GAUSSIN MANUGISTIQUE

Creator of global handling solutions

Manufacturer of handling and self-propelled systems

Automated Horizontal Transportation 3.0

Casablanca 25th of March 2015

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Global Sales Director

No industry would today handle a large amount of unitised cargo without automation.

The automotive industry has used it for decades and so has:

- The food and beverage industries
- Paper and pulp industries
- Steel industries
- Logistic centers
- Airports for their baggage handling
- Seaports for stacking containers

So why isn't automation more frequently used for the transportation between the quay and the stack, also called the "Automated Horizontal

Even though the question is rather simple, the answer is not as easy. There are several factors that need to be considered, such as:

- CAPEX
- OPEX
- Productivity
- Implementation risks.

This presentation will compare existing AGV systems with new technological developments.

Hatch covers and other handling equipment are mixed with the AGVs

Automated stacking cranes

Sequencing is performed before departure

A mix of Diesel/Hydraulic & Diesel/Electric "piggy back" AGVs

All container handling is performed within the STS legs

Hatch covers and other cargo handling equipment are handled within the STS legs

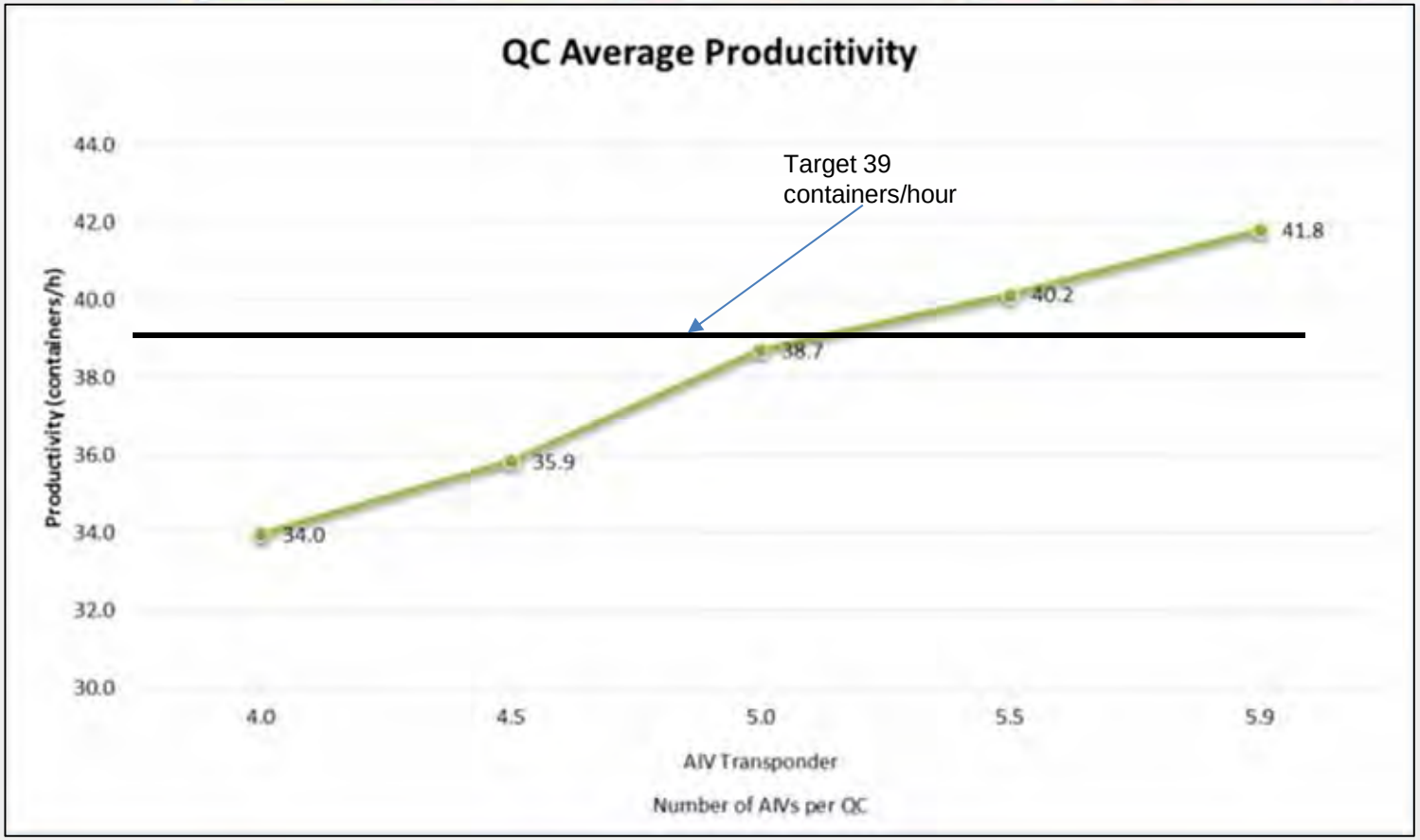
Automated stacking cranes

STS equipped with an automated 2nd trolley

Diesel/Electric "piggy back" AGVs

AGV holding lanes for sequencing

All container handling is performed at the STS back-reach



The simulation results show that 5,1 LOLO AIVs per QC will be needed to achieve 39 container moves per hour per QC.

