

National & international
port freight pinch points are under severe stress
causing container shortages and cost headaches ...

intermodal fast container transfers can help
but they need environmentally smart solutions

Consider the big gains possible with
1000 Standard CONTAINERS / HOUR PORT CRANES!

They use some 200 EV's in the one facility to lift, move, lower, stockpile & load autonomously



Worldwide port congestion as at Nov 27 2021 the week COVID Omicron responses started worldwide

Port Congestion

China has a higher concentration of congested ports globally

Congestion percentage



Total ships in anchorage area



Sources: Bloomberg, IHS Markit, Genscape

Notes: Congestion rate = number of anchored container ships waiting / sum of anchored container ships and container ships in port. Data as of Nov. 19, 2021.

Bloomberg

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Immediate benefits:

Better utilisation of port crane facilities

More revenue-generating trip cycles from ship assets in a year

Change routes to avoid bad climate change weather outcomes like container losses

Ship travel time options to **adjust hull speeds to improve fuel economies**

Improved container stack management and container selection options

Stockpile elimination and **flexible ore blending** / grain mixing prospects

Faster selective container access response to freezer failures

More intermodal **transport swapping options**

Average container **movements are less than 4 seconds each.**



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Set new commercial records

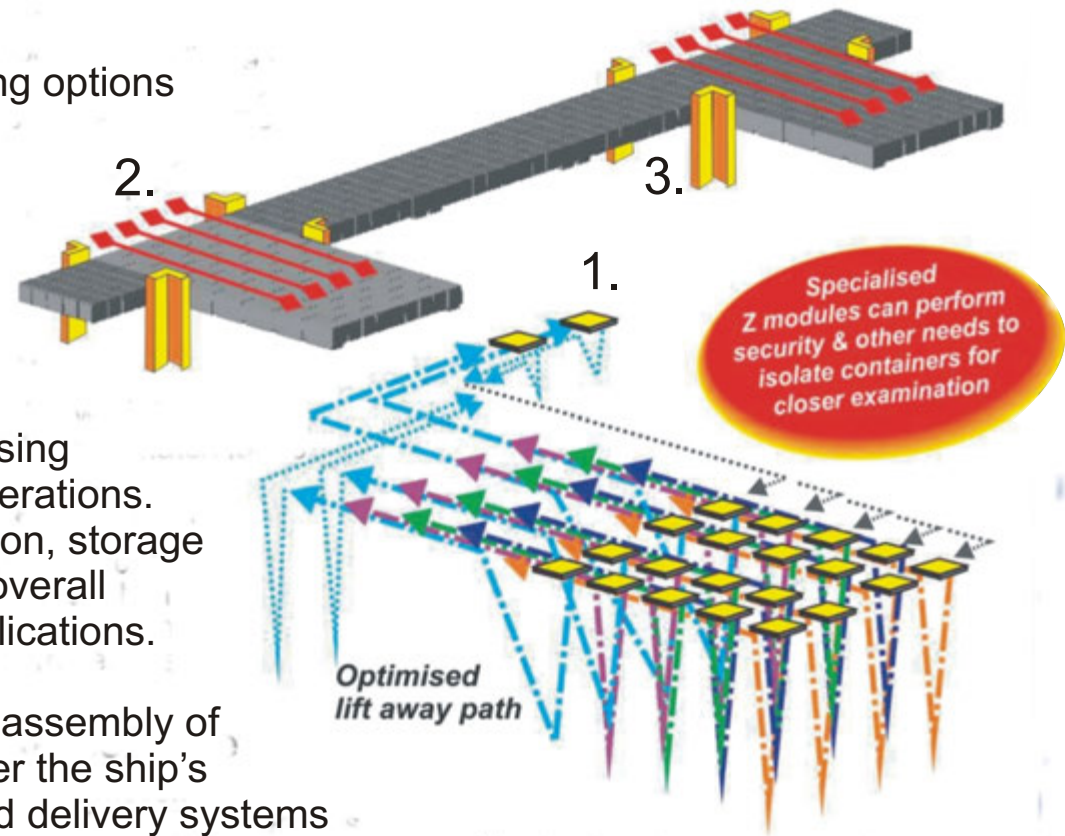
June 2017, the Madrid Maersk moved 6500 containers at the Port of Antwerp and set a record for an ultralarge container vessel in 59 hours, averaging 110 containers per hour. If the Shanghai to Antwerp 11,000 nautical mile trip at 11 knots, both ways, was added to the single cycle time, then imagine the commercial benefits of almost half another trip cycle per year.

