

14 October 2014



MILOTEK
innovating transportation

Using new technology to lower iron ore mining cost for Kaouat mine in Mauritania

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The Futran system is a revolutionary new transportation system that can be applied to transform various industries

1. Mining

Conveyor belts
(40%-80% savings)



Underground mining
(40% - 80% savings)



Open pit mining
(50% - 80% savings)



2. Bulk and freight

Heavy haul rail
(50% - 70% savings)



Dry bulk ship loading
(60%-80% savings)



3. Indoors

Factory / warehouse
transformation



4. Public Transit

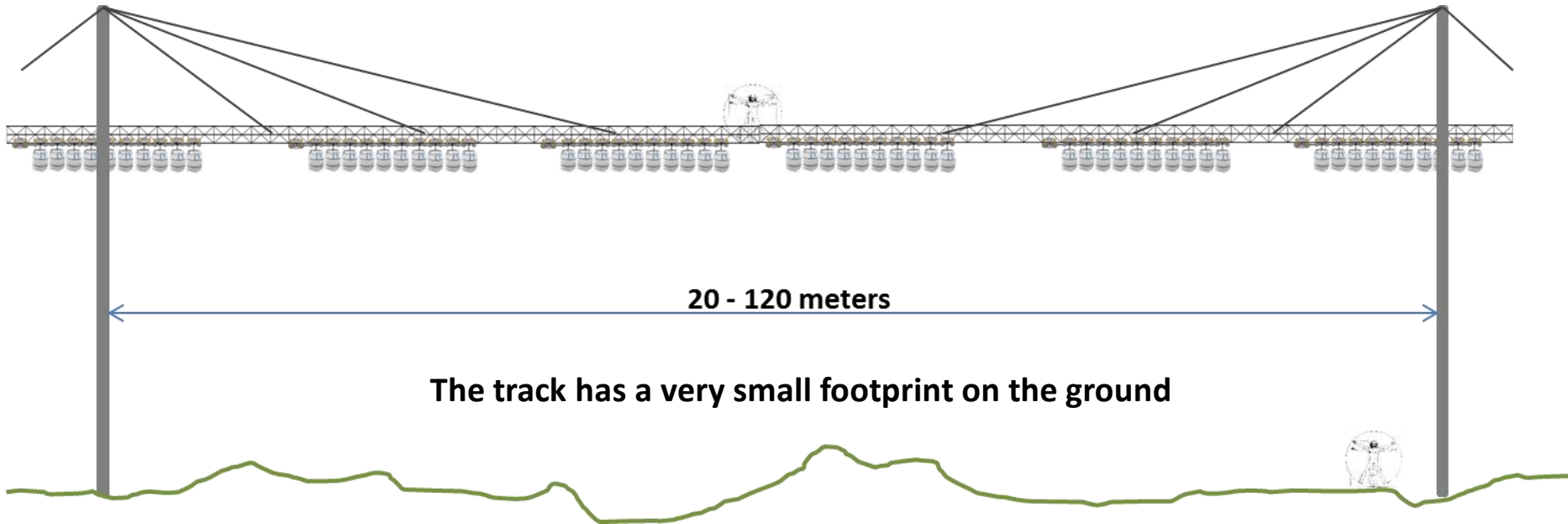
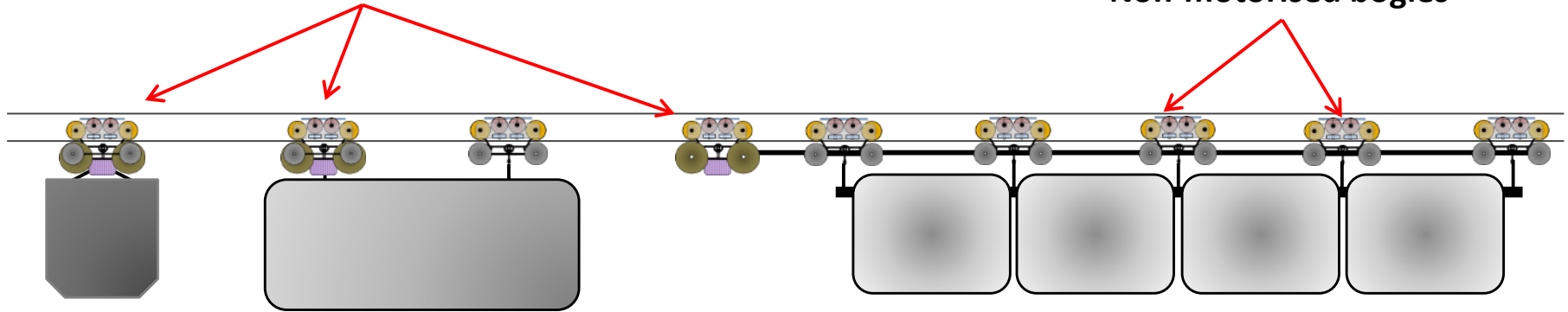
Urban Public transportation
(70%-90% savings)



The Futran System can be used to transport a range of loads of different sizes and weights, using small, powerful electric motors

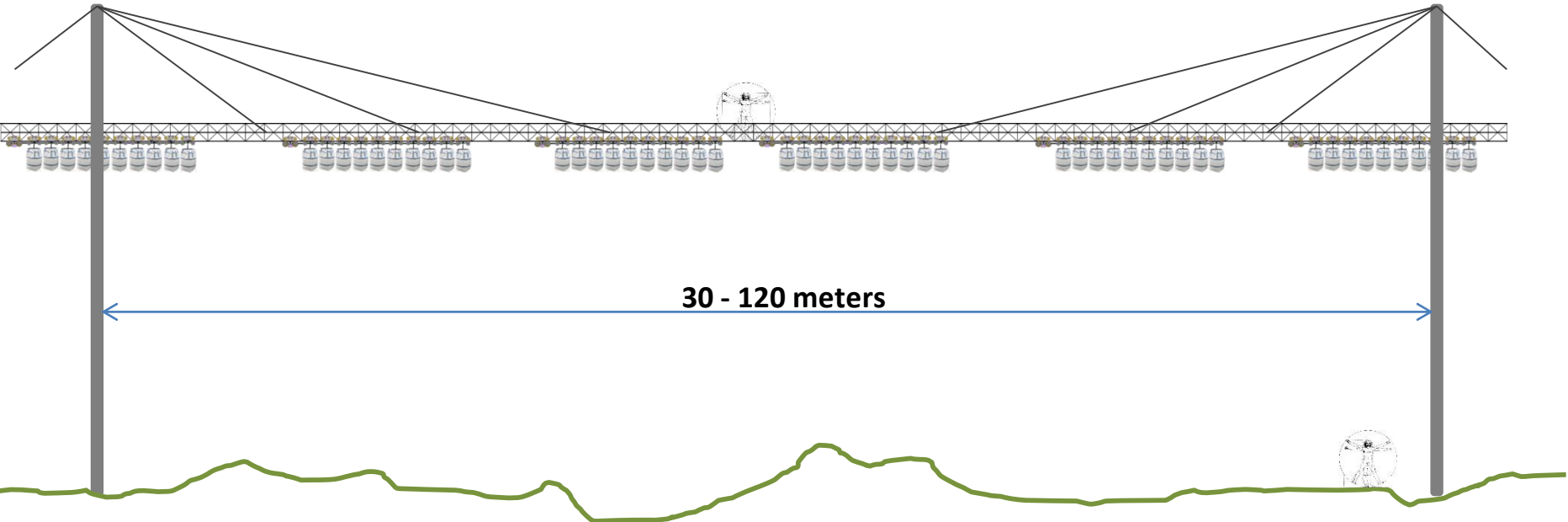
Electric motor unit

Non-motorised bogies



The track has a very small footprint on the ground

The Futran track is supported with pillars, giving the system a very small footprint on the ground while allowing animal migrations below



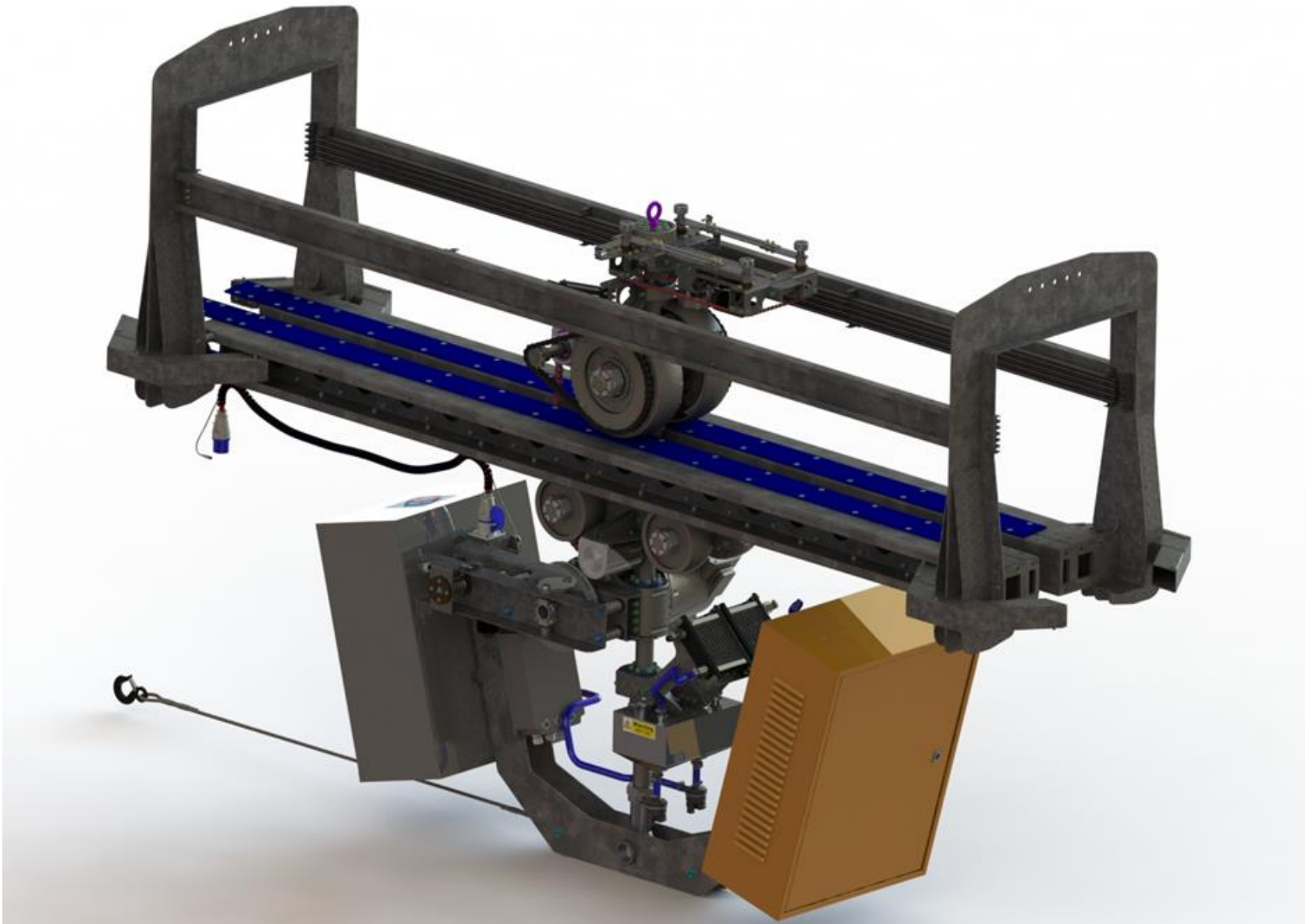
30 - 120 meters



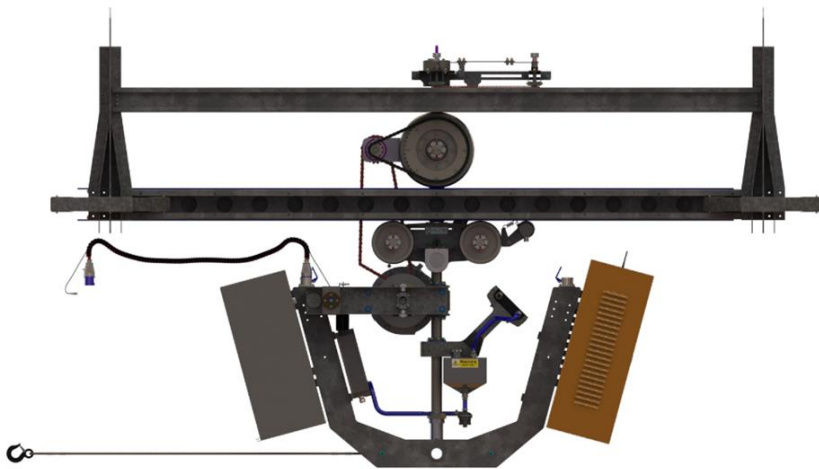
When in the open, low cost pillars such as used for power cables can be used