We call this type of application; Version 1.0

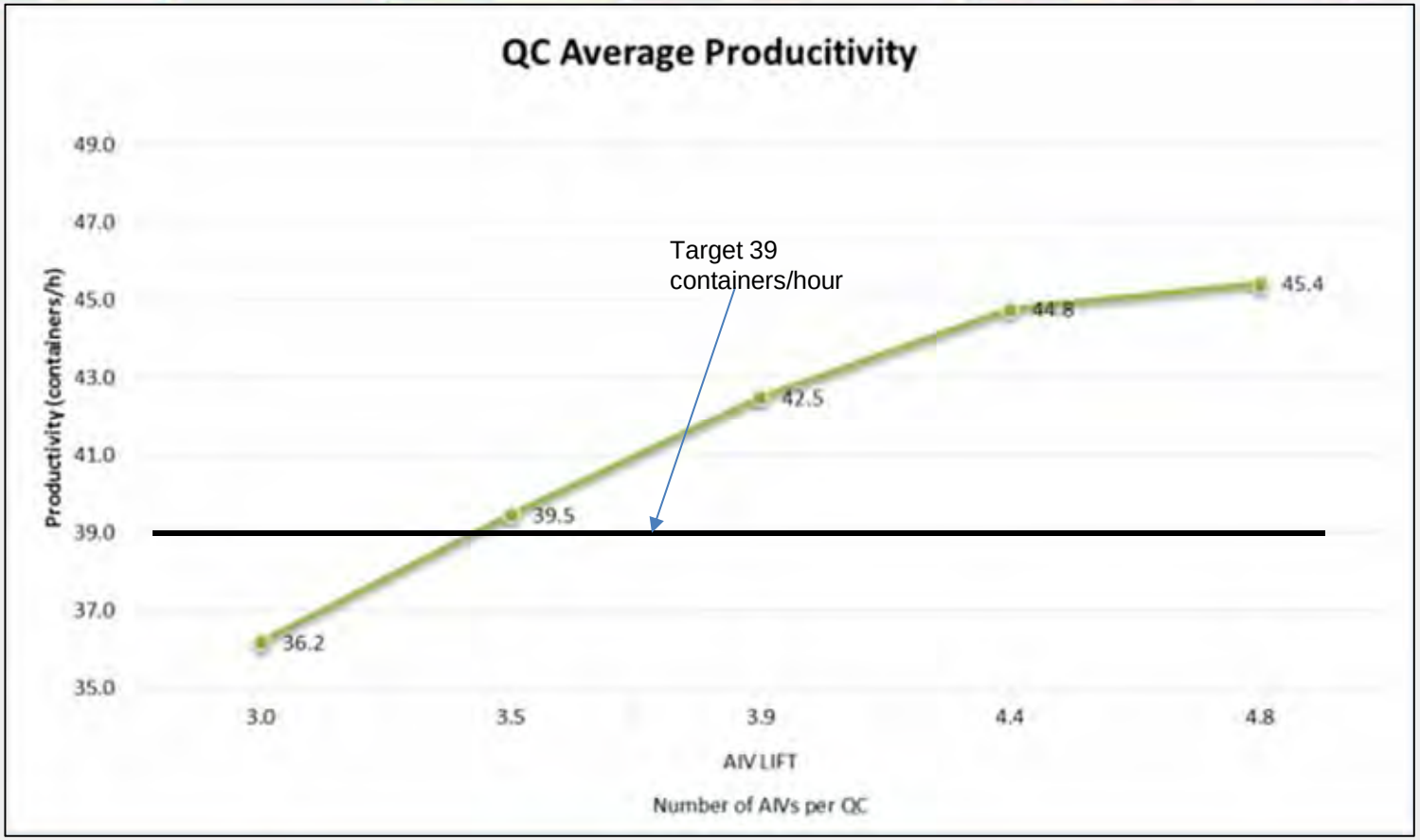
Decoupling at ASC

Traditional layout

- The AGV is waiting for the ASC to be loaded / unloaded
- A ”handshake” between the ASC and the AGV is required

Decoupled layout

- Steel racks are used for placing the containers
- A lifting mechanism on top of the AGV is handling the loading / unloading of the containers on the steel racks
- The AGV is no longer waiting for the ASC to be loaded / unloaded
- Less no. of AGVs are needed due to reduced waiting time at the ASC



The simulation results show that 3,5 AIV Lifts per QC will be needed to achieve 39 container moves per hour per QC.

We call this type of application; Version 2.0

1880 – Eugène GAUSSIN - Metal constructions

1961 – Henri GAUSSIN - Industrial trailers

1970 – Beginning of the containerization

1994 – AIRBUS (FULL ELEC vehicle)

ALGAU LISTED NYSE ALTERNEXT

2006 – IPO Listed on the Nyse Alternext

Modular design

3 section frame design

- All sections are bolted togetner
- Reduced welding due to bended plates
- The mid-section has delta-shape design (strength were needed)

Axles and drives

- All axels are modular and can be assembled separately
