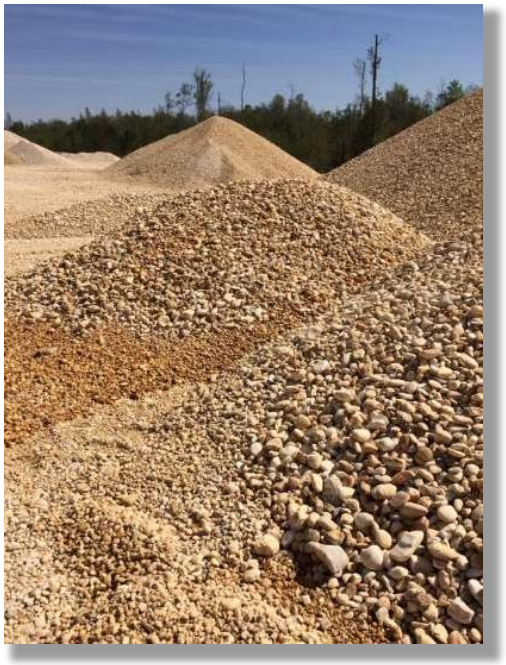
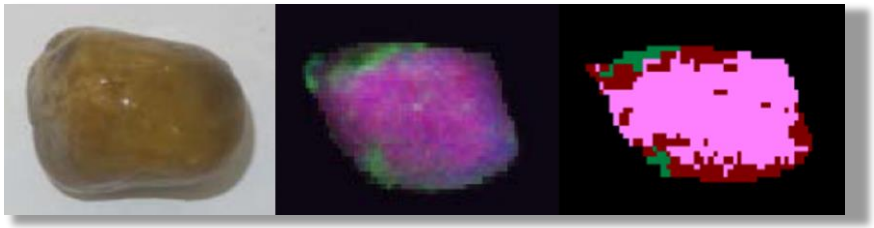
Industrial Minerals Association – North America
IMA-NA
Industrial Minerals Association North America
2017 Technology Workshop

Laser Sorters Minimize Iron Content and Maximize Yield for Quartz Producers

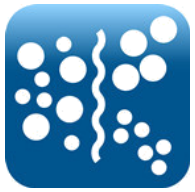
A.J. DeCenso
Preferred Process Solutions