The Futran system design was completed and patented in April 2014



The Futran motorised bogie is incredibly light weight and robust while yielding significant power



Standard motor

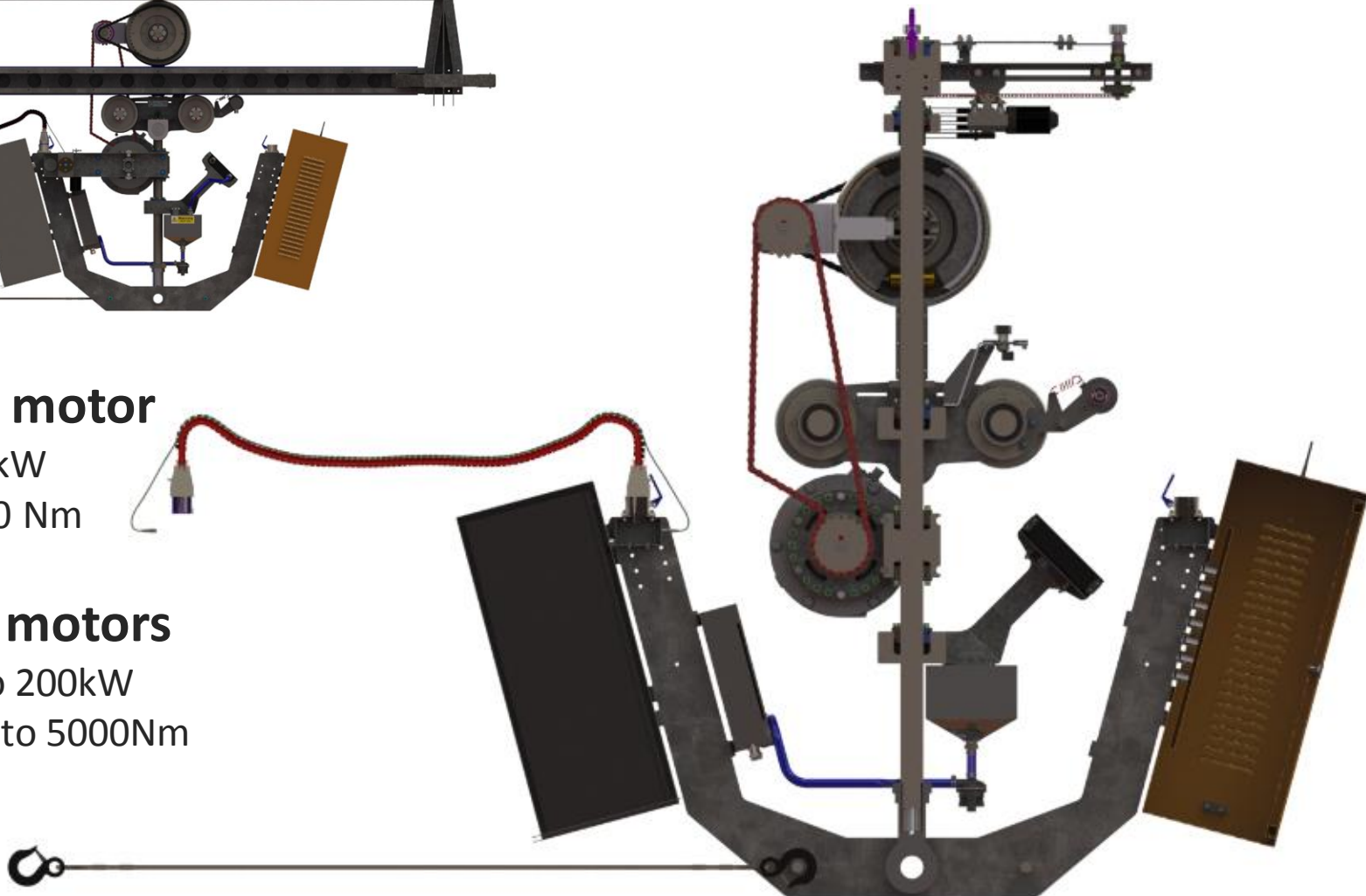
Power: 100 kW

Torque: 2000 Nm

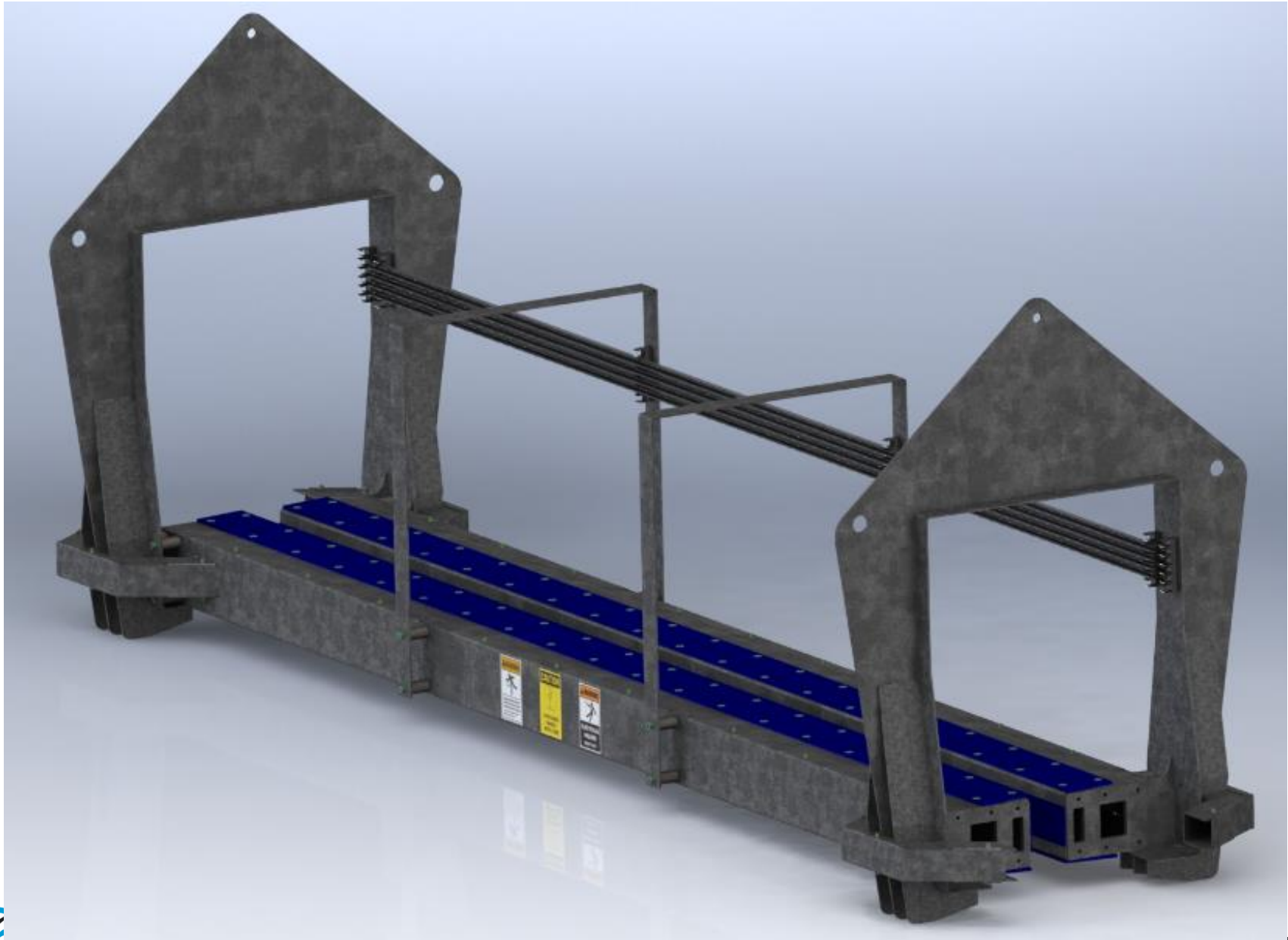
Range of motors

Power: 10 to 200kW

Torque: 500 to 5000Nm

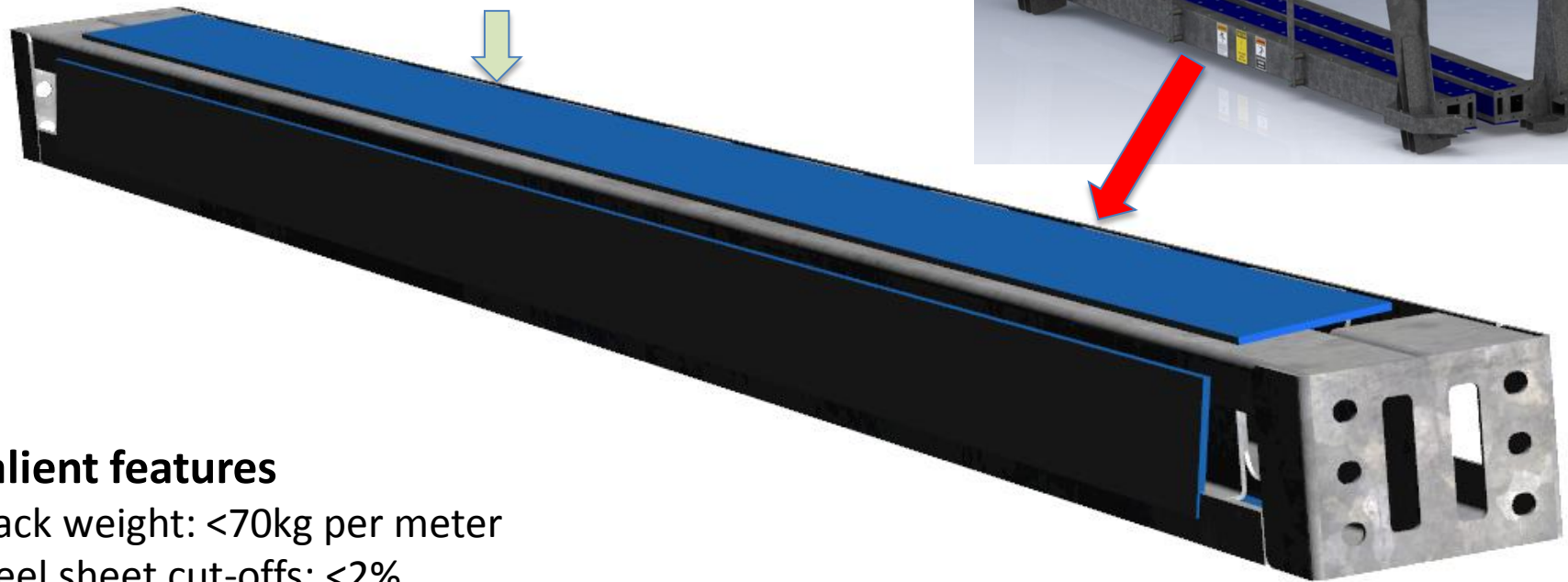
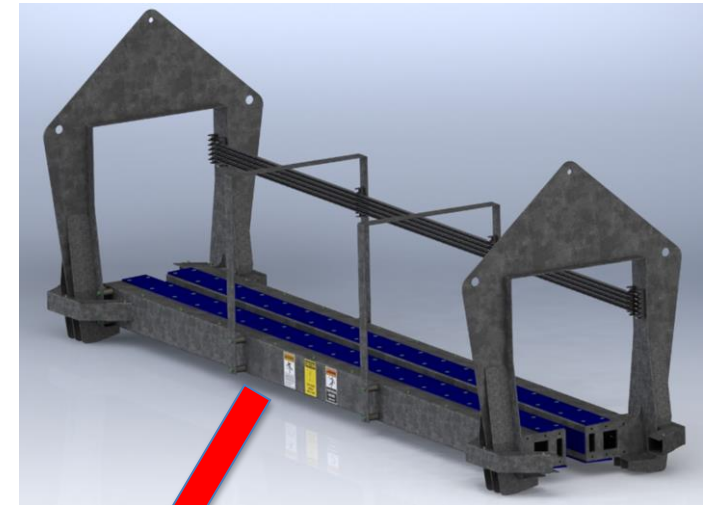