- Two different power sources (Hydraulic or Electric)
- Hydraulic steering and suspension

Bolted fittings

- All guides and stopper are bolted to the frame
- Reduced welding due to bolted fittings
- All fittings are easily exchangeable is damage

- **On 19 October 2012 – APM Terminals Tangier – leading operator of the Tanger Med port, confirmed the firm order for 48 ATT V3 vehicles and 51 POWERPACKs.**

- After final tests by APM Terminals Tangier undertaken using 9 ATT V3 vehicles from October 2011 to June 2012.

- In addition to the 9 vehicles put at its disposal on the port to carry out the tests, the order included 39 additional ATT vehicles, with delivery planned for the first quarter 2013.

- 51 POWERPACK units, associated motorization systems, were also ordered.


LIFT
ATT


104
112
Hapag-Lloyd


LIFT
Automotive Intelligent Vehicle®
By GAUSSIN

You just have one vehicle, but would like to change energy source?

No problem, choose the one you need, they are all interchangeable!

Within 5 minutes, you have a new vehicle!

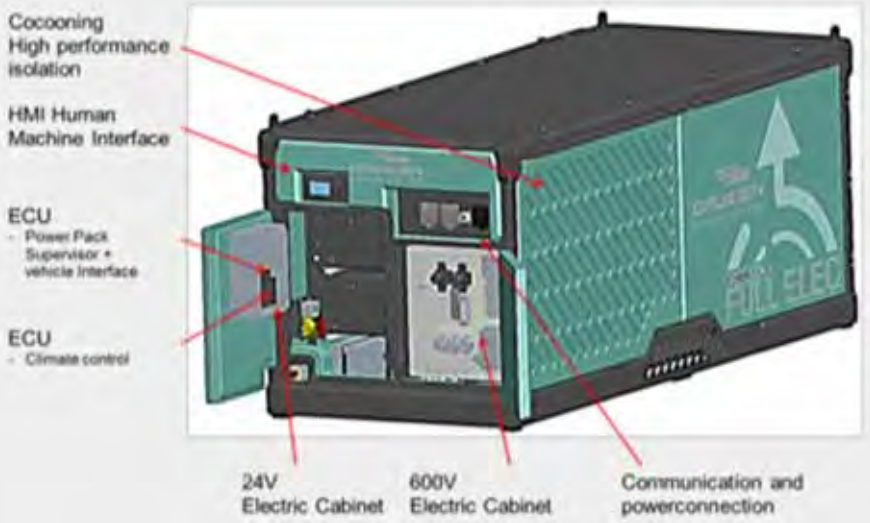
Hybrid
Diesel / Electric

Full electric
Battery

Future energy
Full cell-hydrogen
Under development

The Power of your dreams...