Harold Cline
TOMRA Sorting Solutions



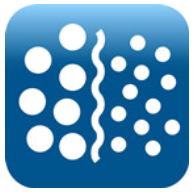


About Preferred Process Solutions


Screening


Sorting


Air Classifying


Milling


Centrifuging


Drying


Coating


Plant Design

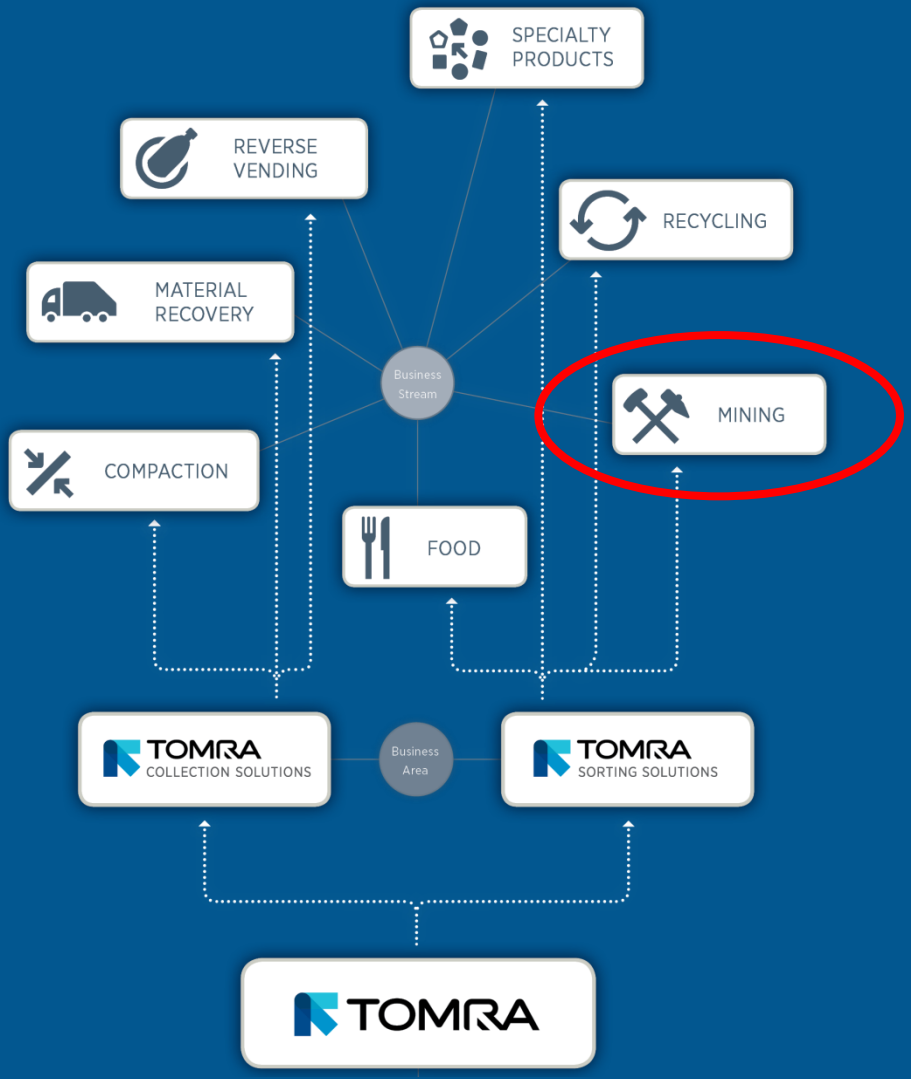
TOMRA SORTING SOLUTIONS

Preferred Process Solutions

SWECO

ecutec®

About TOMRA Group



The Tomra Group

- Listed on Oslo Stock Exchange (OSEBX:TOM)
- 2,800 employees
- Revenues equal to $760 million (2016)

Color Sorter Video

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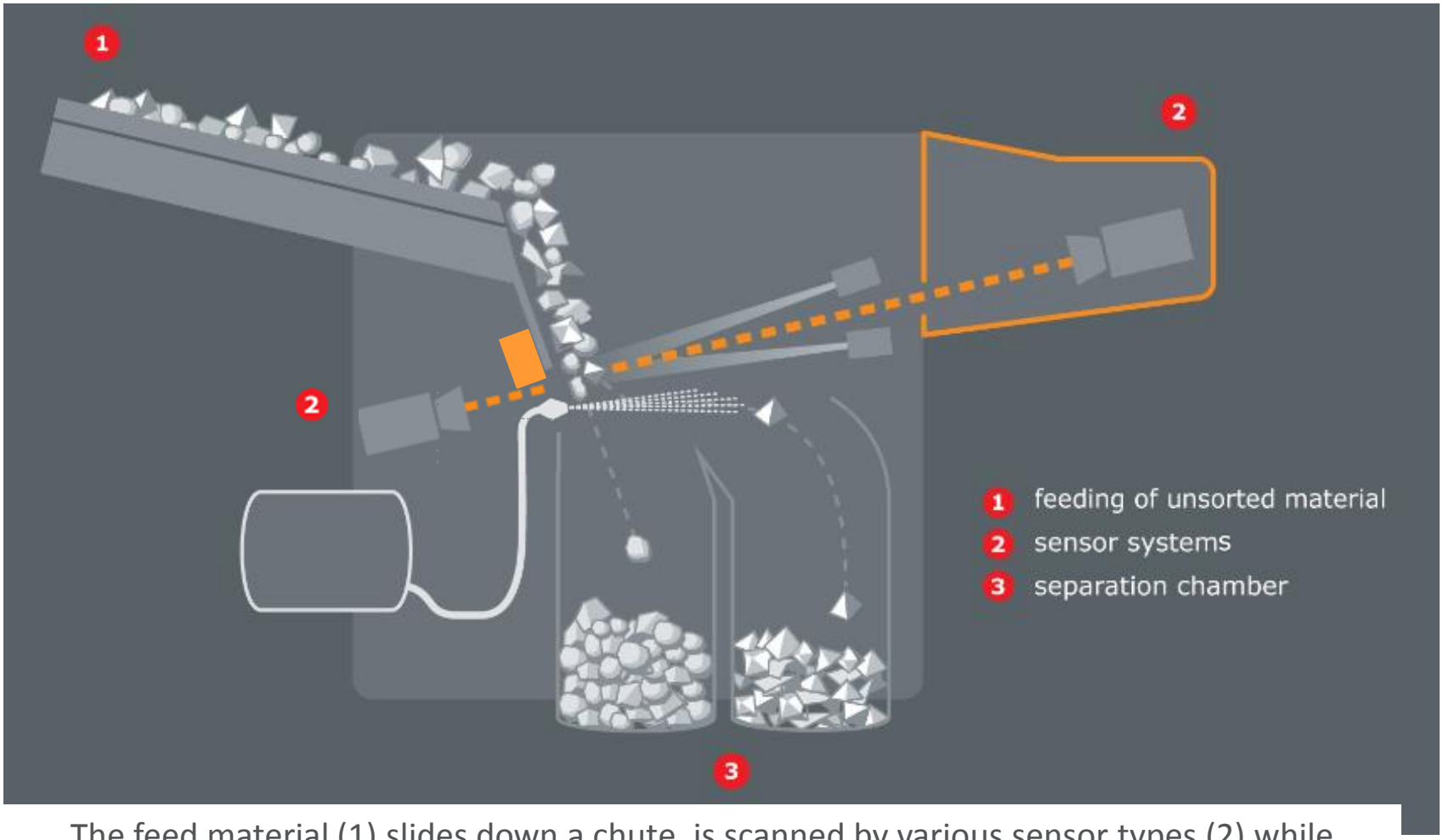
Principle of a Sensor Based Sorter



