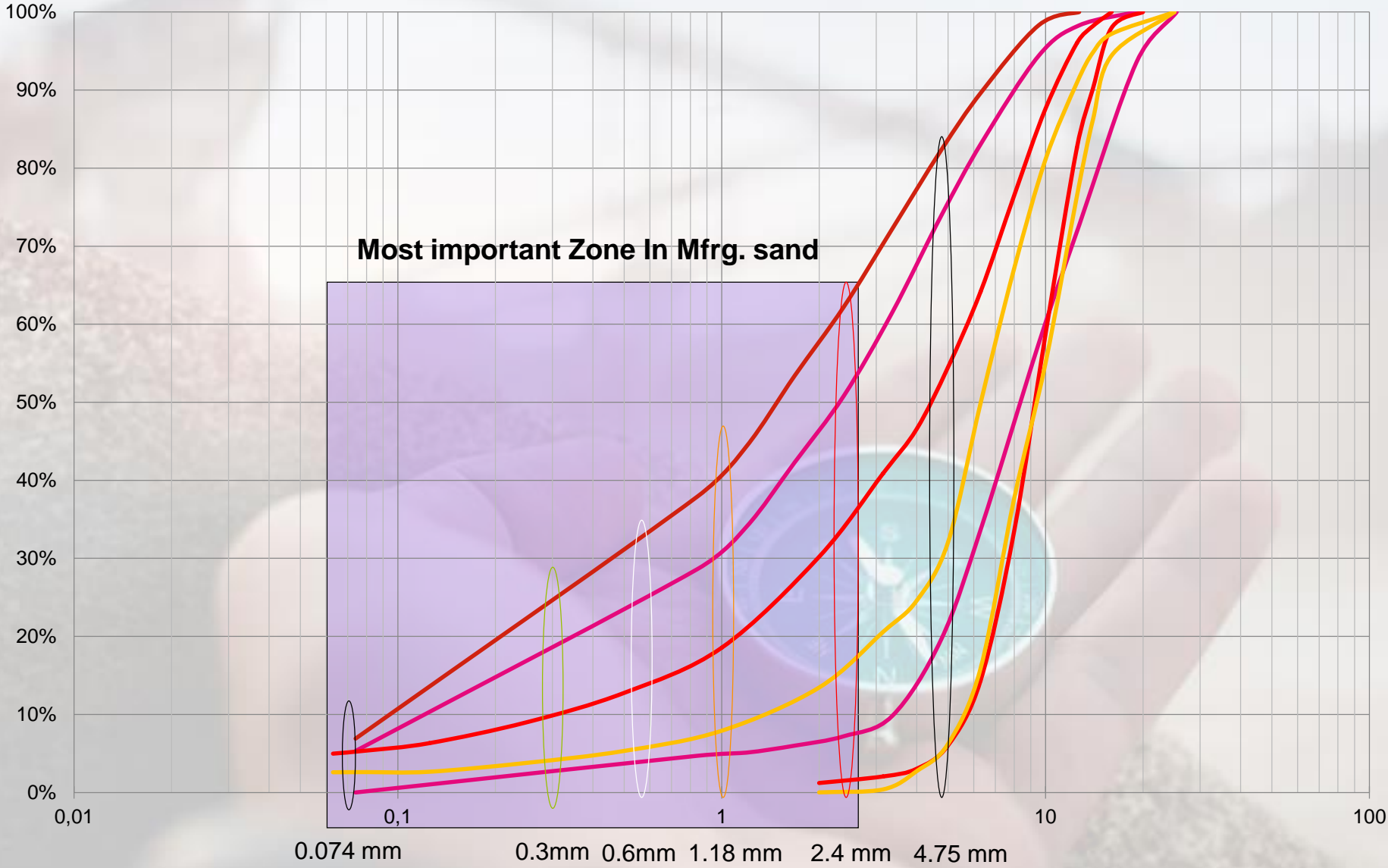
B7150 (250 kw) , HRC800 (220 kw) , HP3 (250 kw)

	Barmac	HP	HRC
Capacity (tph)	175	190	135
KW/tph	1,45	1,15	1,65
% 0- 4 mm	25%	45 %	65%
t/h 0- 4 mm	45 t/h	85 t/h	85 t/h
KW/Tph 0 – 4mm	5,5	2,95	2,6