The track is pre-manufactured and assembled on site



By using Advanced High Strength steel, we managed to drastically reduce the track weight and cost

Hardox
wear plate



Salient features

Track weight: <70kg per meter

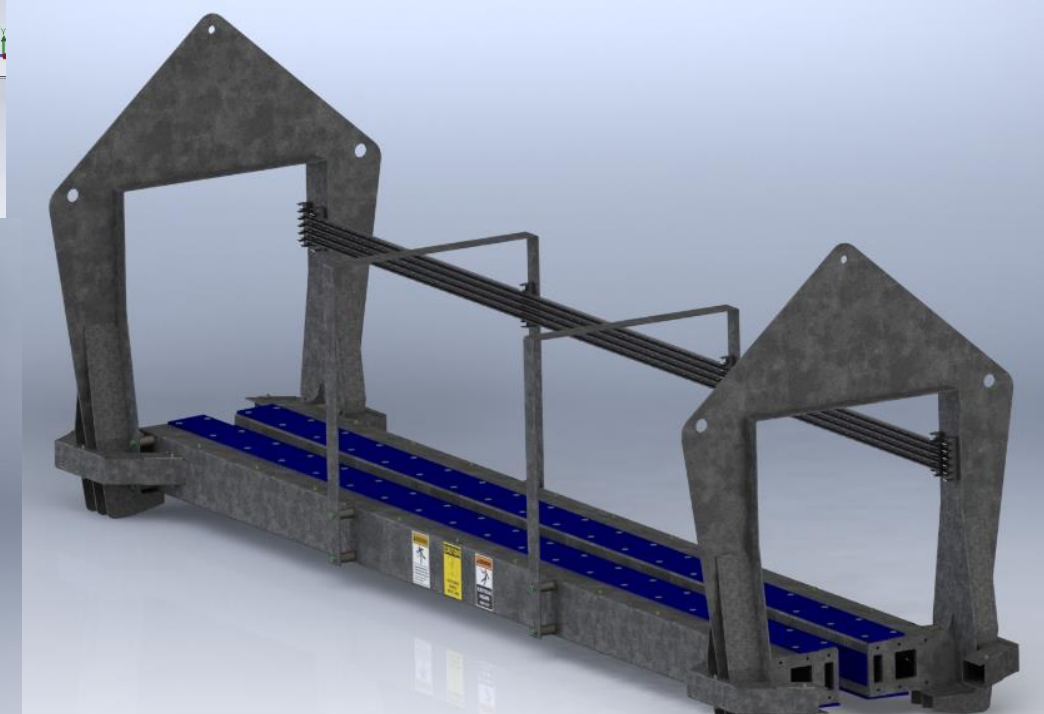
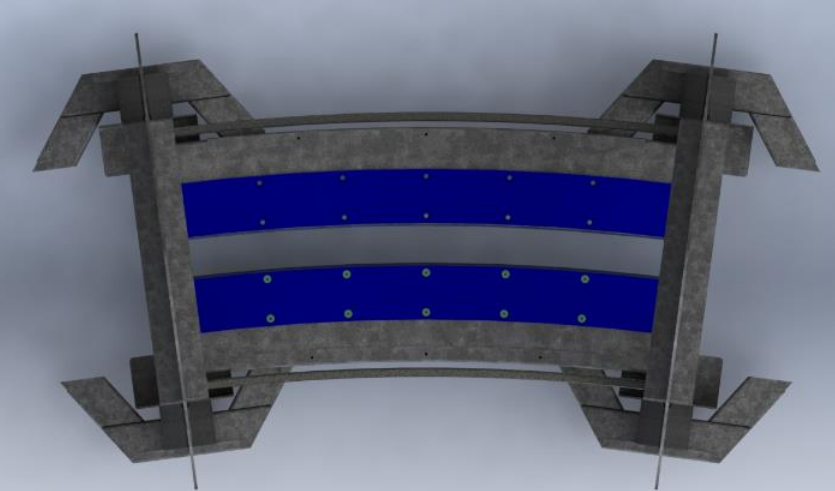
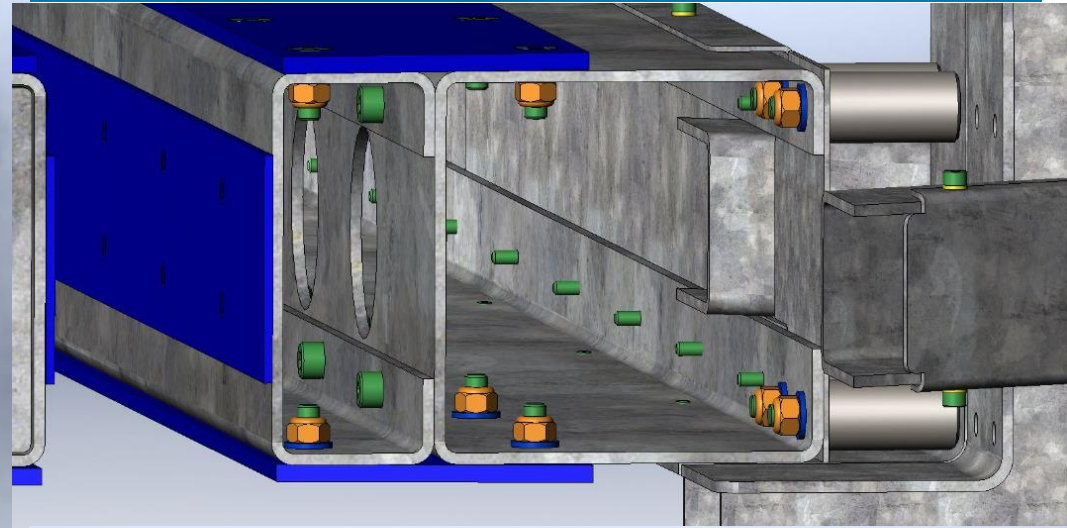
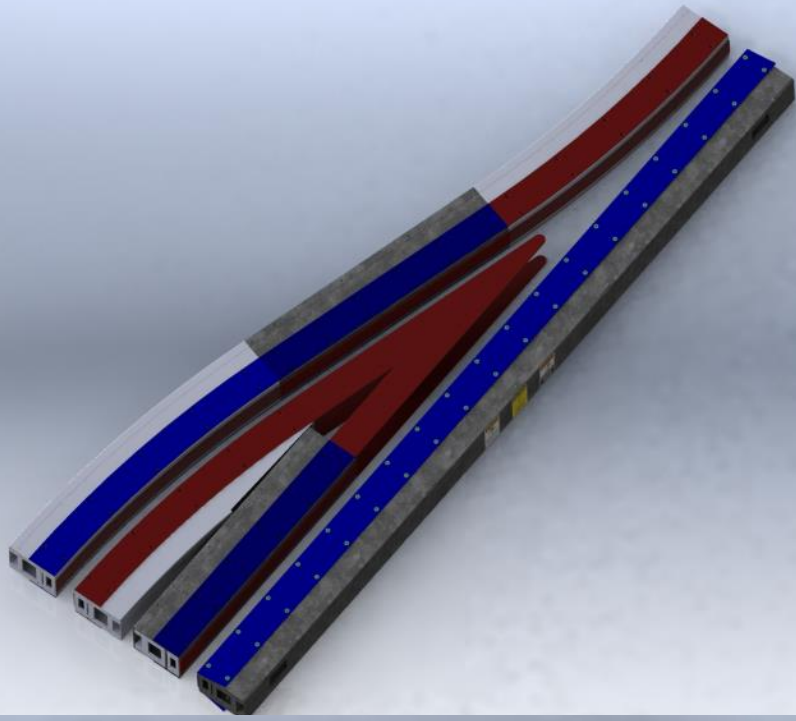
Steel sheet cut-offs: <2%