The feed material (1) slides down a chute, is scanned by various sensor types (2) while sliding and is separated by air jets into the separation chamber (3).

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Color Sorting Examples

Limestone

Accepts

Rejects

Talc

Accepts

Rejects

Magnesite

Accepts

Rejects

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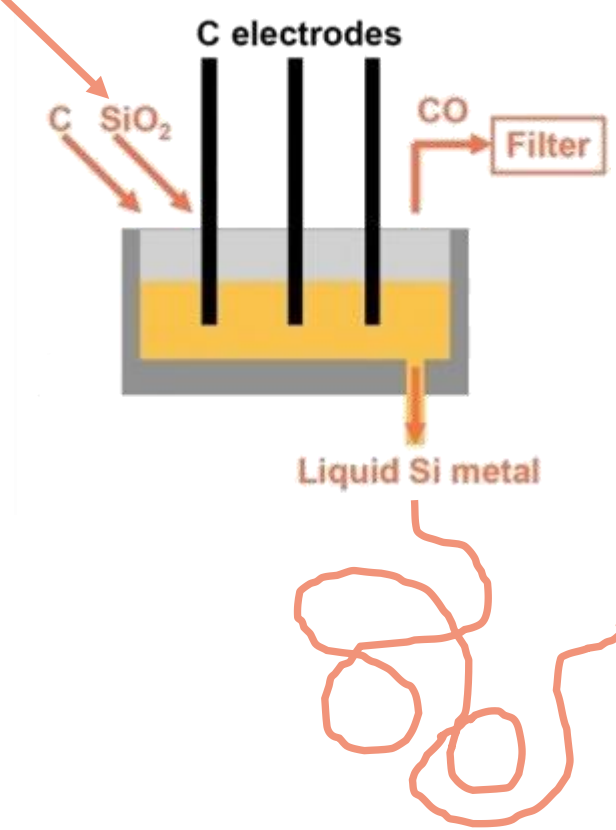
Quartz for Metallurgical Grade Silicon

Quartz used to produce metallurgical grade silicon must be low in iron, typically less than 0.04%.



All silicon metal shares a common origin: Quartz (SiO_2). Quartz is reduced to silicon (Si) in a high temperature melting process using carbon and high temperatures in an electric arc furnace. [1]

For silicon metal to be used in solar and semiconductor applications it must be extremely pure. For solar applications, the metal must be 99.9999% Si. [1]

[1] Courtesy of The QUARTZ Corp

Quartz Sorting with Conventional Color Sorter

ROM Feed

100 t/h
0.110% Fe

Required product spec
<0.040% Fe

Color Sorter

Analysis of reject pile shows that over 2/3 of the rocks in this pile have < 0.04% Fe !!