Note : these figures are indicative

Compression crushers are more energy efficient compare to impact crushers

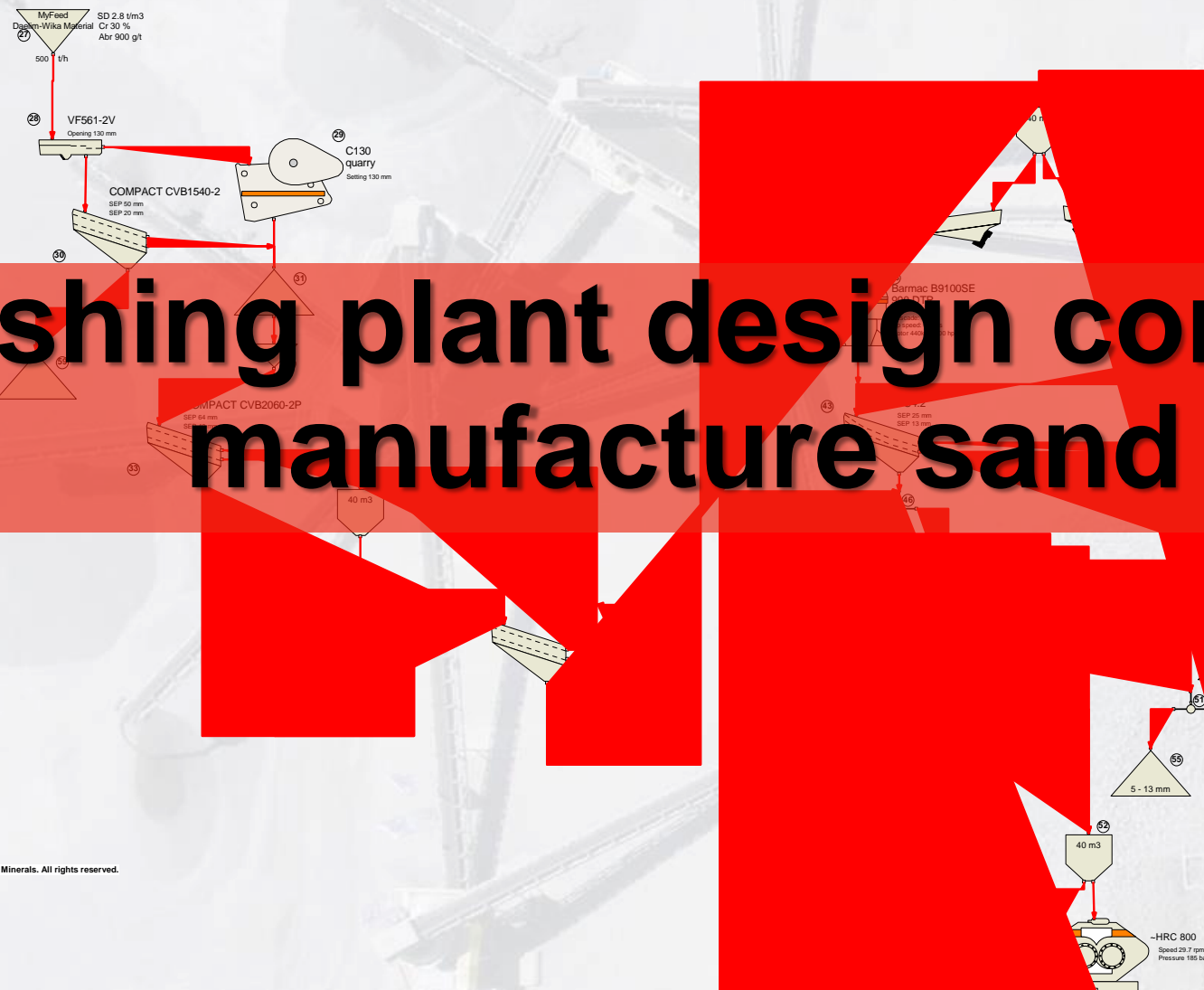
Crushers discharge curves comparison



Concrete Sand:

4.75	=>100%
2.4	=>80/100%
1.18	=>50/80%
0.6	=>25/60%
0.3	=>10/30%
0.150	=>2/10%

4. Crushing plant design concepts to manufacture sand



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Crushing plant design concepts

Needs, wants and requirements

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Manufactured sand requirements:

- Capacity (design and nominal)
- Feed material (Moisture, crushability and gradation)
- A green field project or added on to existing operation?
- Final use(s) or application(s)
- Sand top size, specifications, gradation curves and tolerances, RR
- Fineness modulus
- Mixed with natural sand or not
- Mixed with other different manufactured sands or not
- Particle shape requirement
- Sand treatment after crushing and screening?

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Case studies



Case 1. Typical II stage crushing circuit

Issues:

Particle shape products 10X6 and 6X0mm

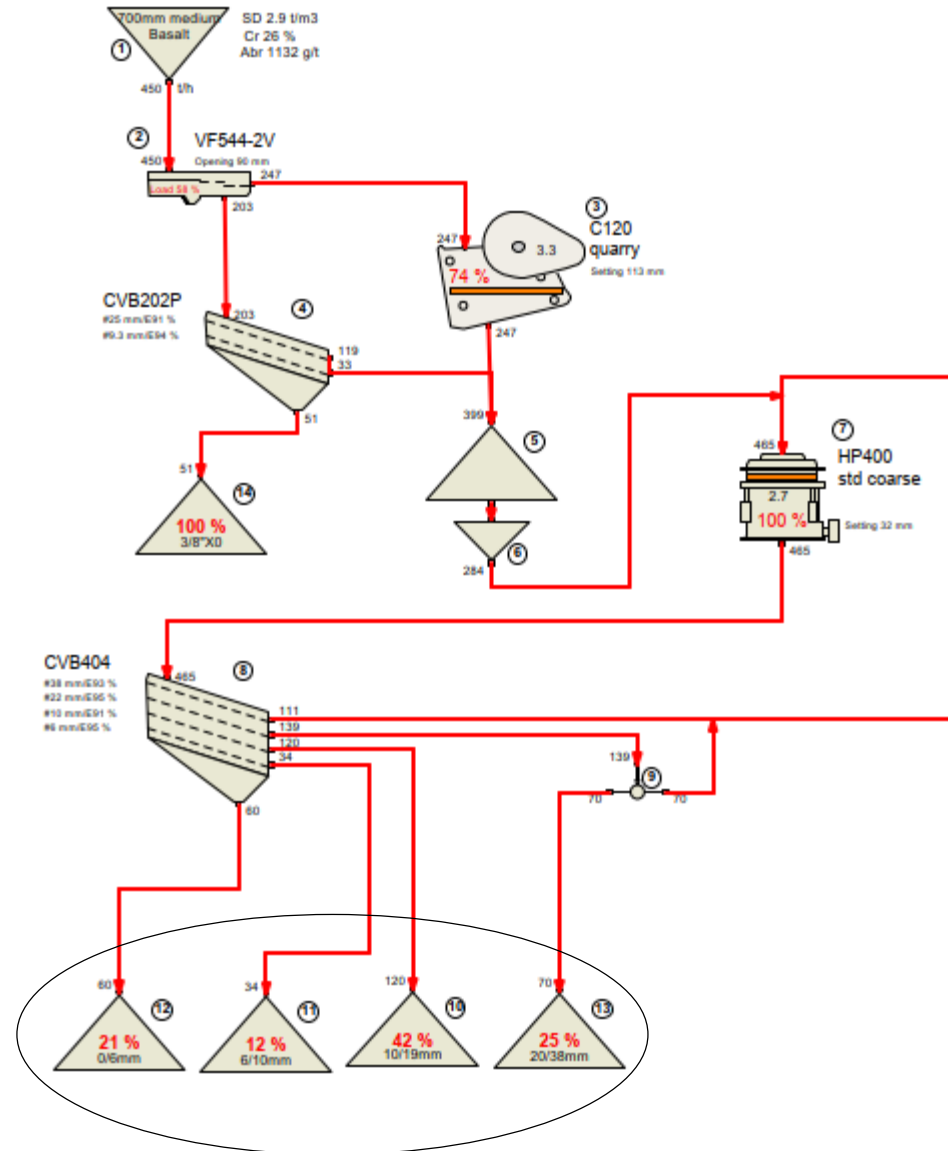
Product 6X0mm with limited demand, doesn't meet any gradation specs

Price products 10X6 and 6X0mm very low

Excess of 6X10 mm product

Product 6X0 mm needs to be blended with natural sand to be sold, natural sand transportation cost very high

Market demand is for good quality sand for asphalt and concrete



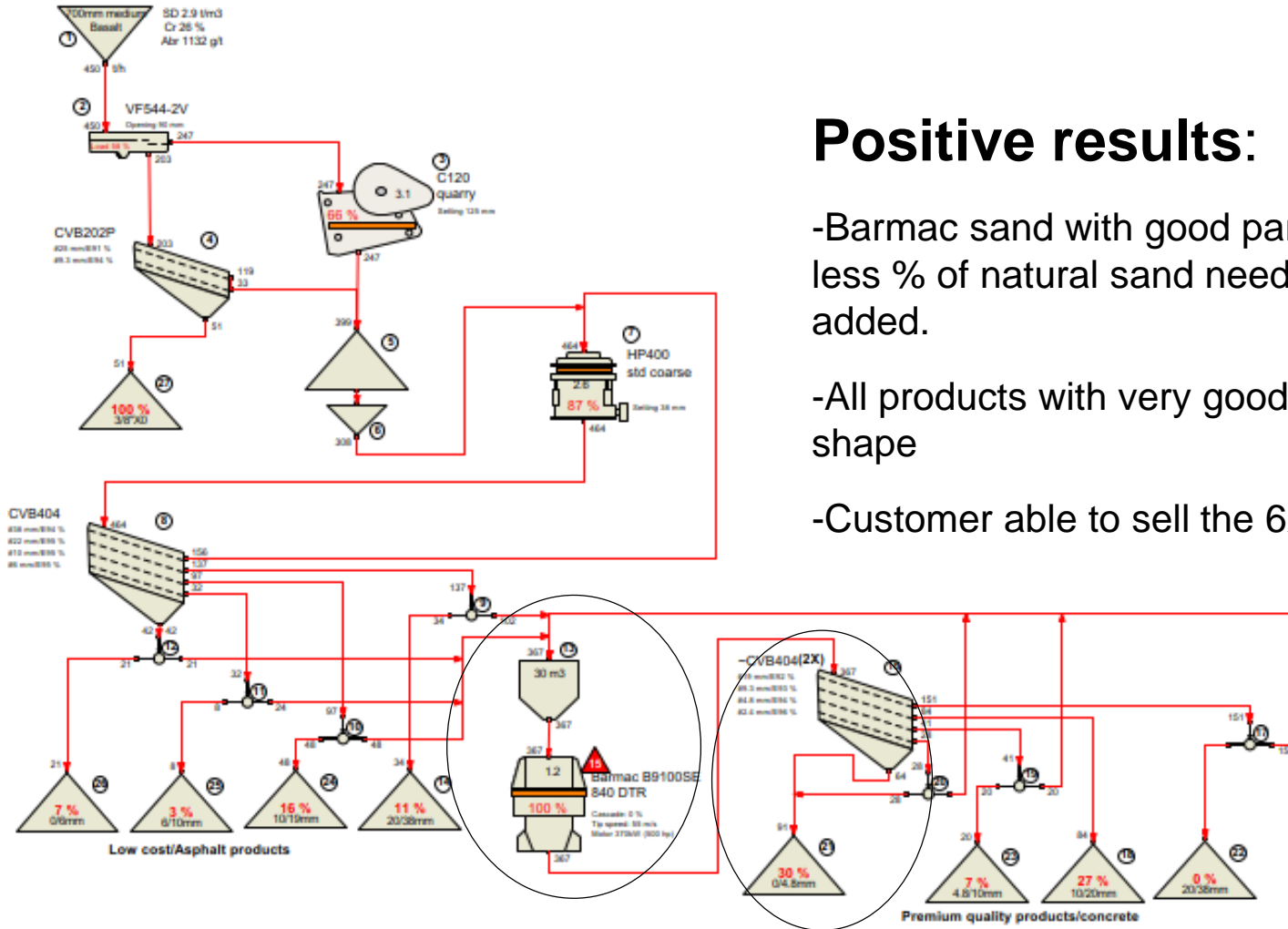
Phase 1 Solution implemented: Install a Barmac crusher & screen