POWER PACK
GAUSSIN



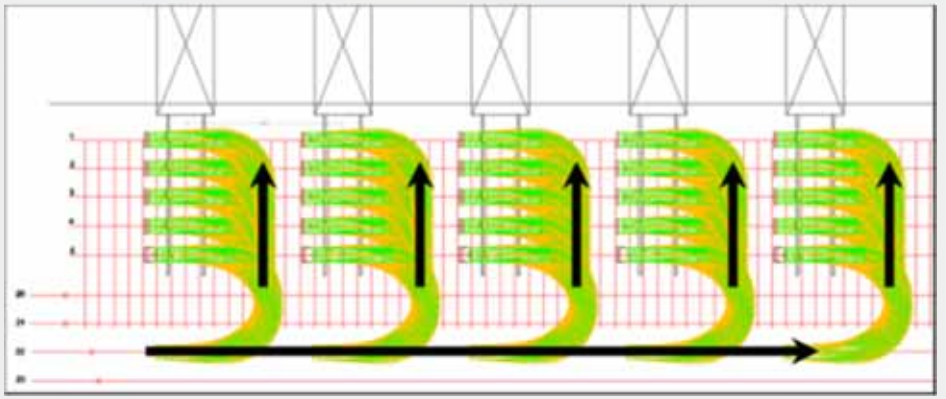
Power pack Full electric

Battery type: Li-ion
Energy: 3 available capacities
80 kWh, 160kWh or 240kWh. (4h, 8h, 12hours autonomy)
Weight: 2, 3 and 4 tons.
Charging: 2 hours
Cooling: Internal integrated air cooling / heating system (-20°C / +55°C)
Life time: 2700 cycles (8 years for a 160kWh power pack, with 66% utilization

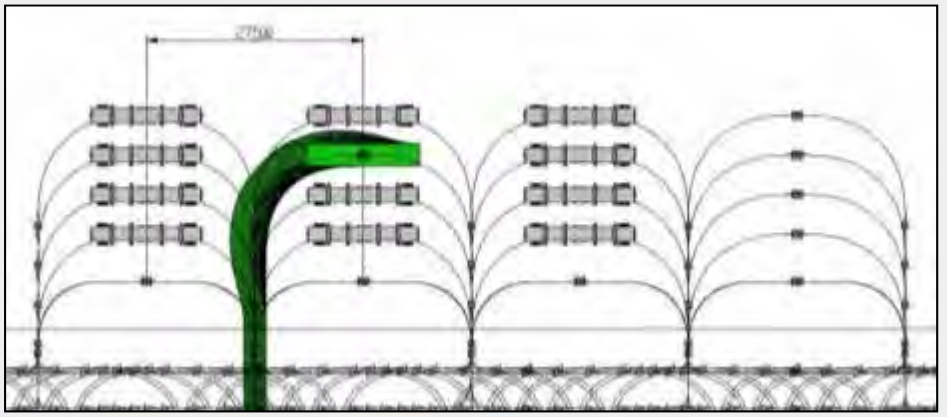
The increased manoeuvrability of the AIV

New layout with buffering under the QC

Due to the increased manoeuvrability, an AIV can access any transfer point under any QC without any limitation or interference even though the QC are placed "Shoulder to Shoulder"!



