



# ***Mechanical and Pneumatic Ship Unloaders***

## ***Maximum Potential and Practical Limitations***

by

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# ***Presentation Focus***

- **Overview of shipunloader design**
- **Dust emission and control**
- **Optimal ship sizes and unloading rates**
- **Power consumption**
- **System configuration**

# ***FLSmidth Pneumatic Shipunloaders***



**FLSMIDTH**

Slide 3

# ***FLSmidth Pneumatic Shipunloaders***



- Material extracted from vessel by vacuum
- Three-section arm for full reach through hold
- Dense-phase conveying to storage (pressure tanks and air compressors)
- Material fully encapsulated from pick-up to storage (two dedusting points)
- Limitless movement along dock (fixed hose connections to convey piping)

# FLSmidth Pneumatic Shipunloaders



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- Three-section arm for full reach through hold
- Dense-phase conveying to storage (pressure tanks and air compressors)
- Material fully encapsulated from pick-up to storage (two dedusting points)
- Limitless movement along dock (fixed hose connections to convey piping)
- Alternatively, equipment can be erected in a fixed position (e.g. barge mounted)

# ***FLSmidth Mechanical Shipunloaders***



**FLSMIDTH**

Slide 6

# ***FLSmidth Mechanical Shipunloaders***

- Material extracted from vessel by vertical and horizontal screw conveyors
- Two-section arm = limited reach without gantry movement
- Limitless movement along dock (infinite discharge points to belt conveyor)
- Separate system required for conveying to storage (typically belt conveyors, bucket elevators, etc.)
- Material encapsulated while in unloader screws, however dedusting is required at every convey system transfer point
- Much less efficient in stationary position