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Issues after the solution implementation:

- Still Barmac sand doesn't meet gradation curves
- Still natural sand has to be added to the Barmac sand
- Barmac sand with excess of <200 mesh
- Barmac with high circulating load
- Still no market for 4.75X10 mm
- More screening capacity



Positive results:

- Barmac sand with good particle shape, less % of natural sand needs to be added.
- All products with very good particle shape
- Customer able to sell the 6X0 mm



Phase 2 solution implemented: install a HRC crusher

Issues and improvements:

Blended Barmac & HRC sand now meets gradation requirements & FM (Finess modulus)

Natural sand is used now in a very low %

Still Barmac sand with high% of <200 mesh

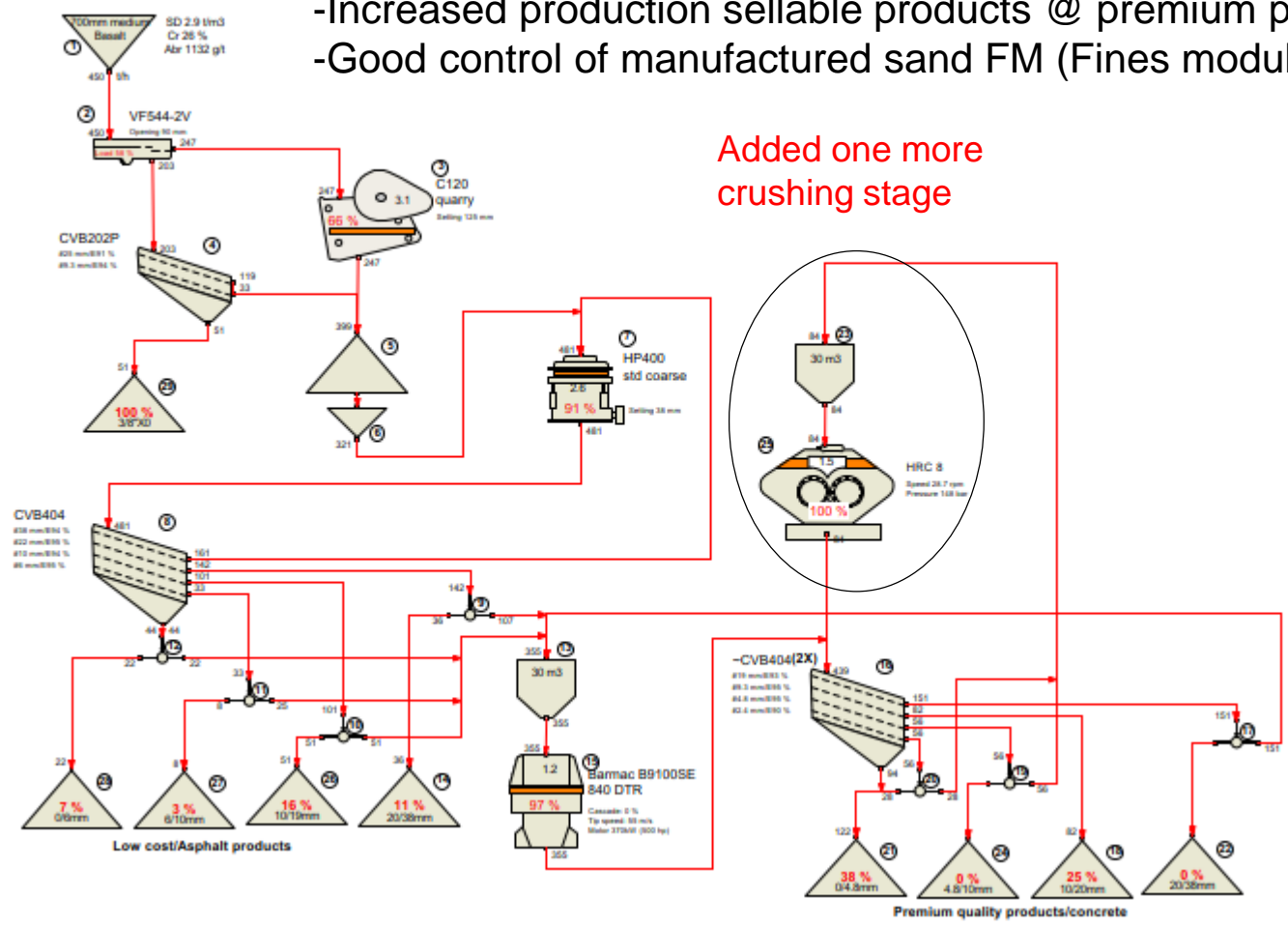
Barmac crusher reduced circulating load

4.75X10mm crushed by the HRC instead of sending it to the Barmac

Results:

- Increased production sellable products @ premium price
- Good control of manufactured sand FM (Fines modulus)