The empty AIV can enter / exit the transfer point from any side.
A loaded AIV will need to enter in a specific direction, however a changed door direction is extremely simple to execute since the AIV can enter / exit

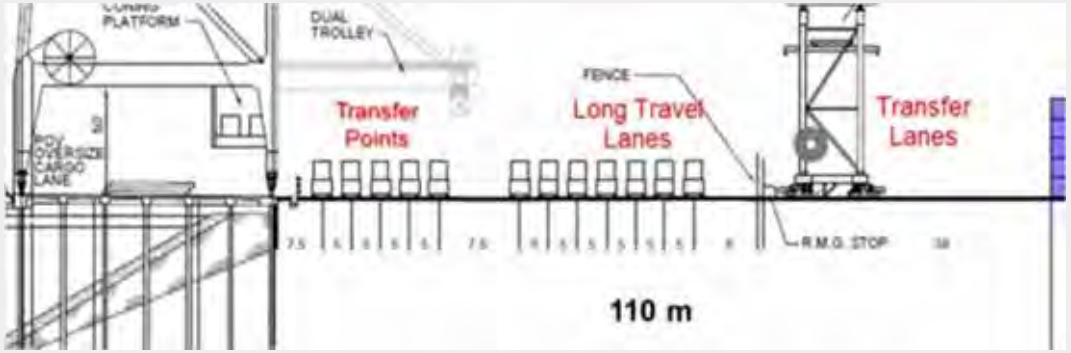


Sequencing in the buffers

The sequencing of containers performed within buffer under the QC

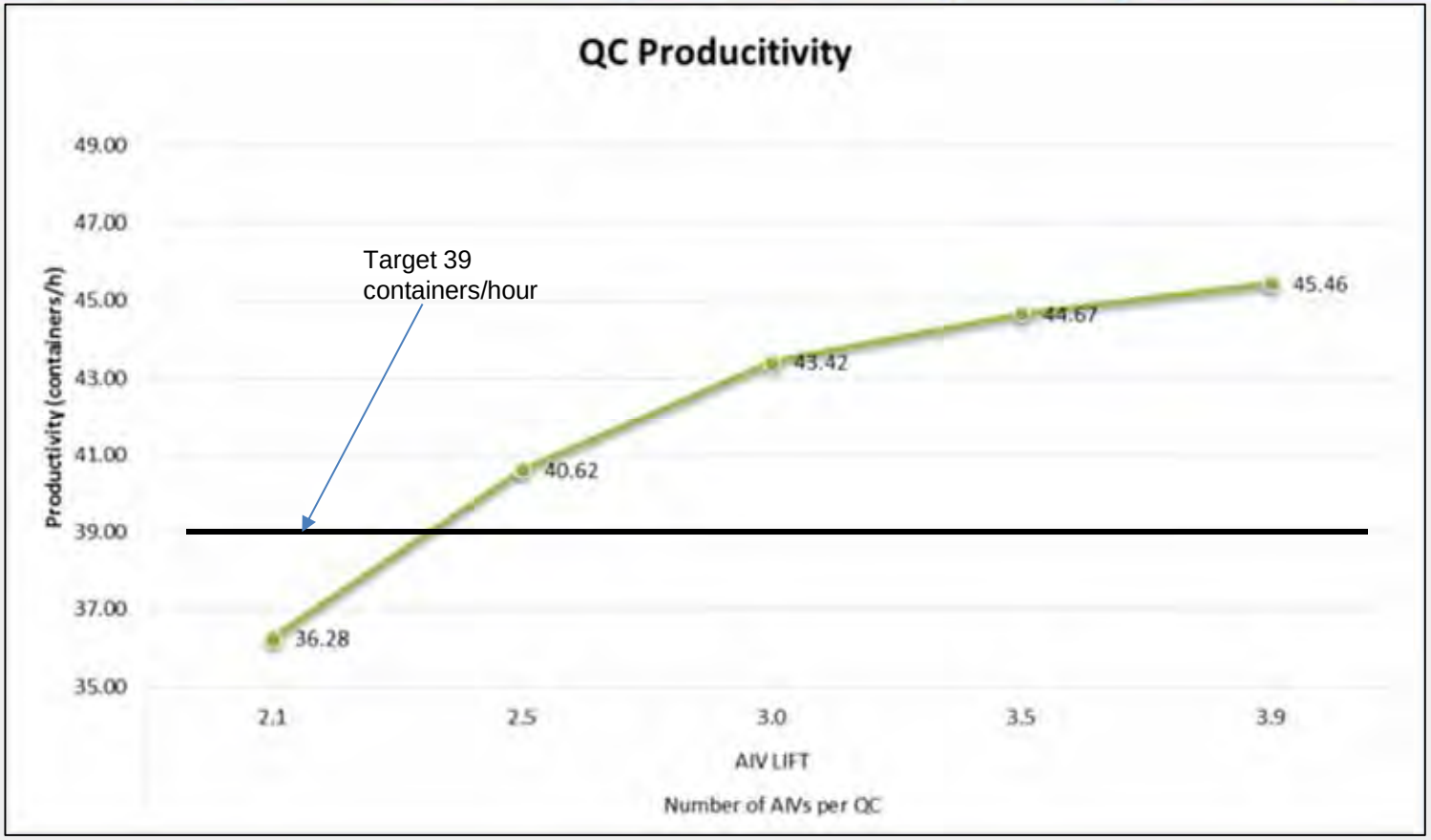
Traditional AGV layout

New AIV layout



Since the holding lanes are not used anymore, the AIV operating area can be reduced with approx. 20%.
The increased lane width is used to safety enter / exit the transfer points when the QC are

The total saving is 28,5m



The simulation results show that 2,4 AIV Lifts per QC will be needed to achieve 39 container moves per hour per QC.

We call this type of application; Version 3.0

An automated system is never better than the software controlling it!

In October 2014 Gaussin and BA Systemes created the

Port Automation Systems

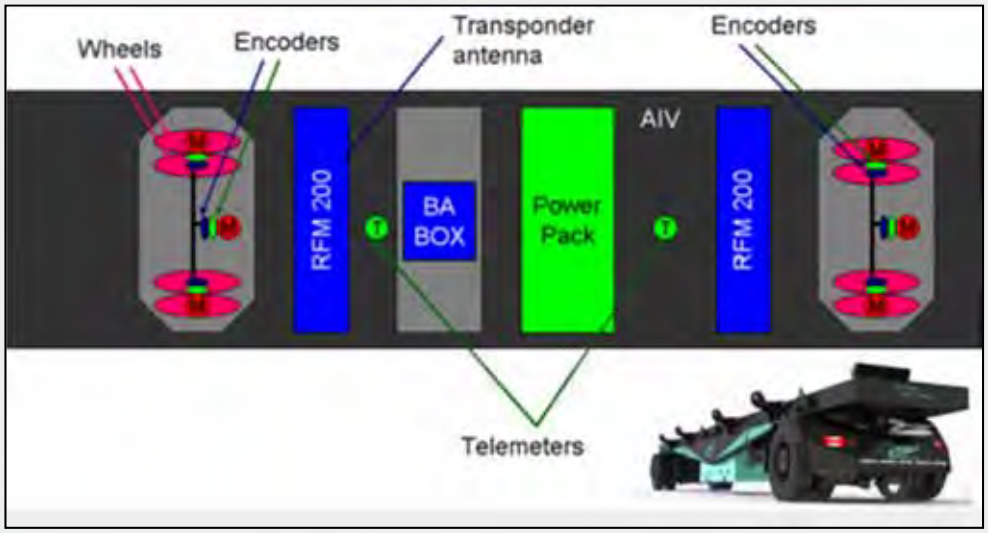