# ***Material Pick-Up and Dust Control***

## **Pneumatic**



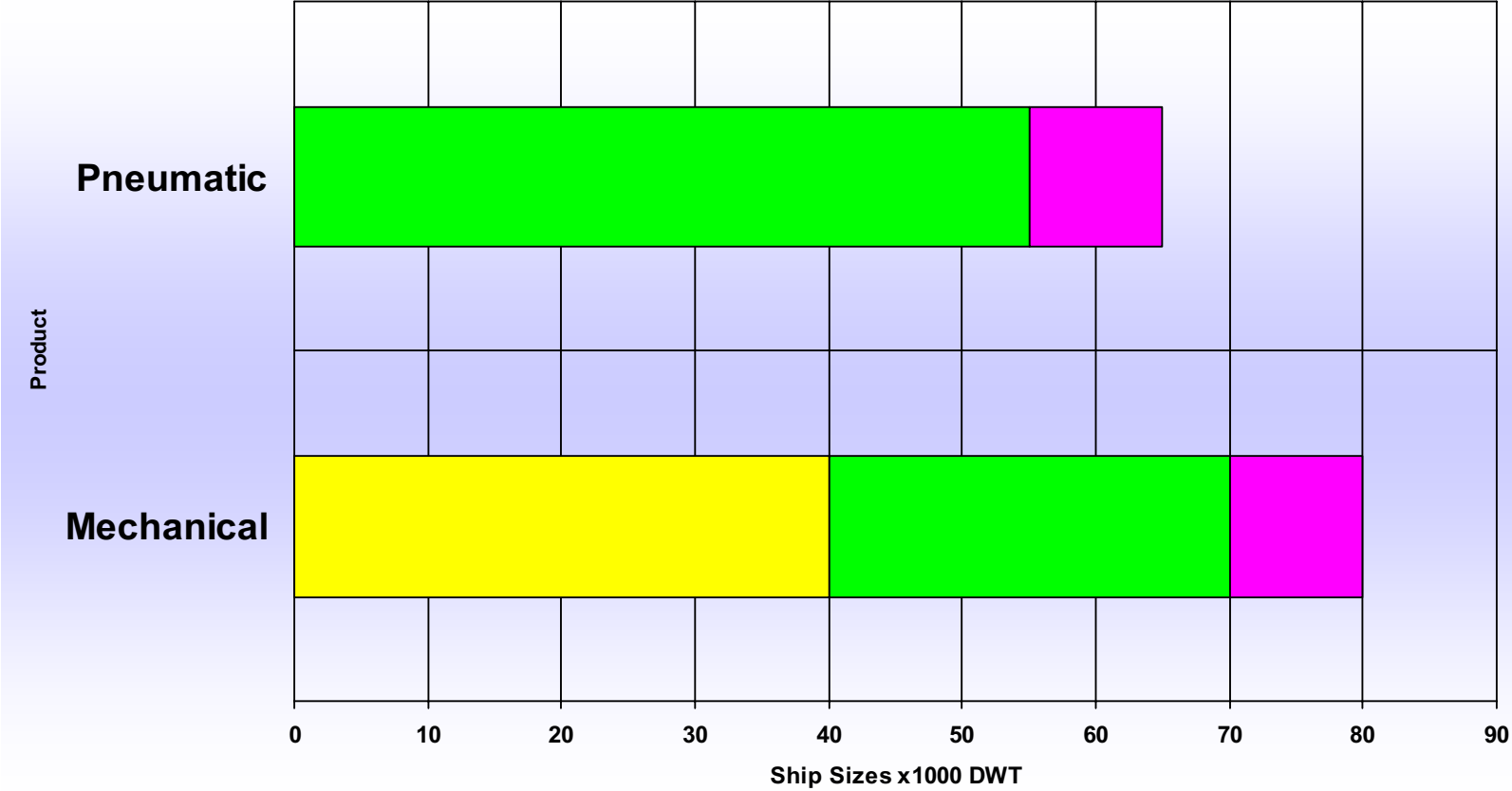


# ***Material Pick-Up and Dust Control***

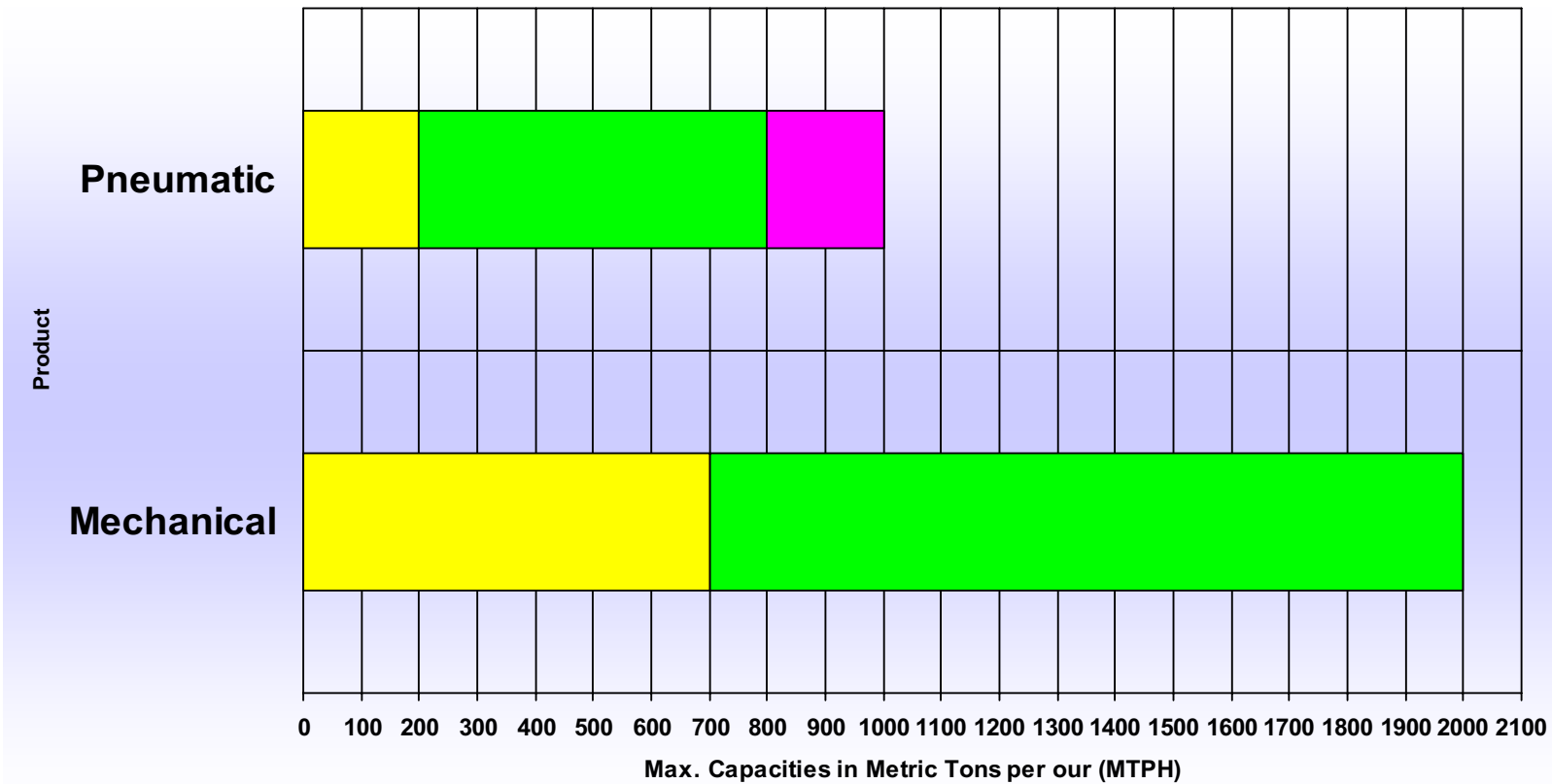
## **Mechanical**



# PNEUMATIC VS MECHANICAL PRODUCT RANGE - SHIP SIZES

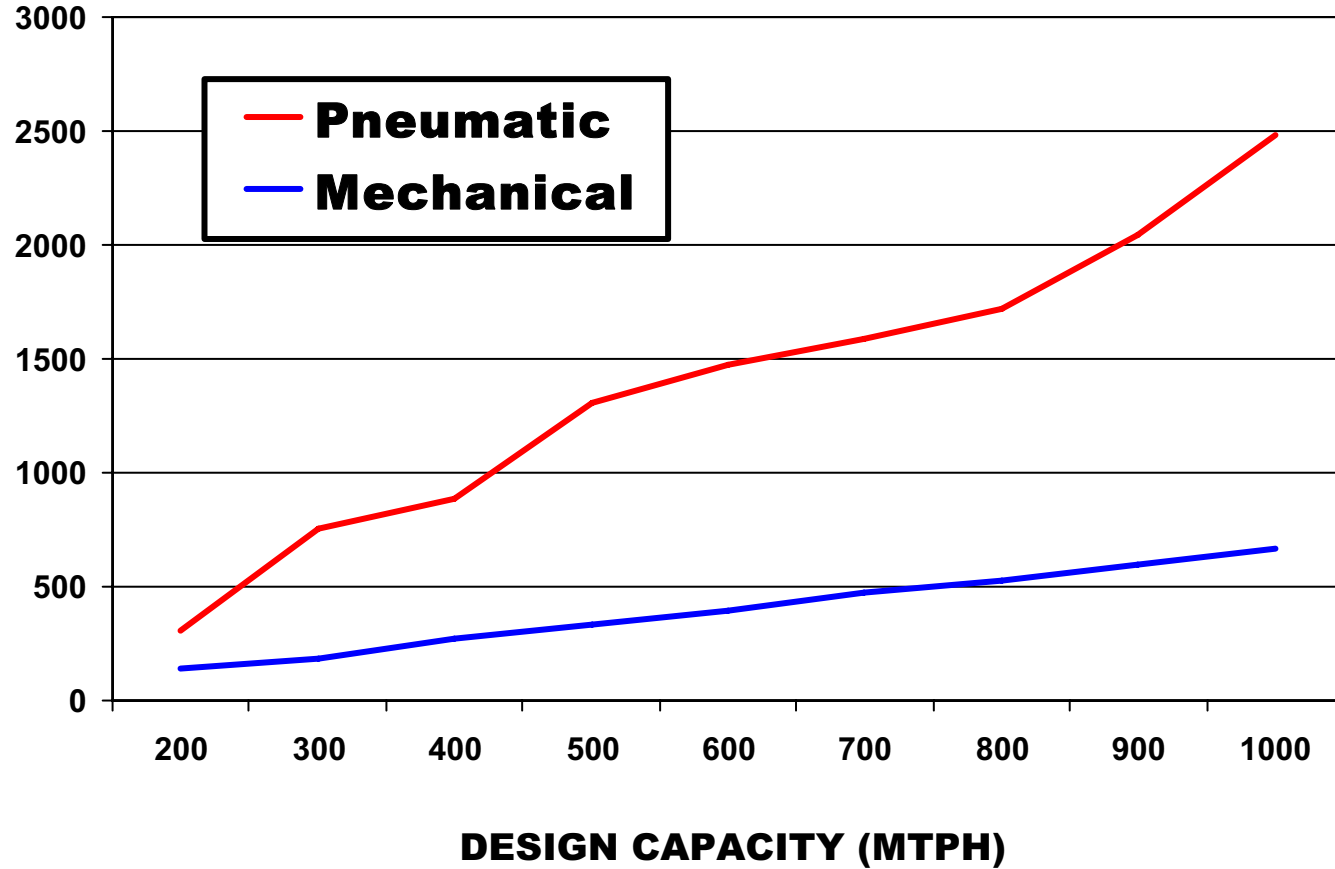


## PNEUMATIC VS MECHANICAL CAPACITIES



**PNEUMATIC VS MECHANICAL  
POWER CONSUMPTION (BASED ON 1000' CONVEY DISTANCE)**

**APPROXIMATE CONSUMED POWER (kW)**



# *Materials*

## **PNEUMATIC**

**ALUMINA  
CEMENT  
FLY ASH  
GRAIN  
PET COKE**

## **MECHANICAL**

<b>ALUMINA</b>	<b>KAOLIN</b>
<b>BARLEY</b>	<b>LIMESTONE</b>
<b>CASSAVA</b>	<b>MANIOC</b>
<b>CEMENT</b>	<b>PHOSPHATE ROCK</b>
<b>COAL</b>	<b>RAPE SEED</b>
<b>CITRUS PULP</b>	<b>RICE</b>
<b>CLINKER</b>	<b>SOY BEANS</b>
<b>DERIVATIVES</b>	<b>SOY MEAL</b>
<b>FERTILIZER</b>	<b>SOY PELLETS</b>
<b>FISH MEAL</b>	<b>SALT</b>