Added one more crushing stage

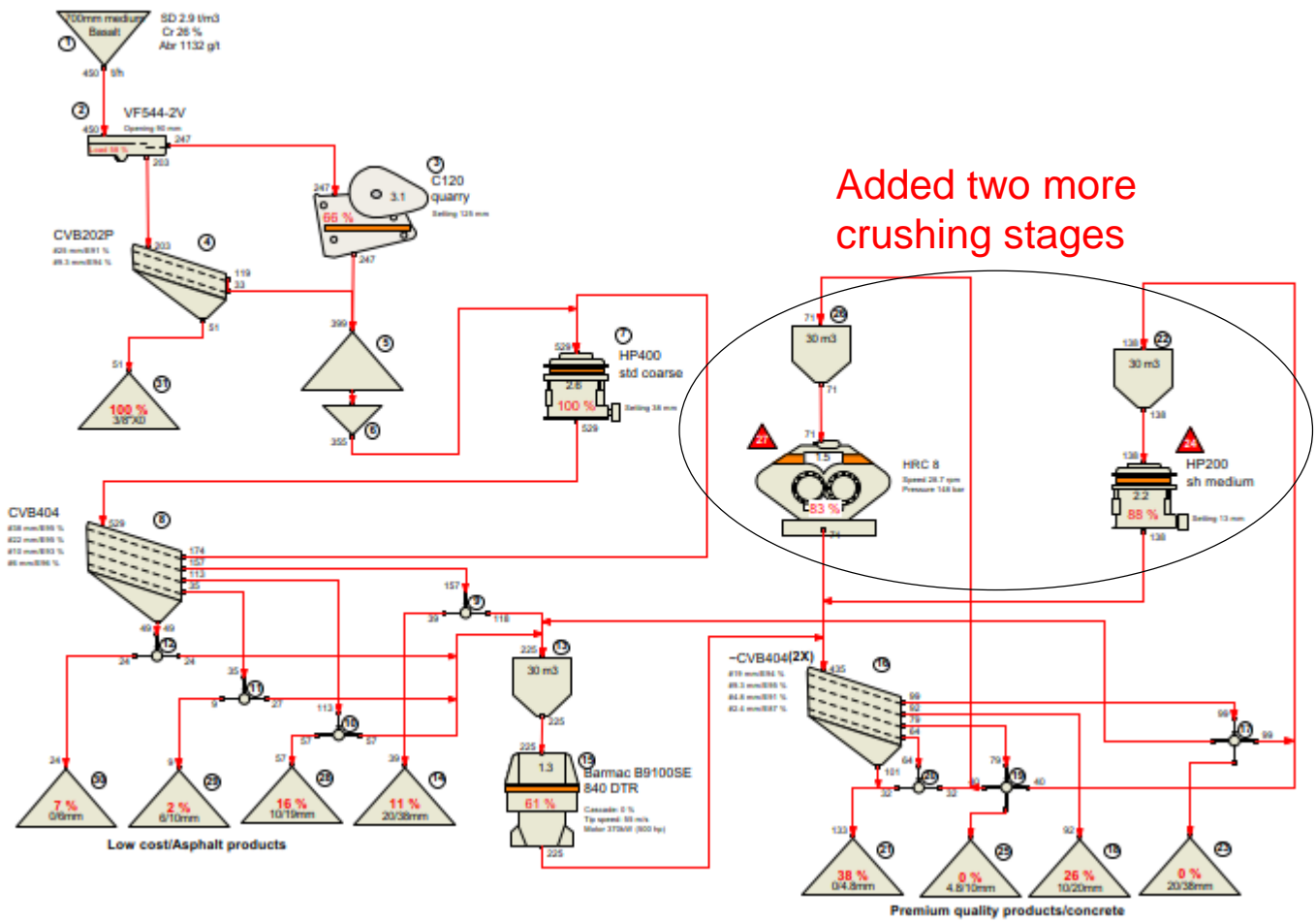




Phase 3 solution implemented: HP cone crusher installation

Solutions:

- Manufactured sand blend meet expected gradation curve
- Optional the use for natural sand blending
- Manufactured sand with less of <200 mesh
- Barmac w/o circulating load
- 4.75X10mm send to the HRC and the cone
- Manufactured sand with good particle shape
- Increased sellable products volume

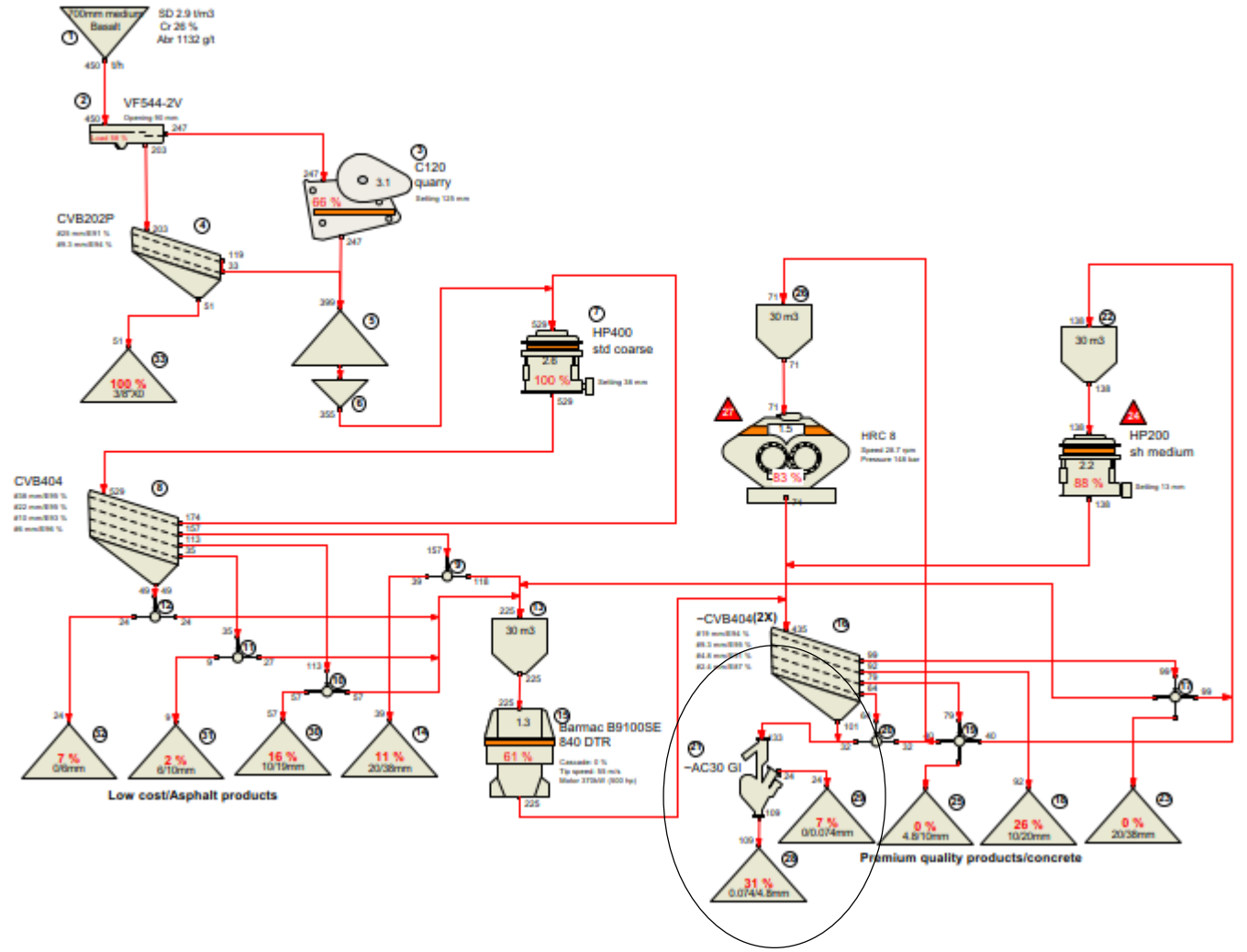




Phase 4 solution implemented, Air classifier installation

Solution:

- Manufactured sand blend now meet gradation curve
- No need for natural sand blending
- Manufactured sand with required <200 mesh content
- Barmac w/o circulating load
- 4.75X10mm send to the HRC and the cone
- Manufactured sand with good particle shape
- Increased sellable products volume



Case 2. River gravel, wet process in Costa Rica, combination HP, Barmac and HRC to achieve product gradation, shape and re-crush waste material.