BA Systemes long track record, will be the base for Port Automated Systems' success into the automated container handling.

An automated system is never better than the software controlling it!

PAS has a well proven Fleet Management System and the interface to TOS and CMS is right now under customization.

PAS has also a full functioning vehicle controller, called the BA-BOX.

The BA-BOX has already an interface to the AIV positing system (navigation) and safety system. The interface to the AIVs lifting-, steering- and drive system is under



CAPEX

The capital cost will decrease when implementing version 3.0 due to:

- Lower amount of vehicles and Power Packs
- Modular and lighter vehicle design to a lower price
- Reduced distance between the ASC and the STS
- Reduced cost for pavement (due to lighter vehicle)
- Lower height of docking station (i.e. simplified foundation)

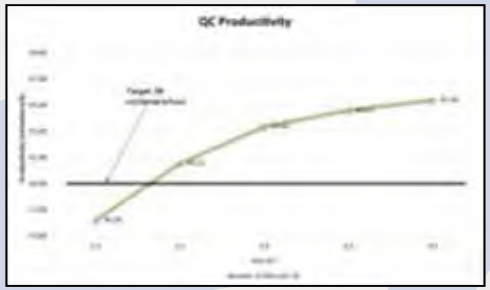
OPEX

The operating cost will decrease when implementing version 3.0, since:

- The lower amount of vehicles reduces the maintenance cost
- The modularity of Power Packs simplify the maintenance (i.e. cost)
- The lighter vehicle and the reduced traveling distance lower energy consumption
- The lighter vehicle and the reduced traveling distance lower tire cost

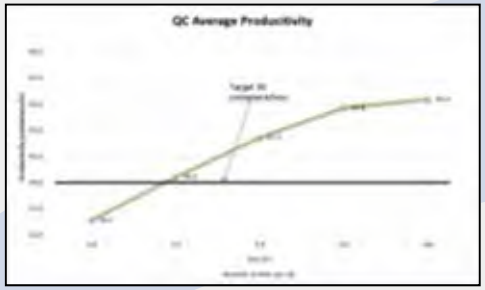
Productivity

Version 3,0



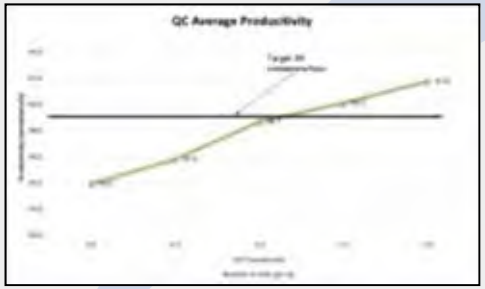
2,4 AIV /QC

Version 2,0



3,5 AIV /QC

Version 1,0



5,1 AIV /QC

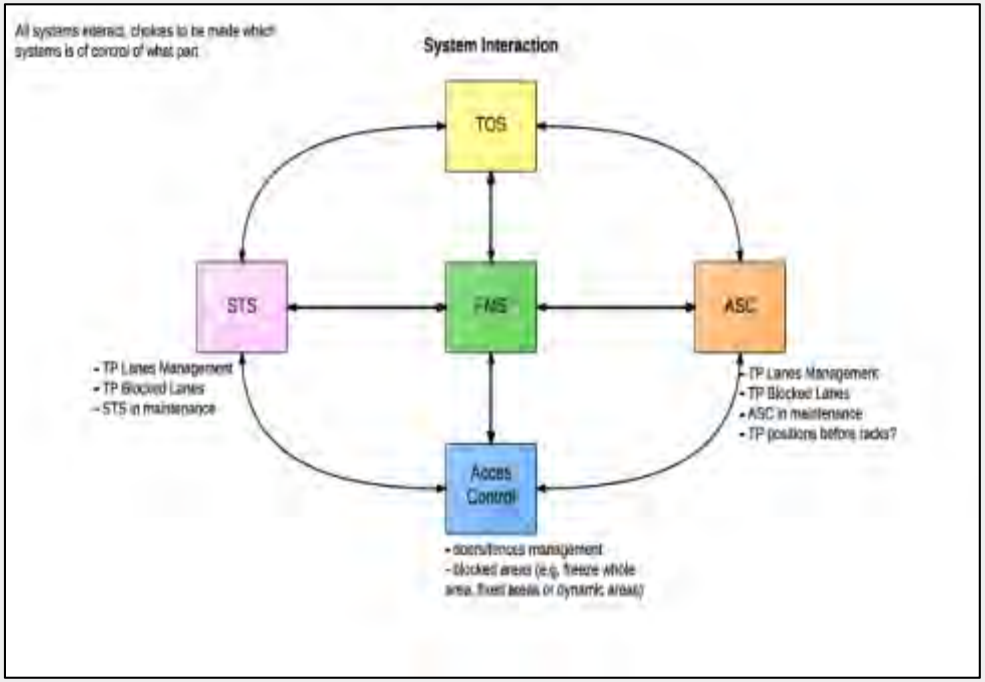
Our simulations have clearly shown that the decoupling and the buffering increases the QC productivity.

What can also be seen from these results, is that the bottleneck is now moved from ATHS to the ASC

Implementation Risk

With over 40 years of experience and 250 automated system in operation, Port Automated System has the correct knowledge when interfacing and building completed systems.

PAS and Gaussin is therefore the reliable partner that has the ability to reduce the implementation risk.



Thank you for your attention!