Section carrying capacity: >1 ton per meter

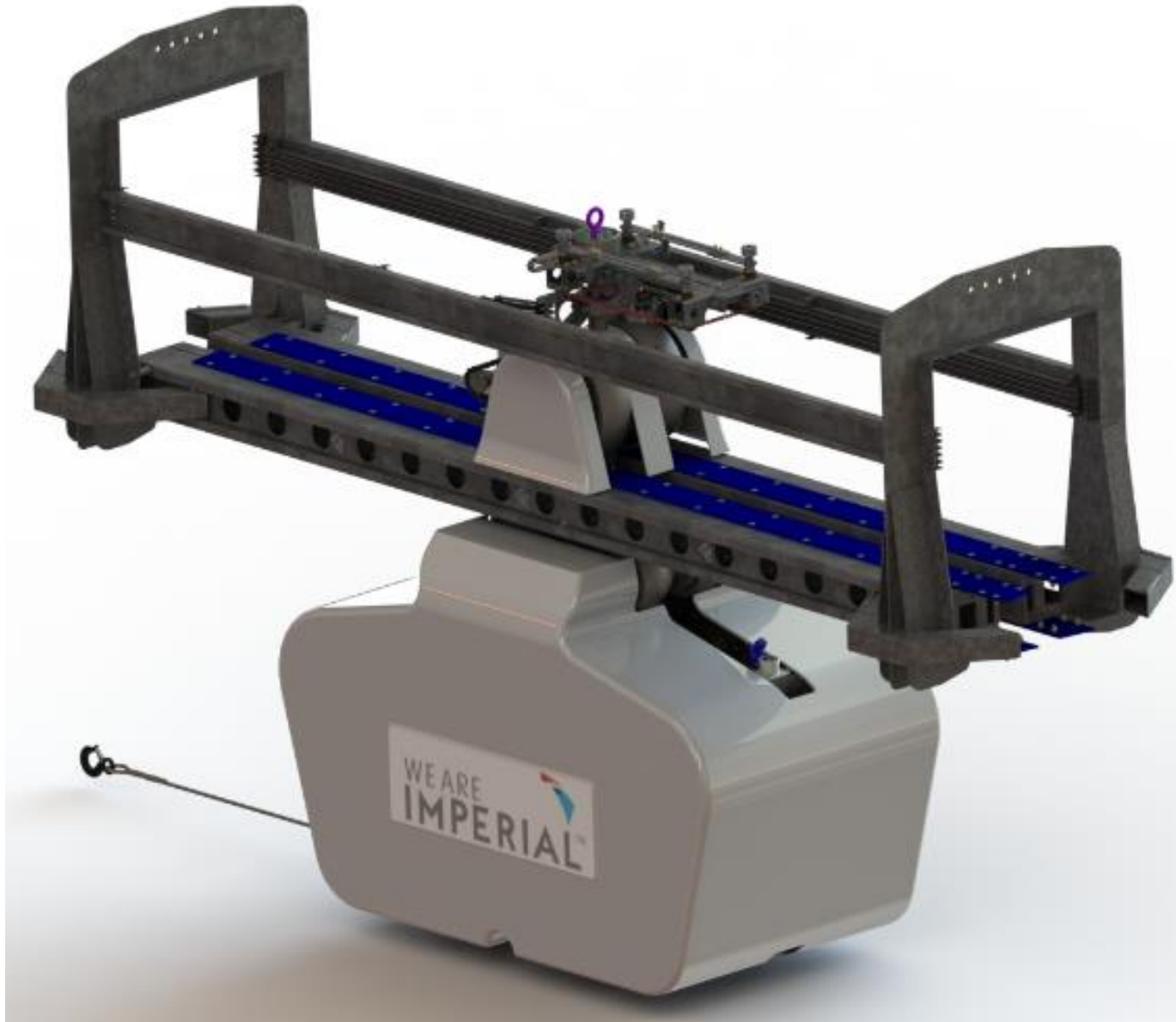
Bulk carrying capacity: >50 000 tons per hour

Track Maintenance cost: <2% of Capex per annum (est.)

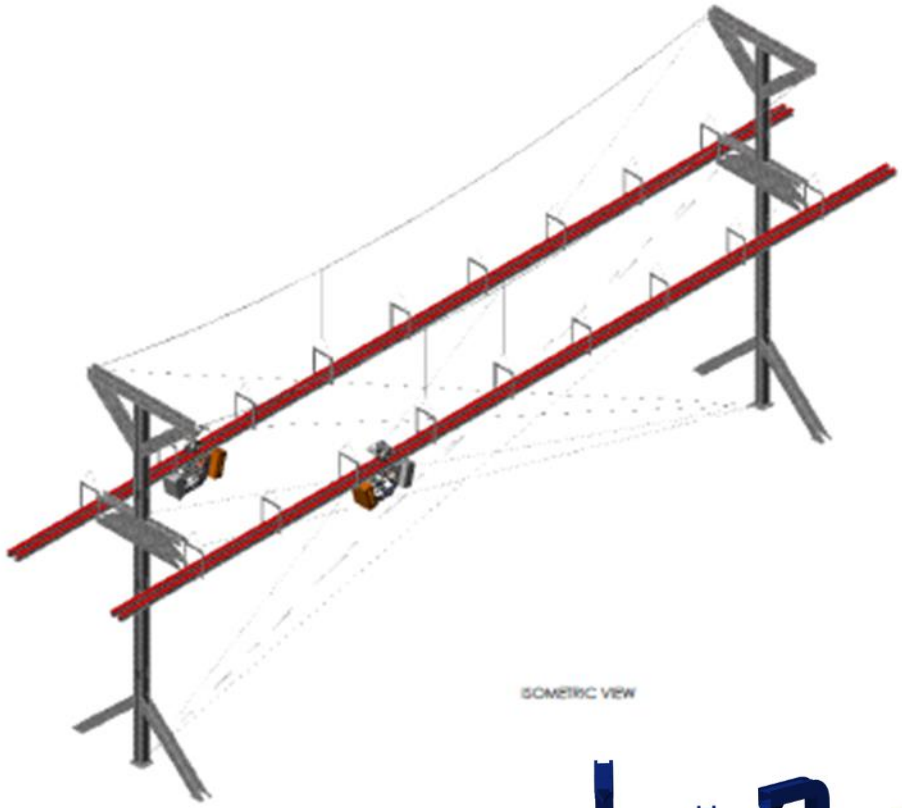
The unique track design enables us to make it very light weight and modular, easy to assemble anywhere



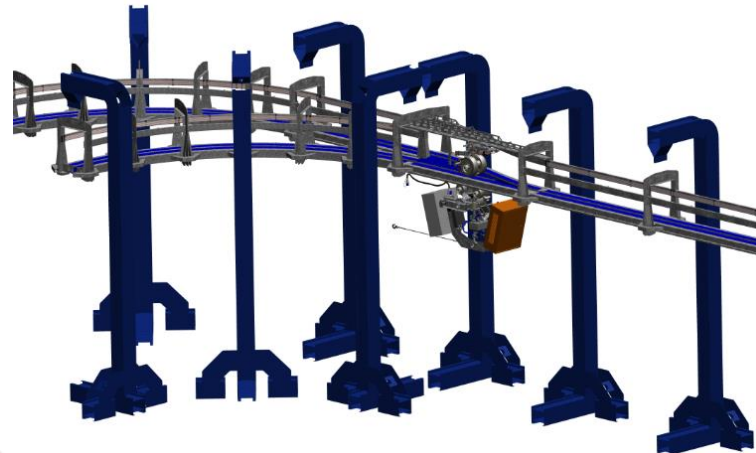
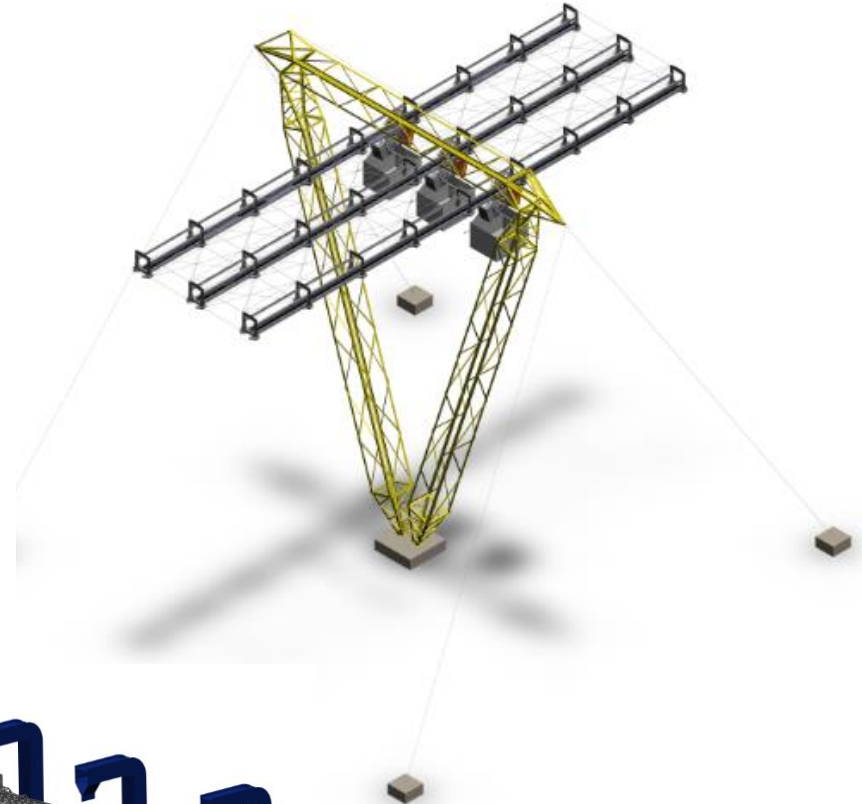
The completed motorised bogie has a protective cover to limit dust and moisture exposure



Superstructures for both single, double and triple lanes have been developed

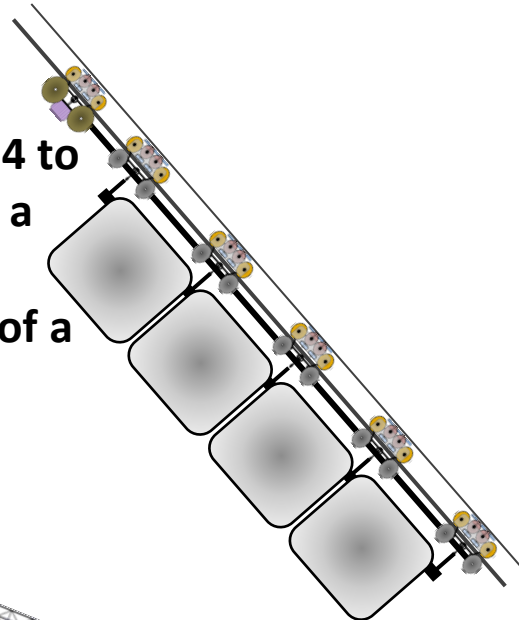


ISOMETRIC VIEW

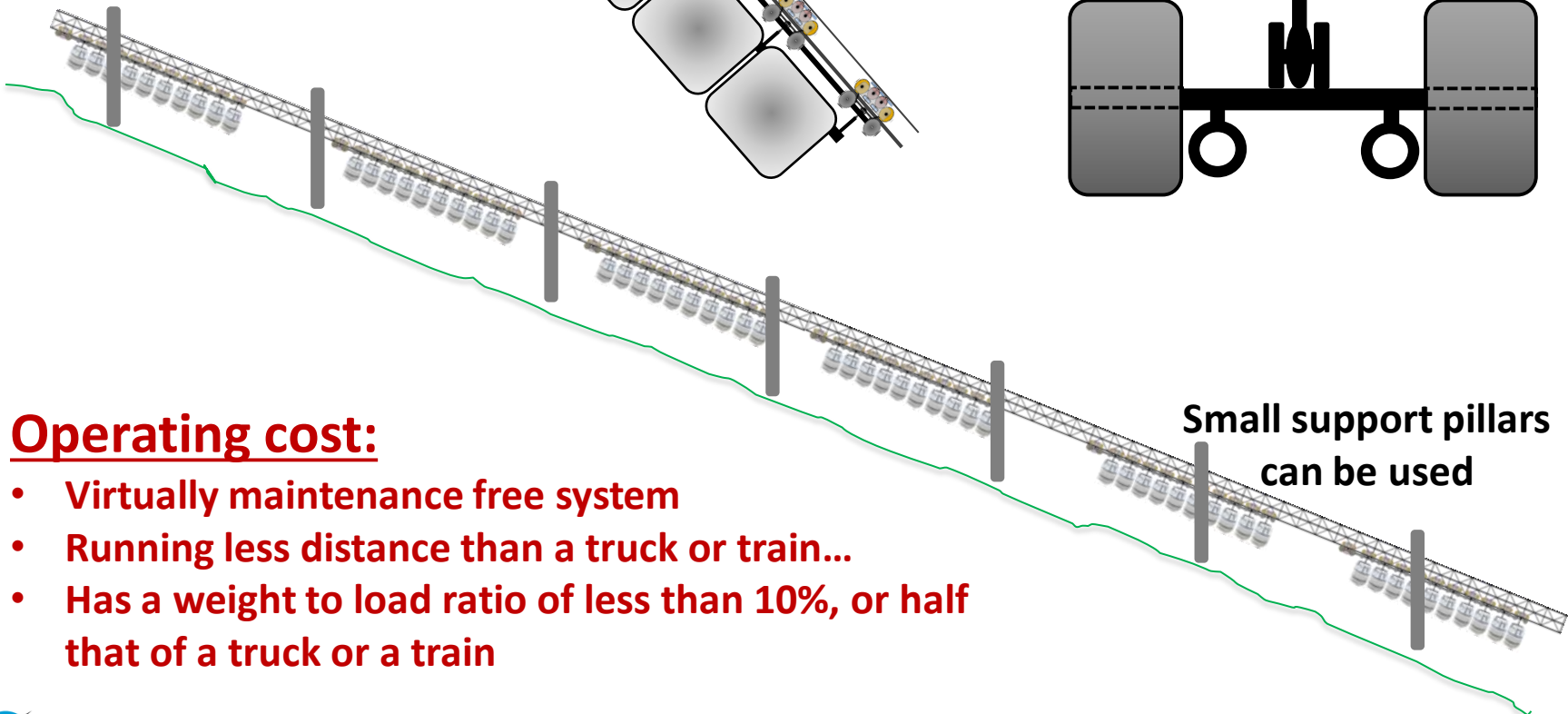
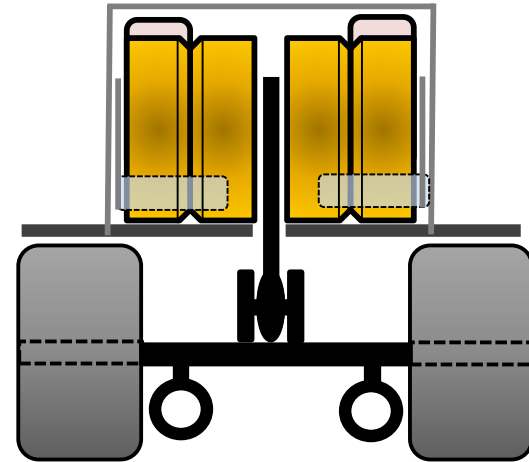