Sorted Product

69 t/h
0.037% Fe

Rejects

31 t/h
0.278% Fe

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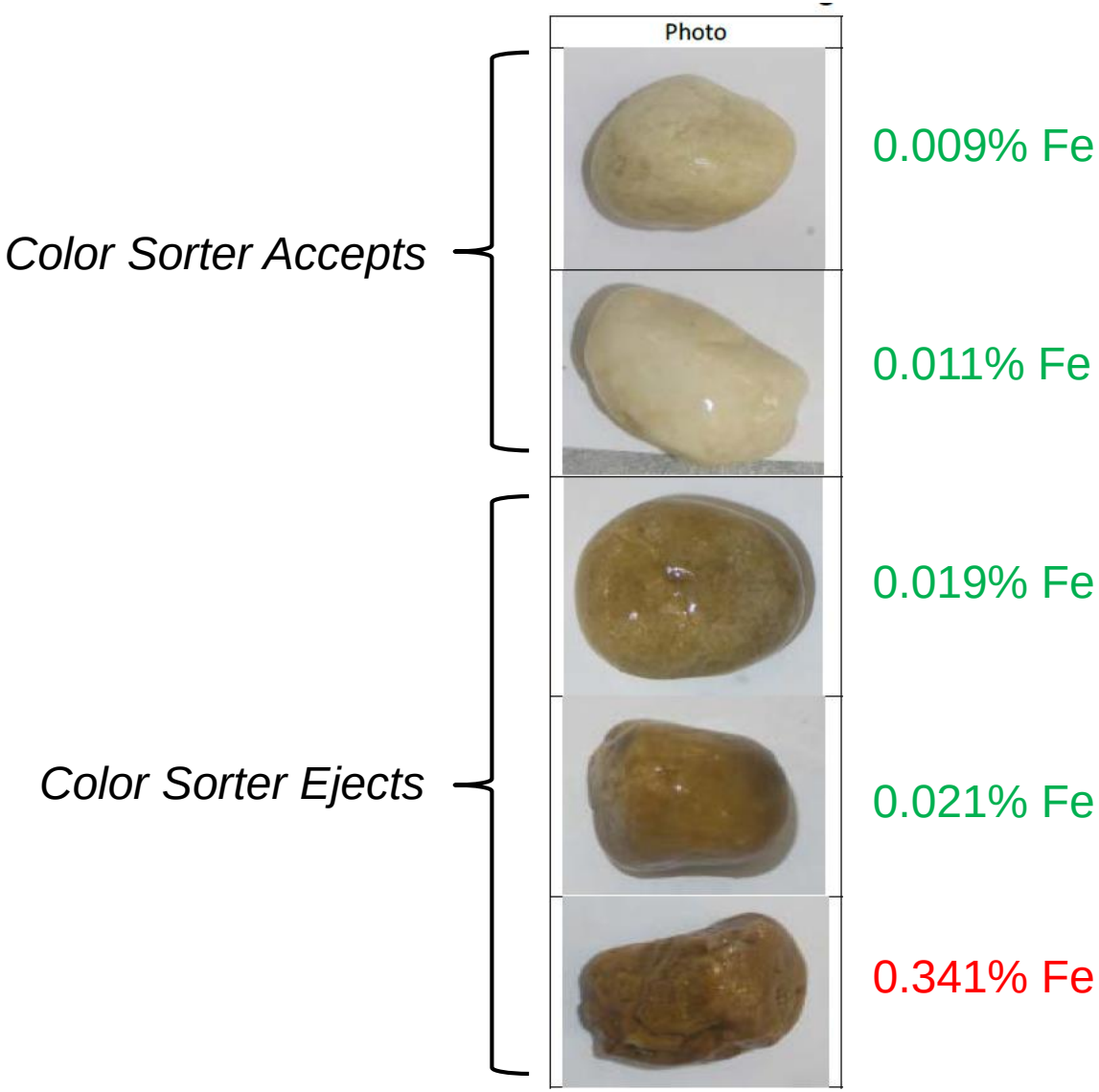
Range of Color Variation in Feed to Sorter



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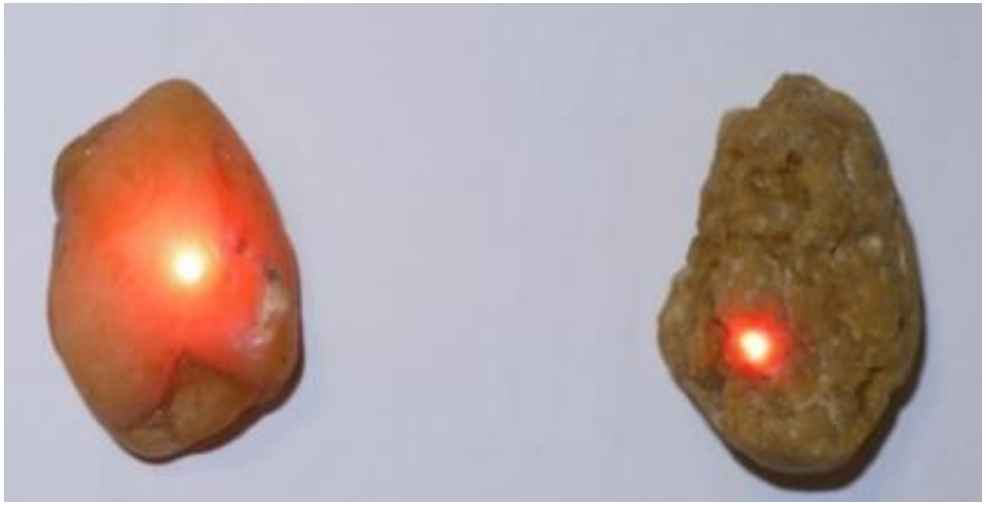
Laser Scattering