**Imagine a MASSIVE 17% better utilisation
of an ultralarge container vessel per year.**



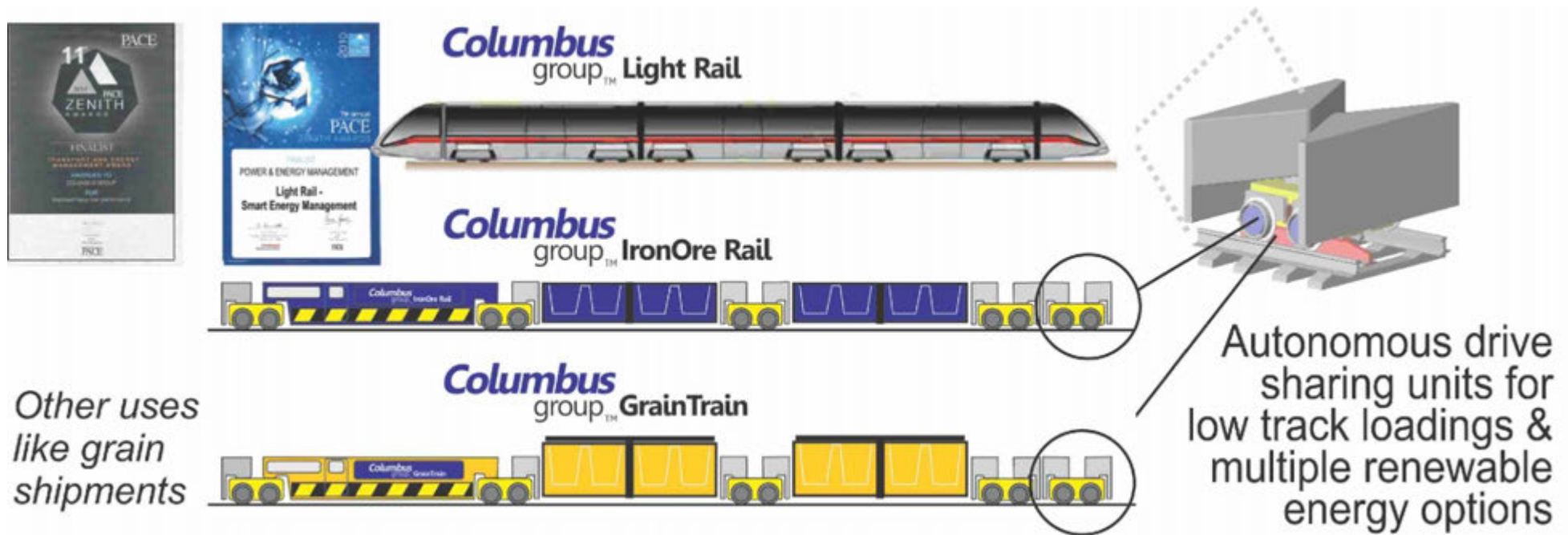
How is it done?

1. Indicatively 200 lifting Z Module hoisting options work together to provide just-in-time hoisting capabilities in stand-alone or multiple combinations to match the container sizes presented. Specialised Z modules can also sense security and other biological contaminations as required to be detected and isolated for other processing as appropriate, away from the core operations. Z Modules also include energy collection, storage and management to complement the overall energy collection and deployment applications.
2. The XY Shunting Track Platform is an assembly of powered blocks that telescopic out over the ship's container stack, intermodal access and delivery systems and 'container warehousing areas to link the whole process together. They carry and hold the 200 lifting Z Modules to deliver and collect the loaded and unloaded containers as needed. The XY Shunting Track Modules also collect and manage the bulk of the energy supply, storage and exchange as used by the Z Modules, using a mix of green hydrogen, solar and batteries.
3. The Lifting and Locating hoists can move the whole structure if required and also lift or lower plus even tilt the whole XY and Z operating crane system for system speed, ease of access and servicing.