<b>FLOUR</b>	<b>SULPHUR</b>
<b>GYPSUM</b>	<b>TAPIOCA MEAL</b>
<b>GRAIN</b>	<b>TAPIOCA PELLETS</b>

# ***System Configuration***

## **Mechanical Shipunloaders**

- **Optimal efficiency for mechanical shipunloaders is reliant on limitless movement along the vessel, therefore stationary unloaders are not practical for large vessel, high-capacity applications**
- **Fixed vertical arm length and limited up/down movement of the horizontal arm can make the application impractical where there are high water level fluctuations**

# ***System Configuration***



- **Fixed position of shore transfer system makes barge mounting impractical**

# ***System Configuration***

## **Pneumatic Shipunloaders**

- **Greater range of arm movement allows for more coverage from a fixed position. Also, flexible hoses allow for limited movement between connections (typically 50' +/-)**
- **Three-section arm better compensates for variable water level conditions**

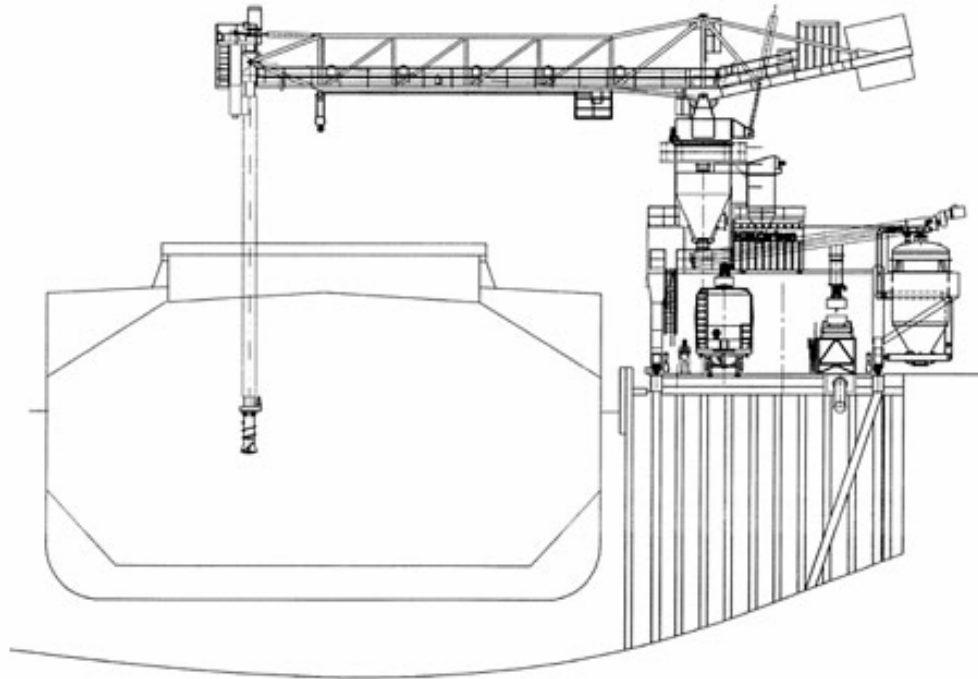


## ***System Configuration***



- **Use of flexible hoses make barge mounting a practical option for pneumatic ship unloader**

# *System Configuration*



**Note: Pneumatic transfer (with flexible hose connection) is an option for mechanical unloaders, however power savings are often negated**

# System Summary

	PNEUMATIC	MECHANICAL
Small Vessels (< 40,000 DWT)	+	
Handimax Vessels (40,000 to 55,000 DWT)	+	+
Panamax Vessels (> 55,000 DWT)		+
Design Capacity up to 700 MTPH	+	
Design Capacity 700 MTPH to 800 MTPH	+	+
Design Capacity > 800 MTPH		+
Dust Control	+	+ *
Power Consumption	Highest	Lowest
Powdery (cementitious) Materials	+	+
Coarse, Abrasive Materials		+
Configuration Versatility	+	

\* Dependent on shore transfer system



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