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PRO Secondary Laser Sorter

NOTE: Double-Sided Laser for looking at both sides of material

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Sorter Installations

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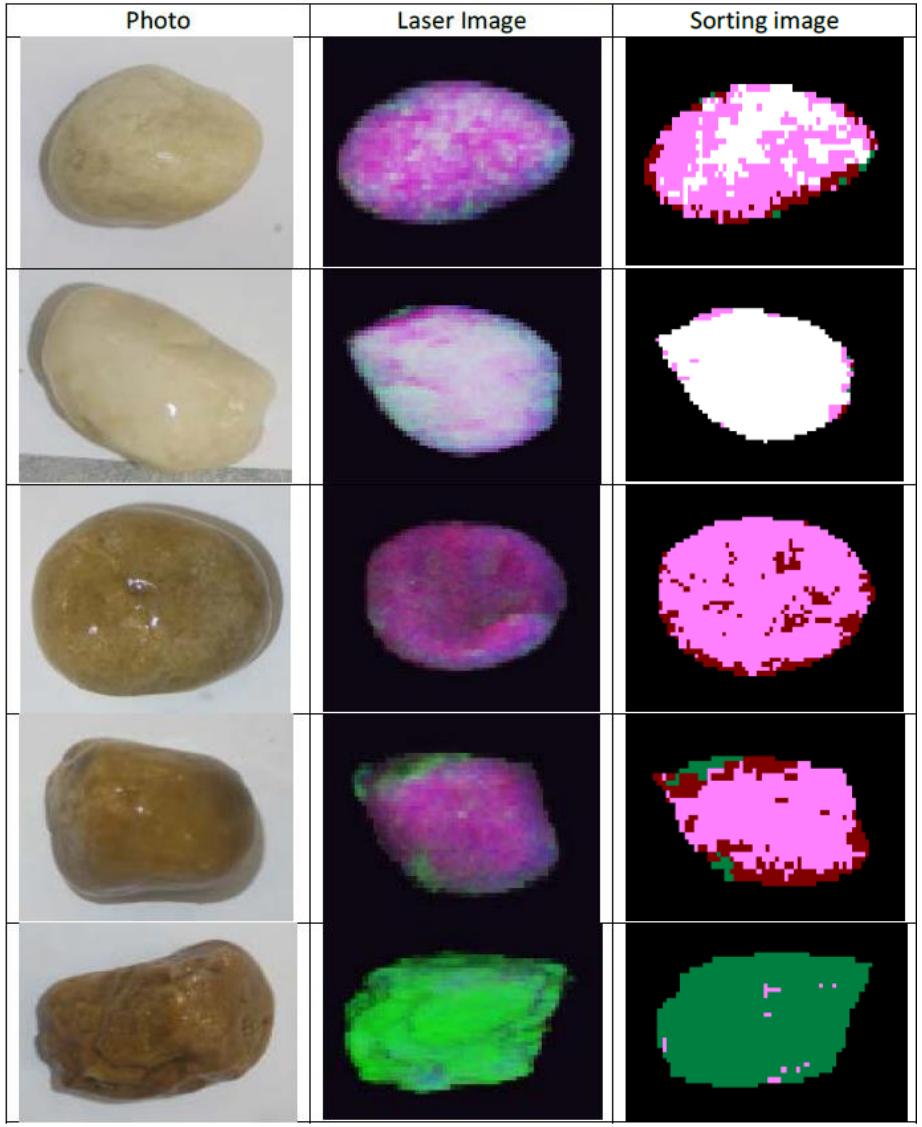
Laser Scatter Sorter Images



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Quartz Sorting with TOMRA Laser Sorter