Certain pending patent technical aspects are not detailed above

Complementary container movements



The COLUMBUS Group's low axle loading iron ore trains and grain trains somewhat complement the 1000 container / hour port crane installations, so expansive stock piles and silo installations are not required, rather the use of half height and full height containers, with or without renewable energy sources adjoining the train lines.

To further simplify the intermodal operations and reduce axle loadings, autonomous drive container linking/sharing driven units are used. Like the 1000 containers / hour port crane systems, there is extensive use of 5G communications and IoT (internet of things) in the overall system management to 'separate' the containers from the driving units for rapid pickup of many containers at the same time, or double stacking of containers as needed.

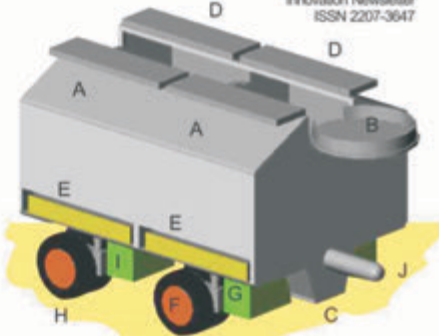
Related technology WINS in movement & energy sectors

Specify Your Own (SYO) autonomous 1000 TONNE open cut trucks

309
Dec 10 2018
© Columbus Group
Innovation Newsletter
ISSN 2207-3647

Core parts of each module:

- 2x 20 cu metre bins A
- Continuous top load pass B
- Bottom load dumping C
- Dust control top closures D
- 4 fast swap main recharge batts E
- 8 high torque drive motors F
- High travel variable suspension G
- 8 offroad tyres (AS4457.2) H
- 4 control pods & backup batts I
- Mechanical, electric & data links J
- Indicative travel options K



Width : 3.2m
Bin length : 4.8m
Height : 4.2m
Op speeds are
grade optimised
10 units : 400 cu m
(Nom 1000 Tonne)

Comparison
CAT 797F truck
Width : 9.5m
Height : 7.7m
Length: 15.1m
Load : 145 cu m
(363 Tonne)

To achieve the '1000' TONNE open cut truck, 10 modules are connected to carry 400 cu metres, autonomously, at optimised speeds that depend on grades and performance specified on much narrower roads and sharper turns.

The use of 40 fast swap main recharge batteries that power the 80 hub motors, have a substantial reduced width and height, (compared to a 797F) and the steering options of each module, makes for an efficient 'train-like' operation, particularly when working with a PAL (progressive autonomous LOADER system) as defined in our last newsletter #308 but with a much lower overall height, so the PAL LOADER can be smaller & longer for very rapid 1000 tonne truck loading in seconds!

WINNER!

Australian Mining PROSPECT Awards
Sydney Oct 26 2017

Awarded to: **COLUMBUS Group**
**EXCELLENCE in ENVIRONMENTAL
MANAGEMENT**

2017
**AUSTRALIAN
MINING
PROSPECT
AWARDS**

Carob: Renewable Mining Power

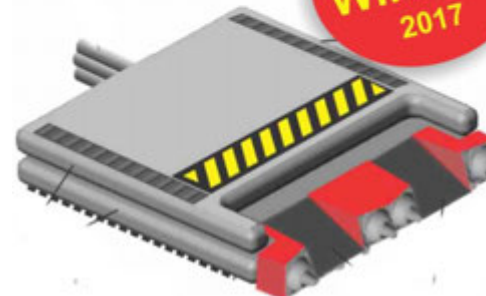


Low cost sugar to methanol fuel cells, for processing, trucks & trains



Sydney 15 August 2017
ZENITH Process and Control
Engineering Awards -
Mining & Minerals Processing

**Category
WINNER
2017**



Double Bed Mining System

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Thankyou! Any questions?

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R&D of the **COLUMBUS Group** has been recognised in many ways
from Blue Carbon Credit seagrass, to innovative comms, defence projects, multiple mining awards & smart software

2019 Sustainability Awards
Seagrass Stimulation integrated System
Highly Commended Award - Waste Elimination

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