When the Futran System runs up steep slopes, like a mountain, an open pit mine or an incline shaft (22 degrees plus), it shifts paradigms

Light weight containers moving in mini-trains of 4 to 20 tons can be pulled by a single motorised unit straight up steep slopes of a mine



A narrow counter-balance bogie can be used (narrow track), resulting in a low cost track structure



Small support pillars can be used

Operating cost:

- Virtually maintenance free system
- Running less distance than a truck or train...
- Has a weight to load ratio of less than 10%, or half that of a truck or a train

By meeting the first two requirements, the system overcomes the gradient and cost and distance limitations of conveyor belts



Problems associated with conveyor belts

1. Open system (dust)
2. Maintenance intensive
3. Low reliability
4. Lots of moving parts
5. Expensive
6. Gradient limitations
7. Distance limitations

THE FUTRAN SYSTEM

1. Closed System
2. Low maintenance
3. 99.9% availability
4. Few moving parts
5. Very cost effective
6. No Gradient limitations
7. No Distance limitations



When used to haul ore out of an open pit mine, the Futran system is much, much more cost effective than current modes



CAPEX: 25 mil US\$ = 4 000 tons per hour

(plus labour, maintenance, high energy cost)
(Only includes truck costs – nothing else)



*Assuming a straight line pit to refinery path of 1km,
and excluding loading systems in both instances



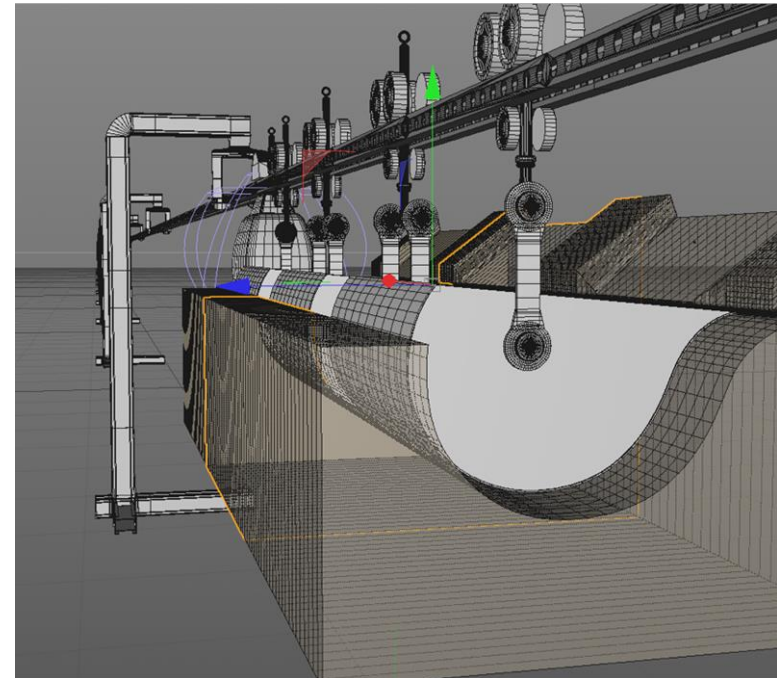
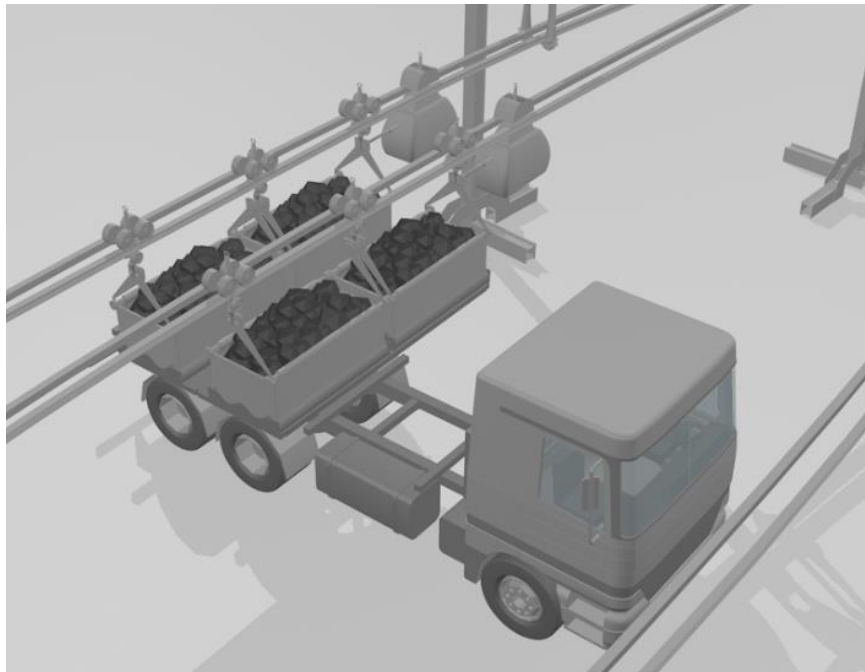
CAPEX: 10 – 12 mil US\$ = 4 000 tons per hour

(no labour, low maintenance, low energy)
(Only includes track and bogie costs – nothing else)