ROM Feed

100 t/h
0.110% Fe

Required product spec
<0.040% Fe

Laser Sorter

Sorted
Product

89 t/h
0.036% Fe

Rejects

11 t/h
0.708%Fe

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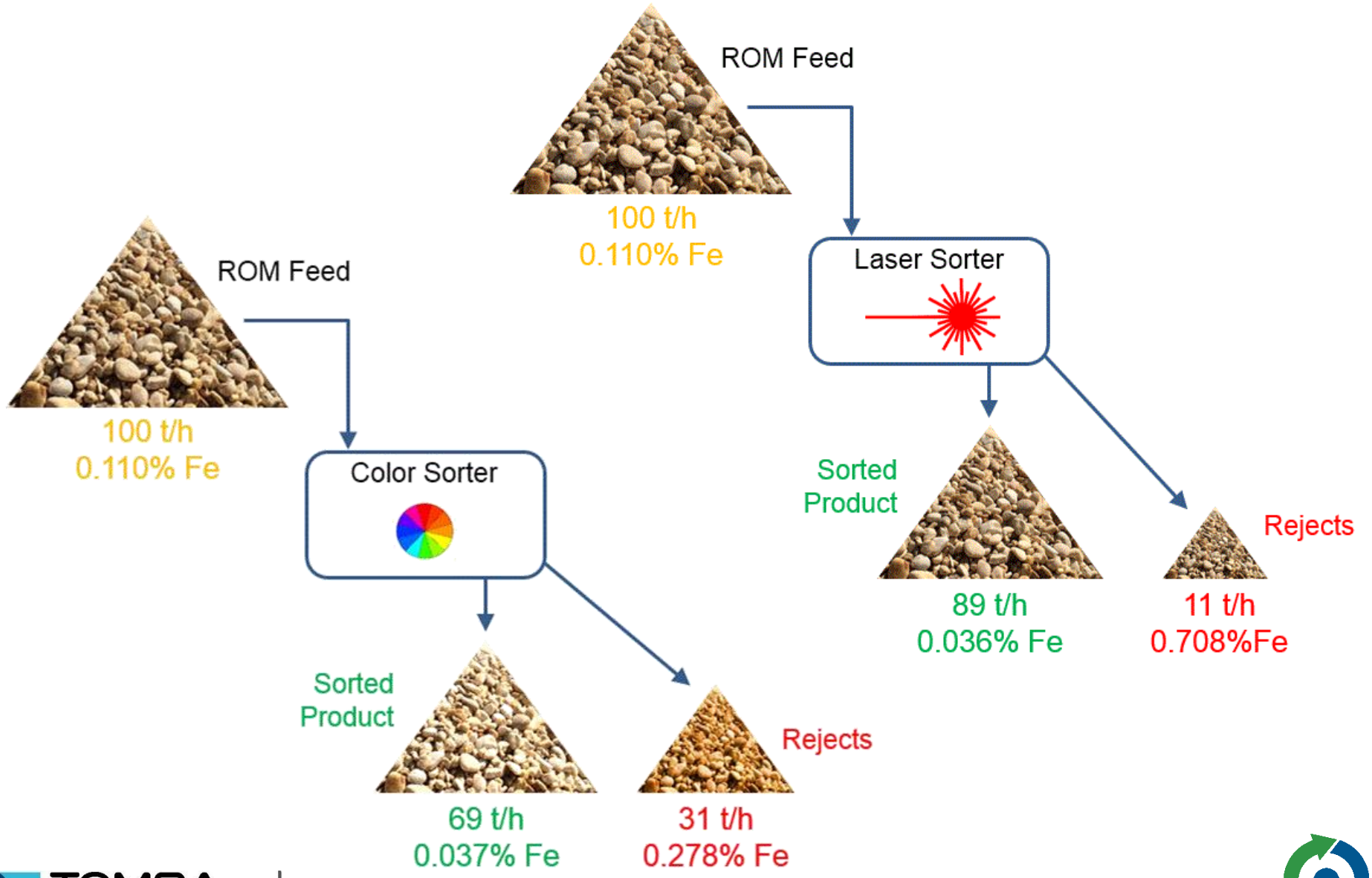
Comparison of Sorter Performance



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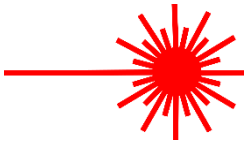
Financial Implications of High Yield Laser Sorting

	 **Color Sorter**	 **Laser Sorter**
Feed Rate to Sorter	100t/h	100t/h
Product Yield	69%	89%
Production Rate	69t/h	89t/h
Product Value	$50 per ton	$50 per ton
Revenue	$3,450 per hour	$4,450 per hour

Contacts

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