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River Gravel,
Cr 25%
Abr 1500 g/t

The issue: Re-crush natural round gravel waste material 25X6 mm.

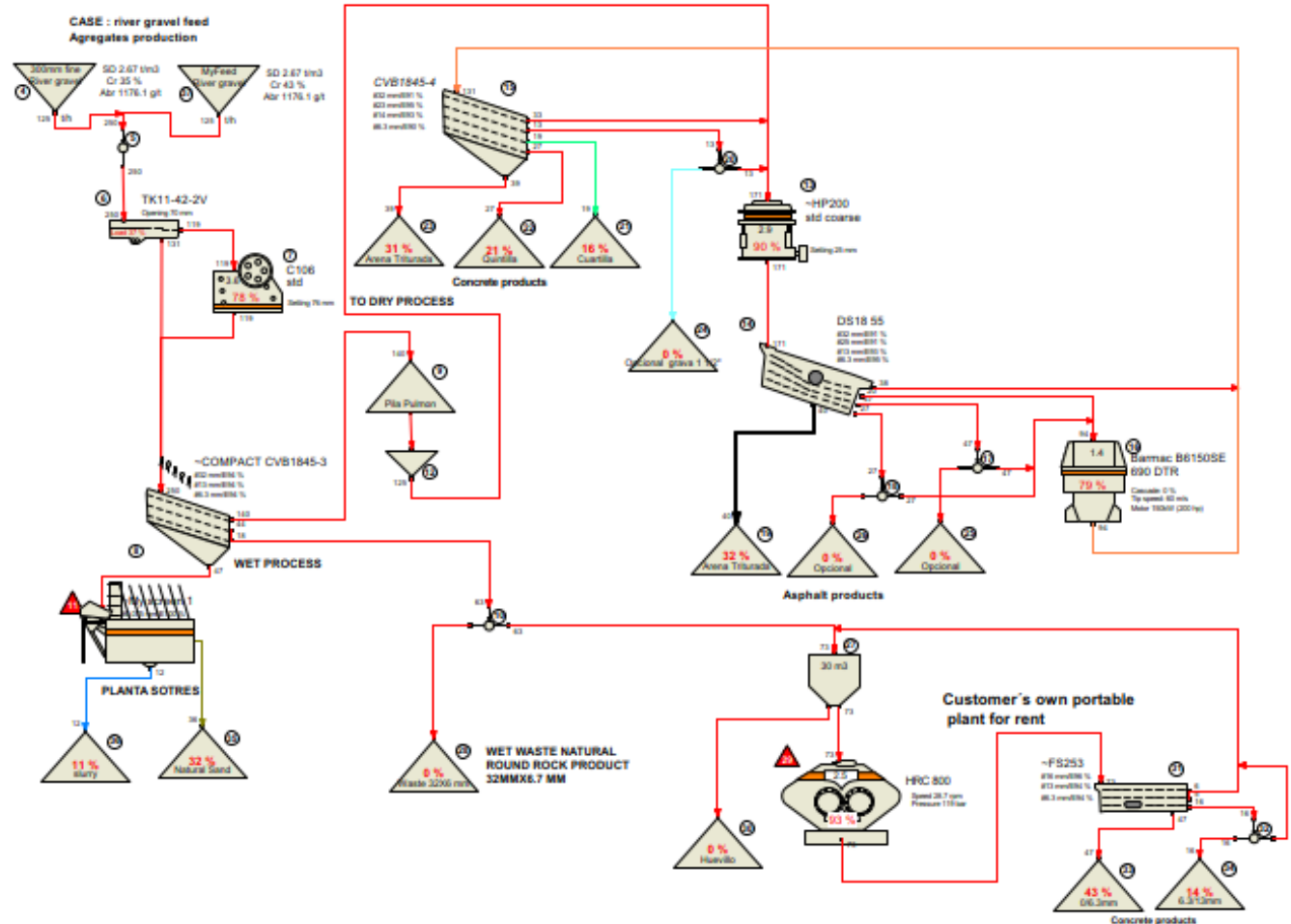
Use the crushed rock for for concrete using the HRC-800.

HRC sand FM and shape specs requirement achieved.