VS

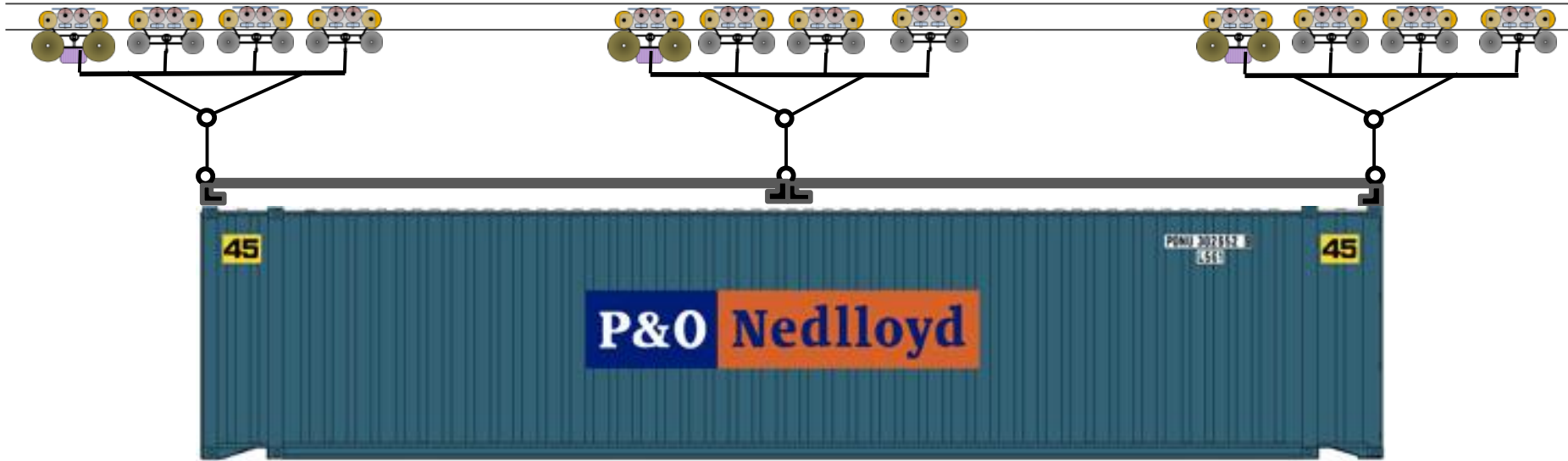


A range of loading systems are being developed for different uses

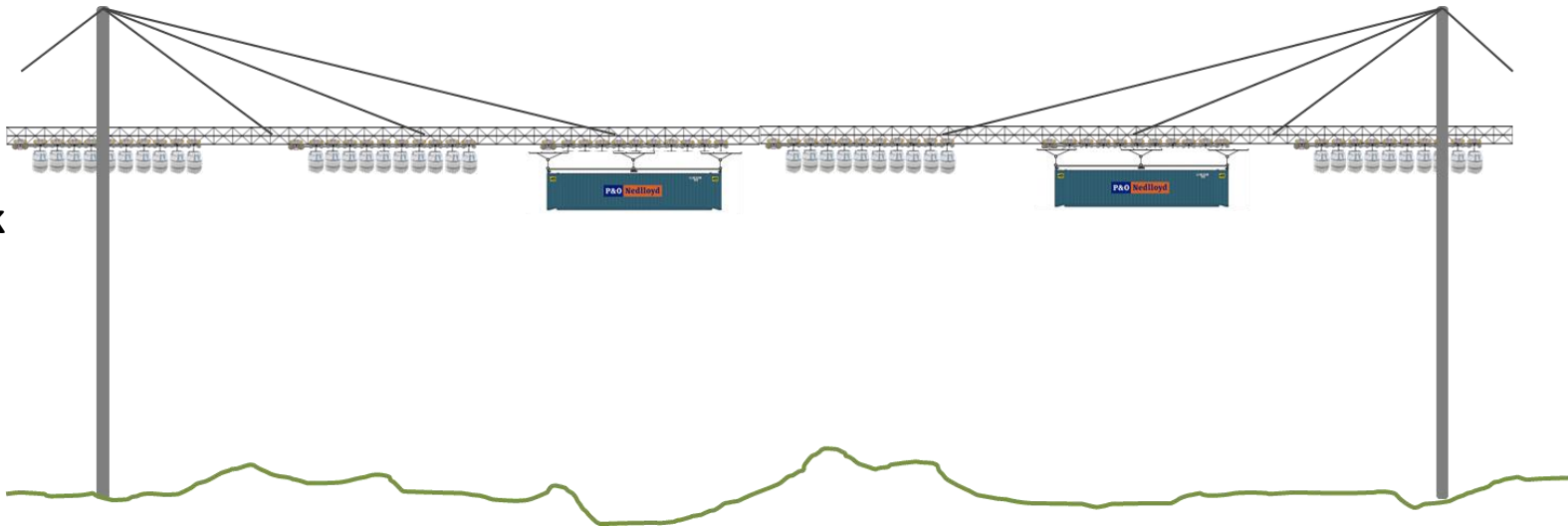


Run-of-mine standstill loading

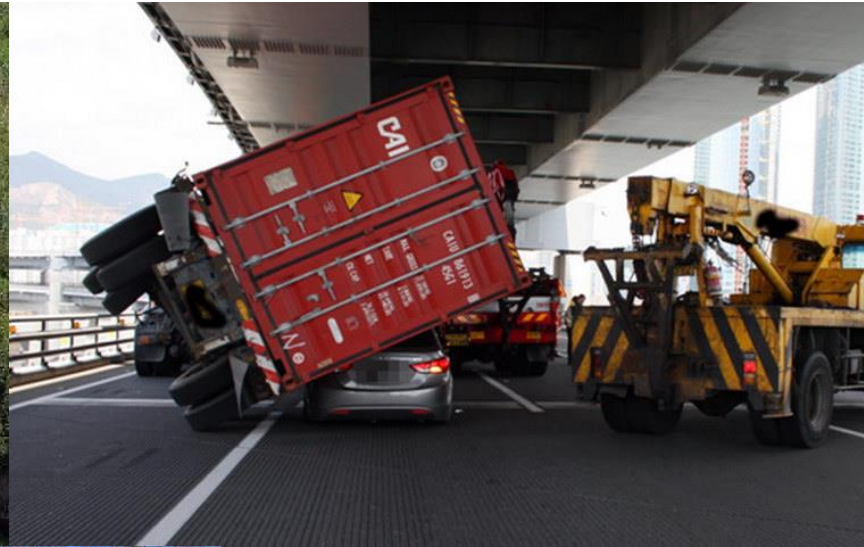
By spreading the load across multiple bogies, the system can also be used to transport larger loads, such as containers



Containers and dry bulk can be transported using the same track



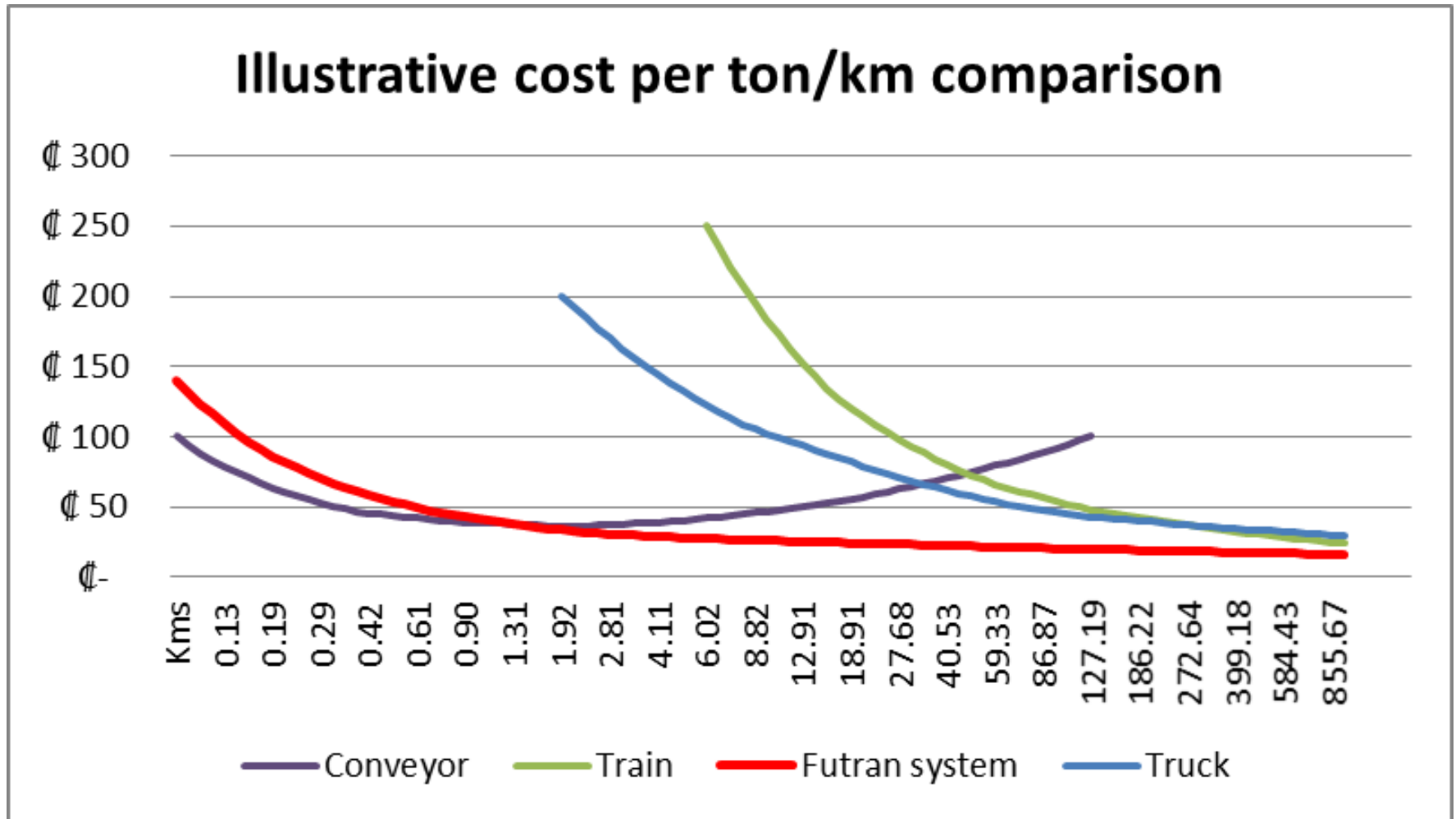
The same system can therefore be used for Long distance bulk, freight and containerised transit



Problems associated with Dry Bulk, freight and containerised transit

1. Expensive
2. Dangerous on roads
3. Track volume limitations
4. Critical mass required
5. Right of way issues
6. Labour intensive
7. Environmental contamination (dry bulk specifically)
8. Prone to people error

The Futran system has almost no competition when distance is too long for conveyor belts and too short for trains or trucks



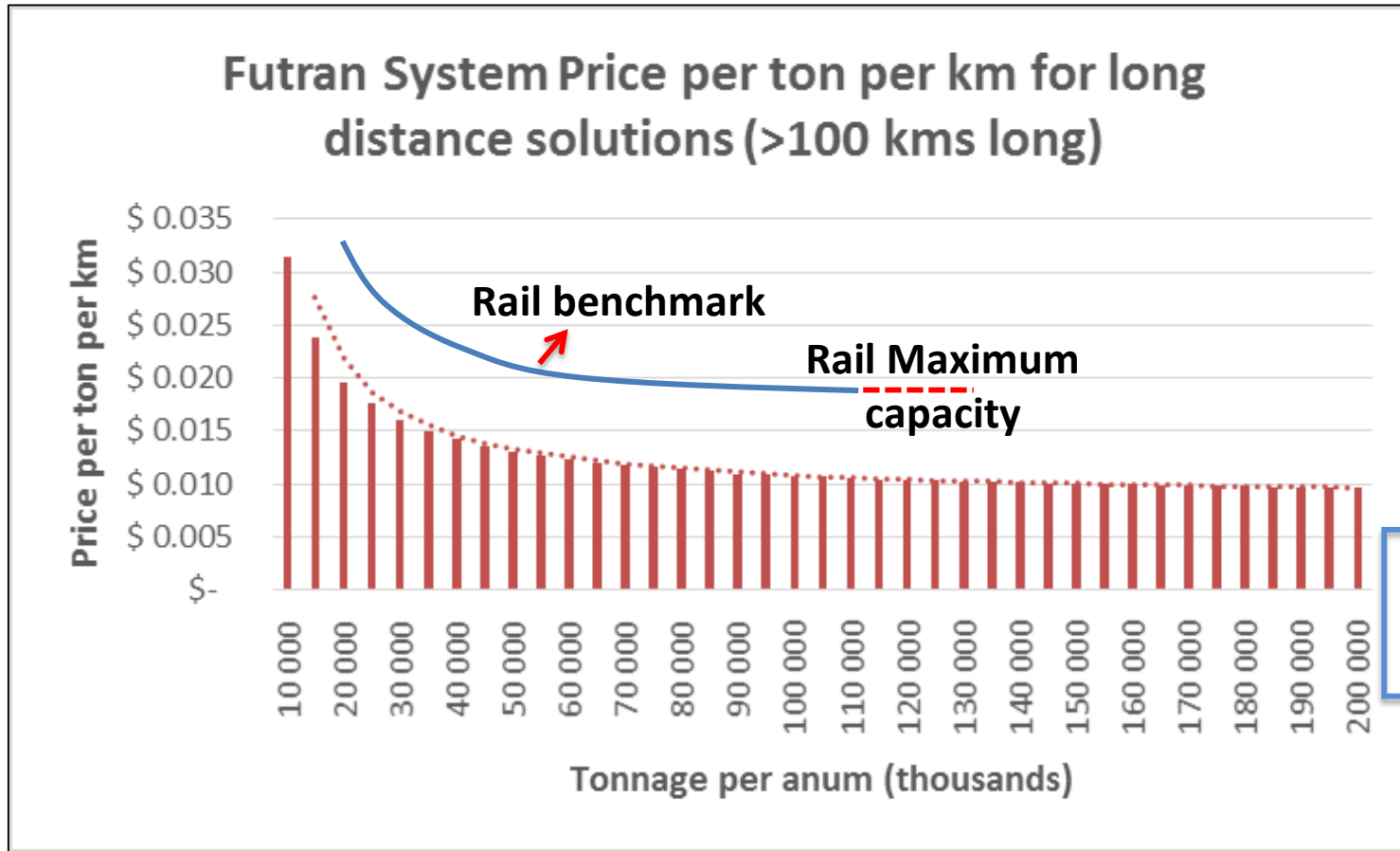
Typical conveyor belt replacement costing

		Operating cost per ton (depending on volume per annum)					
		Millions of tons per annum committed on the line					
Distance from core network (kms)	Capex Cost (once off)	2 Mil	4 Mil	7 Mil	10 Mil	20 Mil	30 mil+
5	\$ 6 500 000	\$ 0.42	\$ 0.30	\$ 0.26	\$ 0.23	\$ 0.20	\$ 0.18
10	\$ 12 500 000	\$ 0.57	\$ 0.44	\$ 0.37	\$ 0.32	\$ 0.28	\$ 0.25
15	\$ 18 500 000	\$ 0.72	\$ 0.56	\$ 0.47	\$ 0.40	\$ 0.36	\$ 0.32
20	\$ 24 500 000	\$ 0.88	\$ 0.68	\$ 0.57	\$ 0.49	\$ 0.43	\$ 0.38
30	\$ 36 500 000	\$ 1.16	\$ 0.92	\$ 0.77	\$ 0.65	\$ 0.57	\$ 0.50
50	\$ 60 500 000	\$ 1.76	\$ 1.40	\$ 1.16	\$ 0.97	\$ 0.84	\$ 0.75
80	\$ 96 500 000	\$ 2.62	\$ 2.10	\$ 1.72	\$ 1.44	\$ 1.23	\$ 1.09



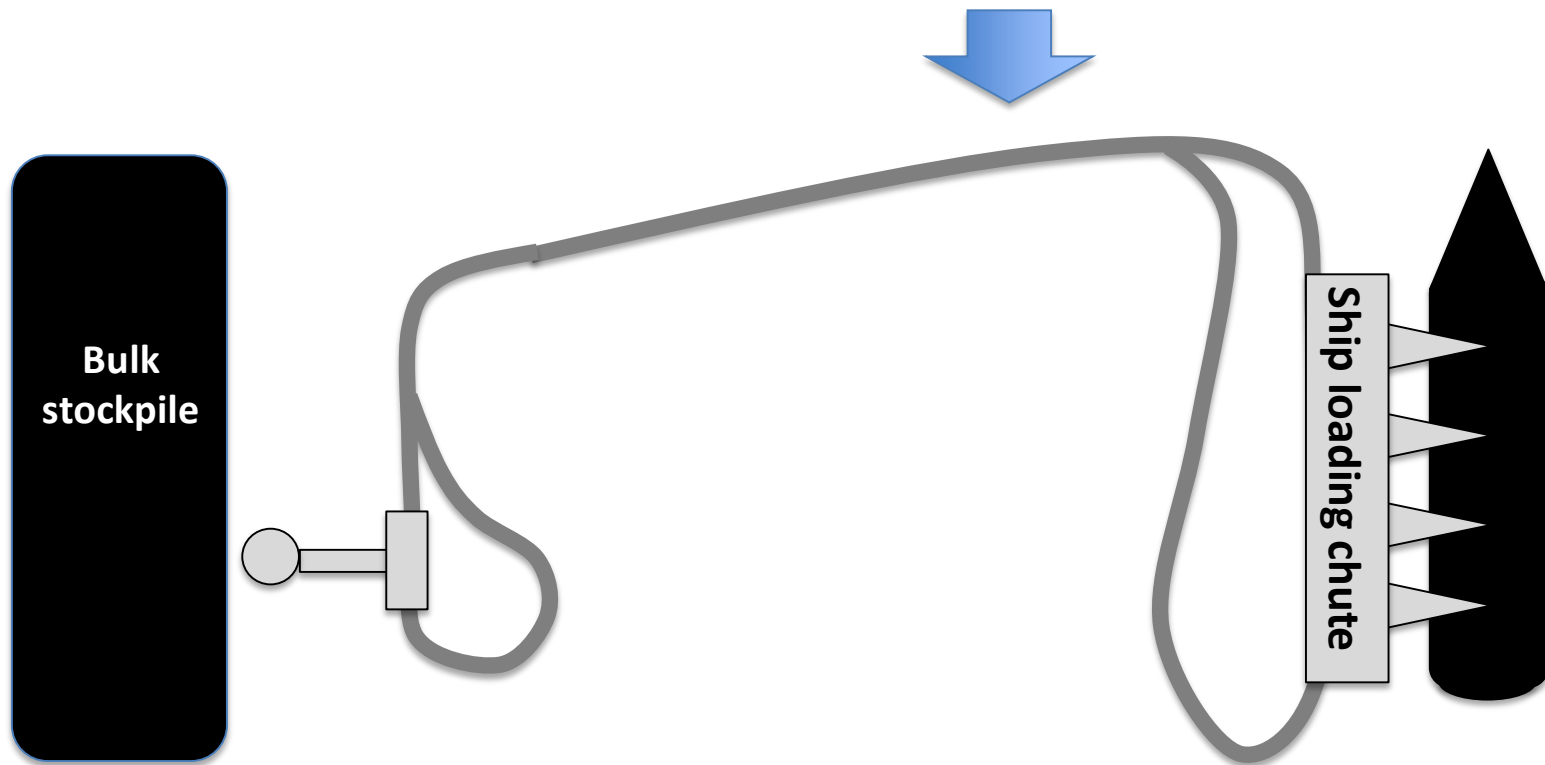
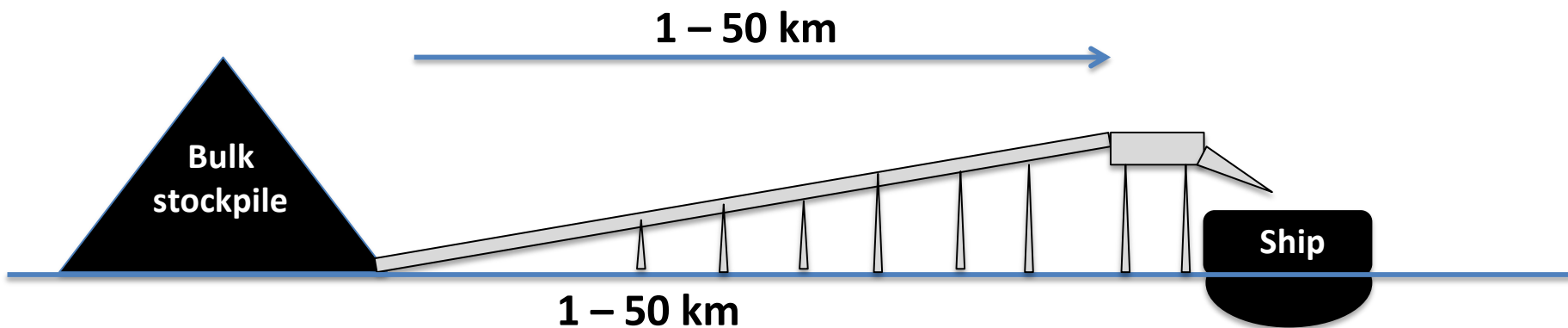
The Capex cost can be covered by the client itself, or by a financier who will ask a usage, rental or per ton delivered charge for the use of this asset

When compared against long distance rail, a well designed Futran system can run at half the cost of a rail line

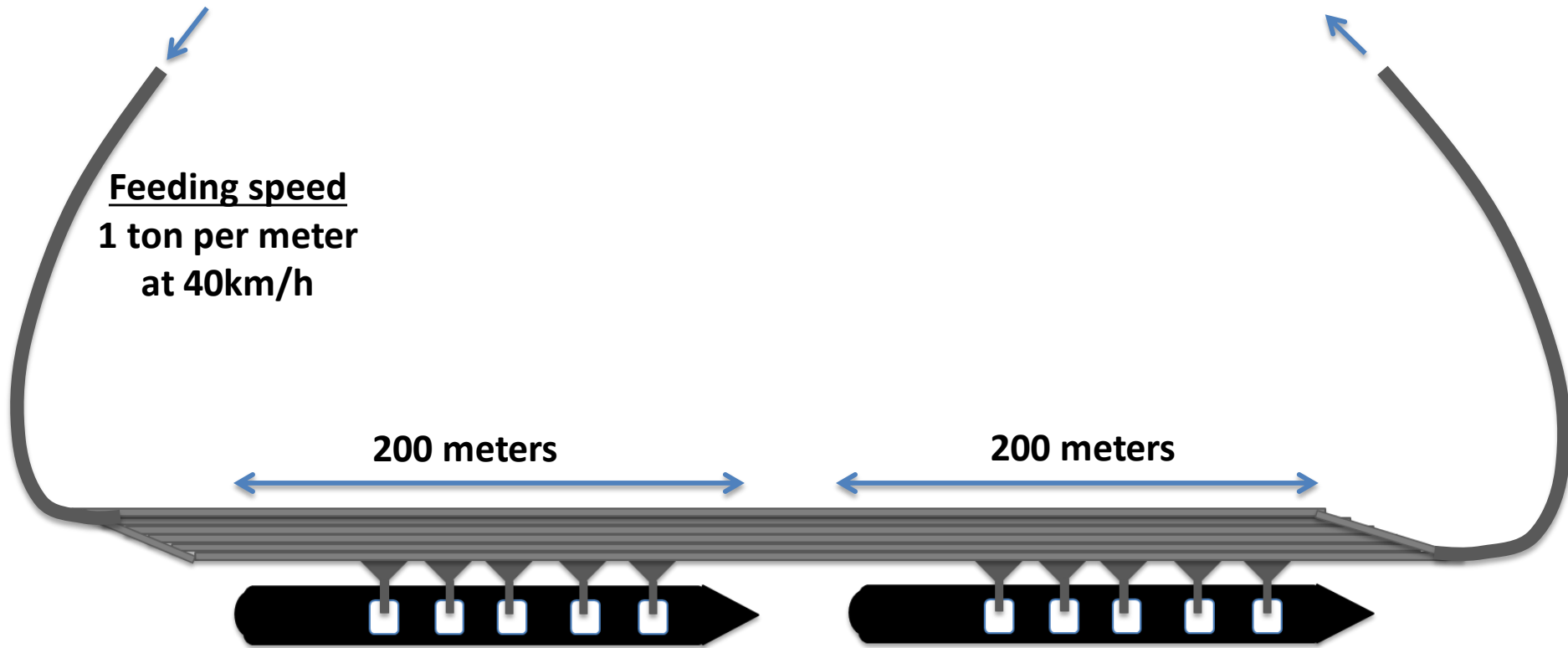


Given enough volume, cost per ton km can drop below 1 US cent, even for a fully outsourced solution running at profit for the operators. Maximum system capacity exceeds 300 million tons per annum

At Coal and Iron Ore terminals the Futran system can further be used to do ship loading at a rate of 40 000 tons per hour for less than 2 US\$ per ton



It is theoretically possible to achieve a rate of 40 000 tons per hour using only a few berths (handymax or bigger)



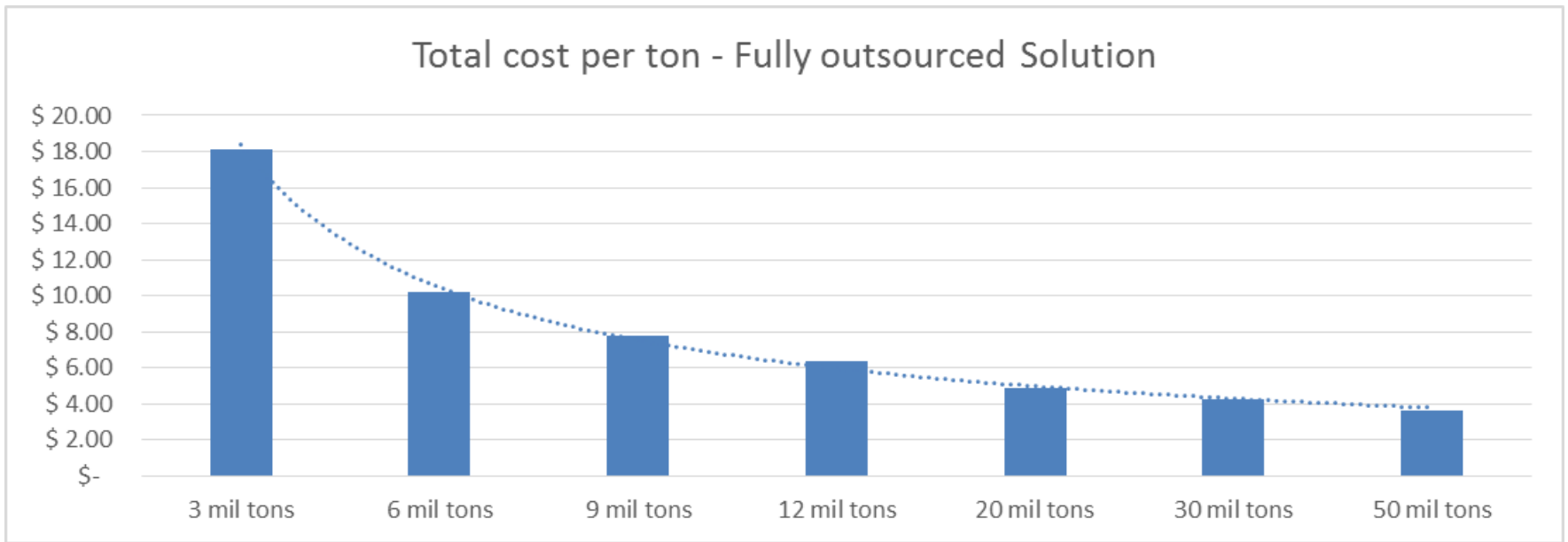
Each ore ship loading chute is fed by up to 7 tracks that can each take 20 containers of 2 tons each. These open in sequence to ensure a constant flow. All chutes can be operated simultaneously.