Asphalt products from HP300 cone crusher

Concrete products from Barmac VSI B-6150

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Case 3. HRC800 in open circuit in Mexico, in combination with old cone crusher technology

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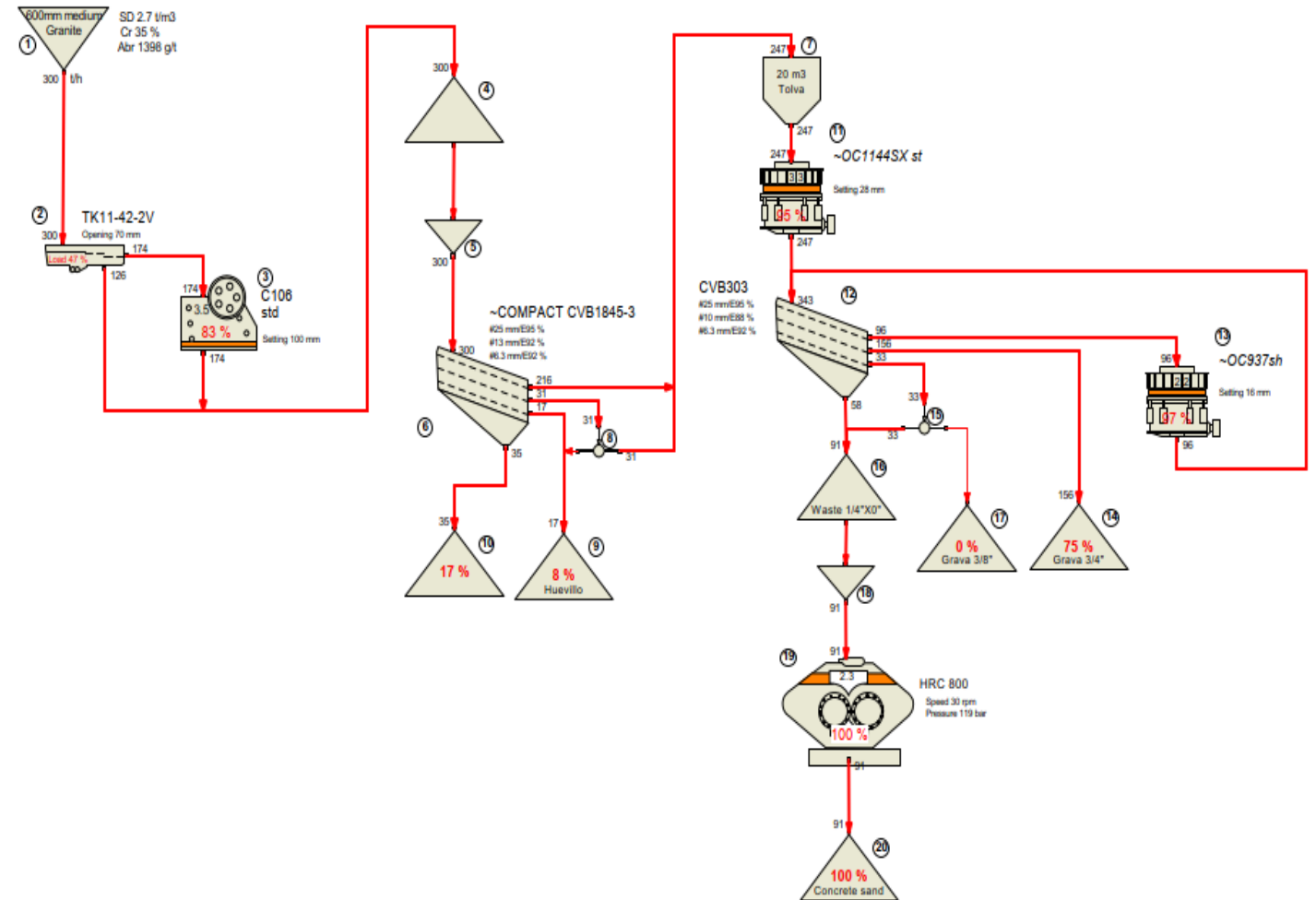
Basalt,
Cr 27%
Abr 1000 g/t

Problem:

Large stock of 0/6.3 to 0/10mm, (46% < 4,75mm) waste material, poor shape and it doesn't meet any spec.

P=0/6 mm
(88% < 4,75mm)
(47% < 2,36mm)

Used in concrete, good shape, meets customer specs





5. Ultra fines <0.074 mm (200 Mesh) removal



<200 mesh (0.074 mm) fines removal

Wet process

A more traditional process

Needs high water volumes

With severe environmental restrictions

A complex process is required if high efficiency is demanded, high investment





<200 mesh (0.074 mm) fines removal

Dry process

A dry solution is a simpler solution

Easier to implement, with high separation efficiency

Easy to operate
Environmentally friendly

With a very low operating cost

Very low maintenance



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6. Conclusion

Conclusions

Manufacture sand solutions

Well graded and good quality manufactured sand demands a customized crushing and screening process and that will define the type of crusher, crushing stages and crusher settings required.

We as Metso can provide the crushing and screening technology able to produce the end product quality required for any specification.

The screen configuration and the screening station accessories will define the manufactured sand process efficiency

Sand gradation top size does not necessarily dictate the screen cut, neither the crusher setting to achieve the grading proportions requirements because,

Re-crushing the excess of coarse grains in the sand may be required to achieve the gradation and FM requirements, this should always be considered in any manufacturing sand process.





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Questions & Answers

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