At 10 million tons of pellets per annum, the cost effectiveness of the Futran system is very appealing



**Total transportation cost per ton of pellets (mine to pelleting plant to ship)
= 15 to 20 US\$ per ton**

Costing along this specific Kaouat line becomes more competitive as volumes increase



Where water is shallow, we can even create loading facilities in the sea without having to build expensive harbours first

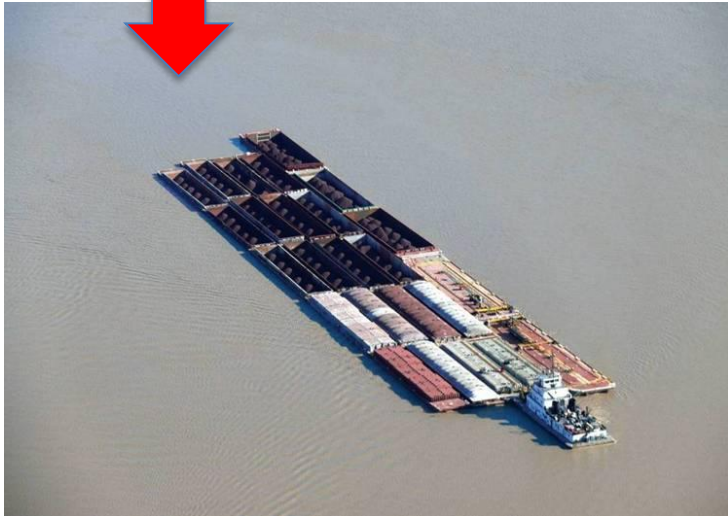


In a case like Mauritania, the Futran system can be used as a direct ship loader or a barge loader

Ideally, the environment will allow us to run the Futran track far enough into the sea to do direct ship loading from the coast



If such a long track is not feasible, we will do barge loading closer to the coast and then tranship in deeper waters



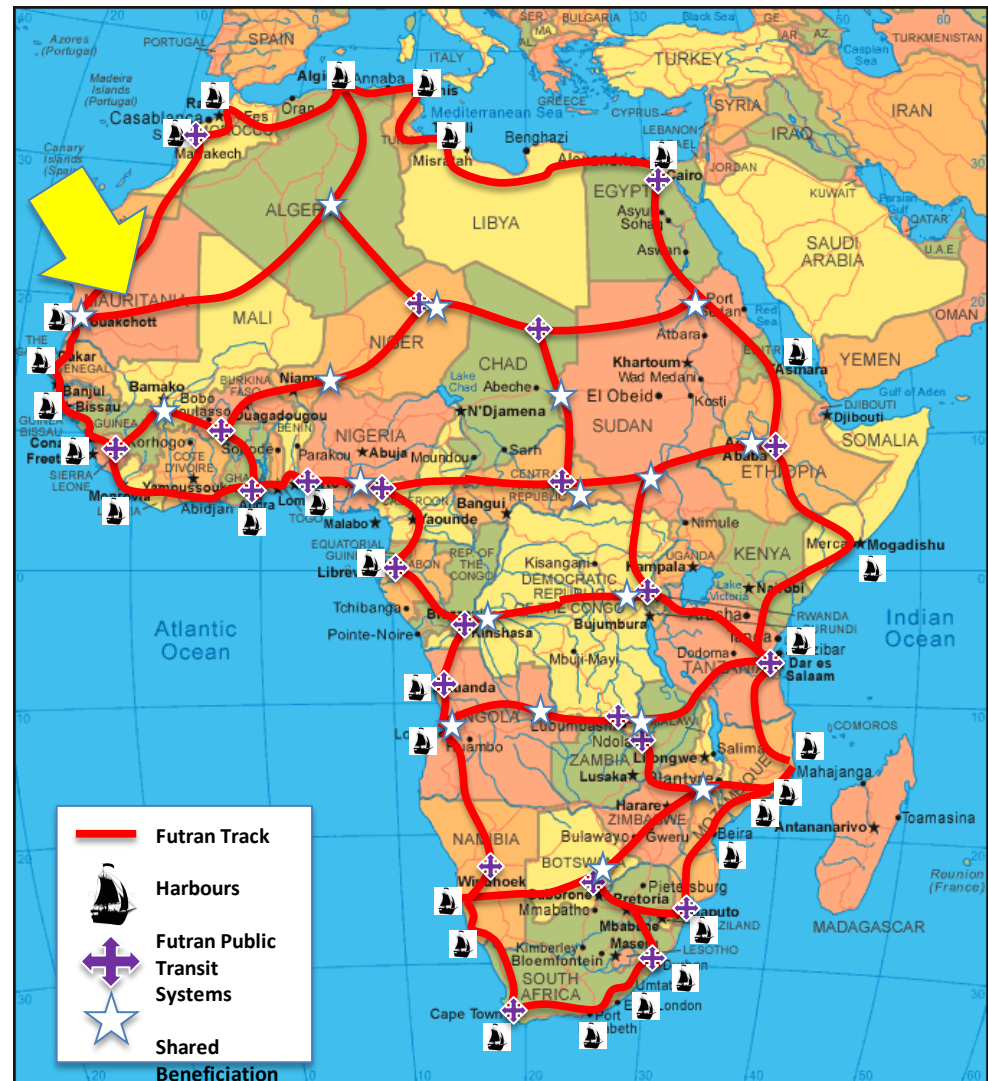
In future the line will be integrated into the African Ecolink programme

The proposed African Ecolink consists of a bi-directional Futran track that runs right through Africa, linking most of the economies and major centres to each other using this low cost, highly reliable, effective and easy to maintain transit system.

By easily linking multiple resources to each other along the way, shared beneficiation and secondary processing is enabled.

By deploying the ultra low cost Futran public transit grids in key centres, the easy movement of people are enabled which, when mixed with beneficiated materials, enables large scale manufacturing.

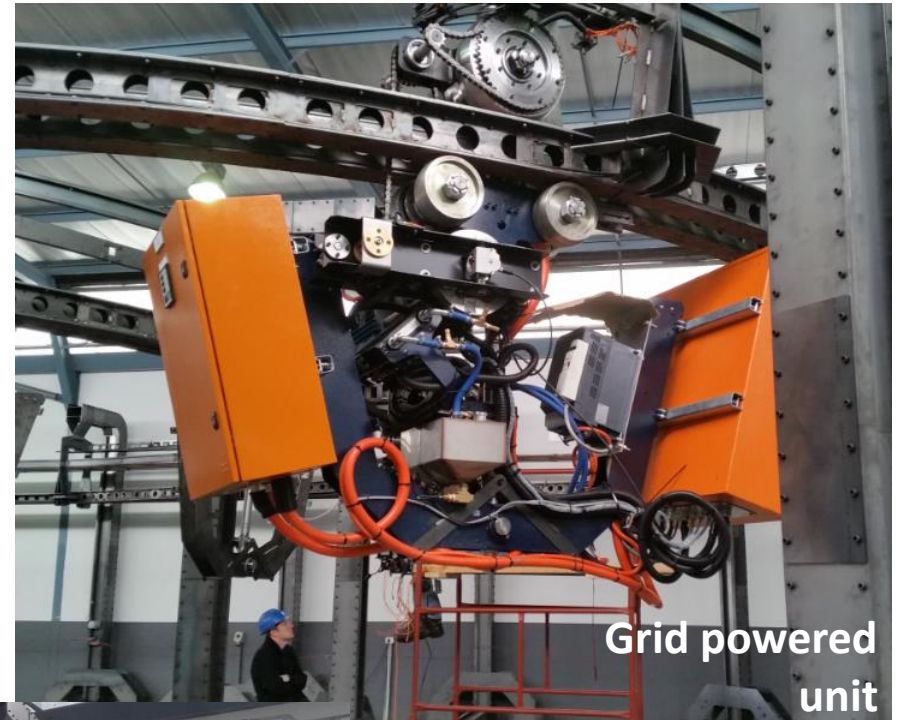
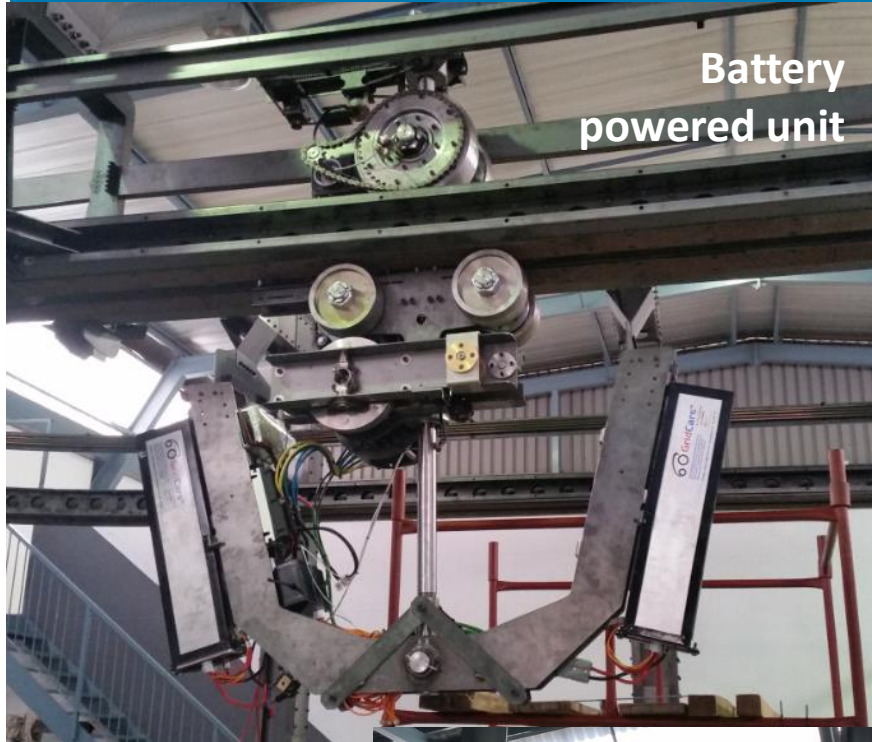
By linking the system to multiple ports, inbound and outbound trade is enabled, irrespective of political or environmental turmoil.



Early in July the prototype test track was completely assembled and electrified using Vahle rails



Both a grid powered and a battery powered test unit was successfully commissioned and are being tested at present



Testing is progressing well and clients can view the fully operational system at our facilities in Midrand



Click on picture



Click on picture



For further information

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