Certain information regarding Linamar set forth in this presentation and oral summary, including management's assessment of the Company's future plans and operations may constitute forward-looking statements. This information is based on current expectations that are subject to significant risks and uncertainties that are difficult to predict. Actual results may differ materially from these anticipated in the forward-looking statements due to factors such as customer demand and timing of buying decisions, product mix, competitive products and pricing pressure. In addition, uncertainties and difficulties in domestic and foreign financial markets and economies could adversely affect demand from customers. These factors, as well as general economic and political conditions, may in turn have a material adverse effect on the Company's financial results. The Company assumes no obligation to update the forward-looking statements, or to update the reasons why actual results could differ from those reflected in the forward-looking statements.

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Harnessing Digital Technologies in Access & Beyond

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Brad Boehler - President, Skyjack

Harnessing Digital Technologies

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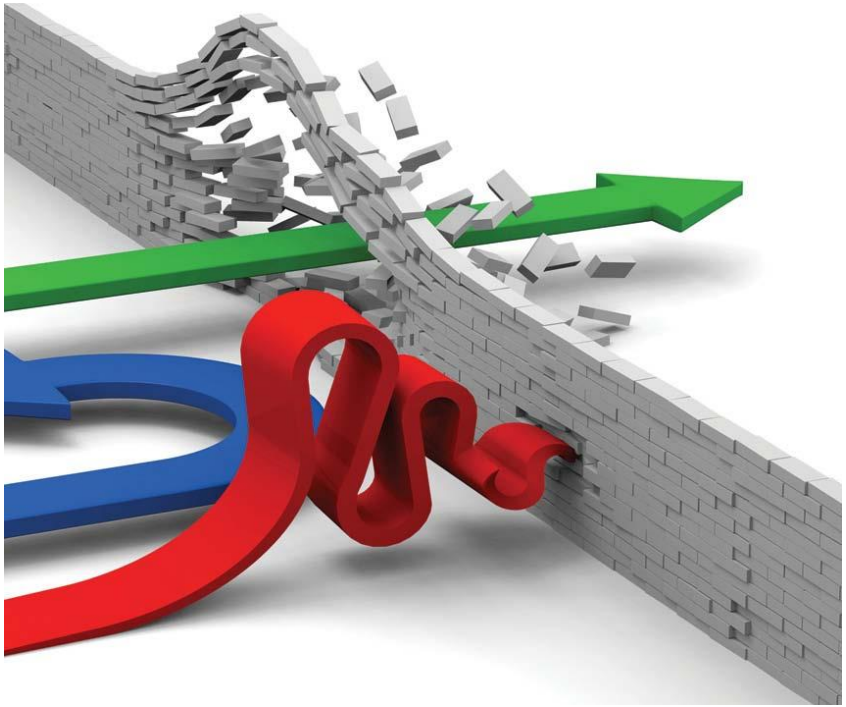
Harnessing Digital Technologies

- Why do we care?
- Top ten construction trends
- How does it impact us ?
- Current and near term technology
- Telematics as a start
- What if…?
- Our Skyjack 2023 challenge
- Conclusion



Why do we care?

- In 2017 the UK's top 100 Construction contractors collectively achieved a pre-tax profit margin of just 1.5% last year…the construction index

Why do we care?

- “Over the past 25 years productivity has increased in many sectors of the economy, but unfortunately the same cannot be said about construction. According to an analysis by McKinsey, no industry has done worse; since 1995 the manufacturing sector has nearly doubled productivity, while construction has basically remained flat.”

Michael Kneeland CEO United Rentals

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Why do we care?

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Why do we care?

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Why do we care?

Why do we care?

Top 10 Construction Trends (On-site magazine)

1. Aging workforce
2. Relentless technological change
3. Project size and complexity
4. Globalisation
5. Gobble-isation
6. One-stop shopping
7. Deteriorating designs
8. Deteriorating payment practices
9. Procurement helter-skelter
10. Risk adversity

Top Construction Technology Trends (constructionworld.org)

1. Augmented Reality, Mixed Reality and Virtual Reality
2. Cloud and mobile technology
3. Connected Jobsites
4. Construction Management Software
5. Wearable technology
6. Drones
7. Smart/Green construction
8. BIM (Building Information modelling)
9. 3D Printing
10. Robotics

Technology of Today….BIM Modelling

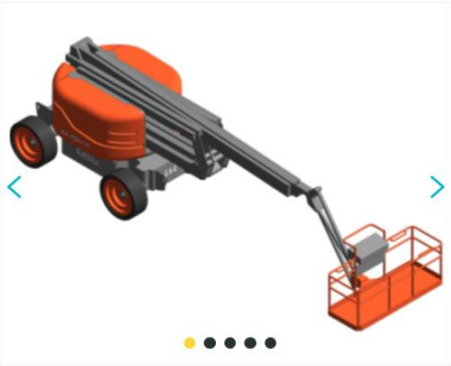
Mobile Boom - Telescopic

Select regional version:

UK | Rest of the world

Download

SKYJACK - Articulating Boom - SJ63AJ



MANUFACTURER:	Skyjack
MODEL:	SKYJACK - Articulating Boom - SJ63AJ
REVISION:	1
CI/SFB CODE:	[83]
UNICLASS:	Pr_65_80_47_95
OMNICLASS:	23.50.85.17.11
WEBSITE:	skyjack.com/
SOFTWARE:	Revit 2016
LAST UPDATED:	22 Jun 2018
EMBED:	Click to get code

- www.bimstore.co.uk

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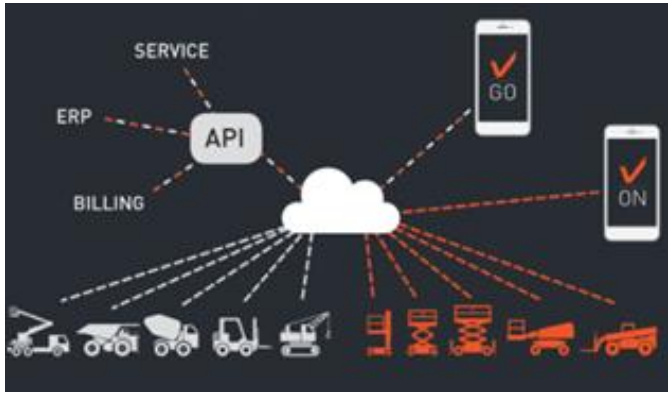
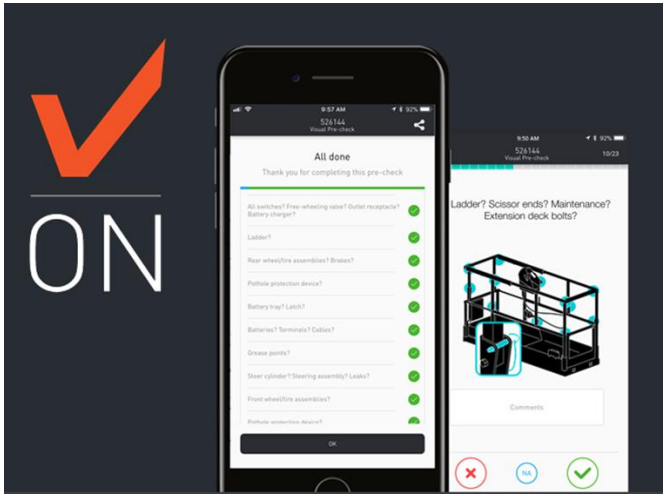
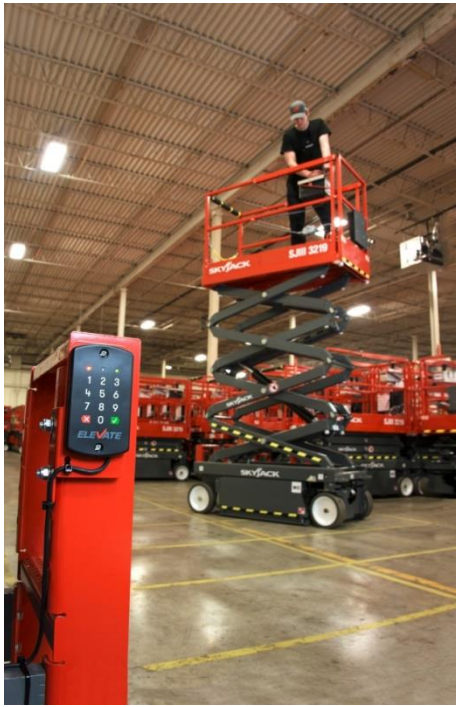
Today







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Today +… Augmented Reality, Mixed Reality and Virtual Reality

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Today +… Hybrids/Electrification

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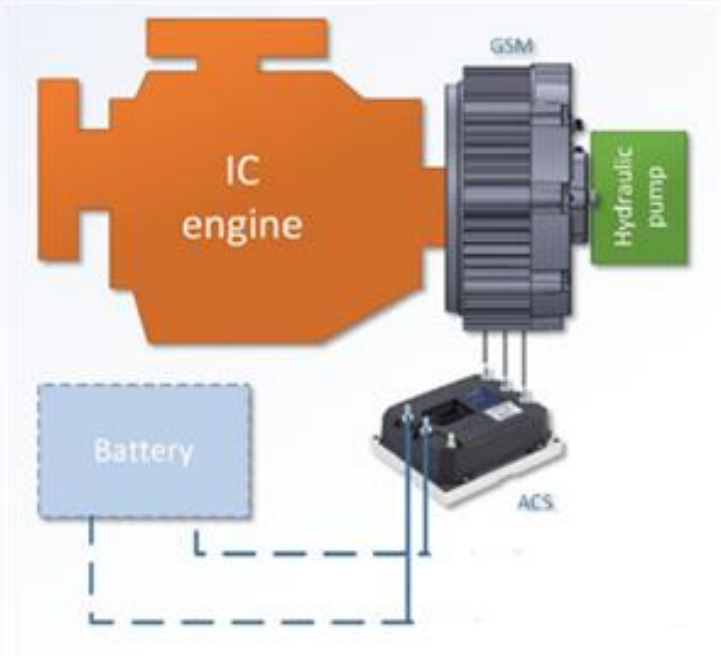
Today +… Hybrids/Electrification



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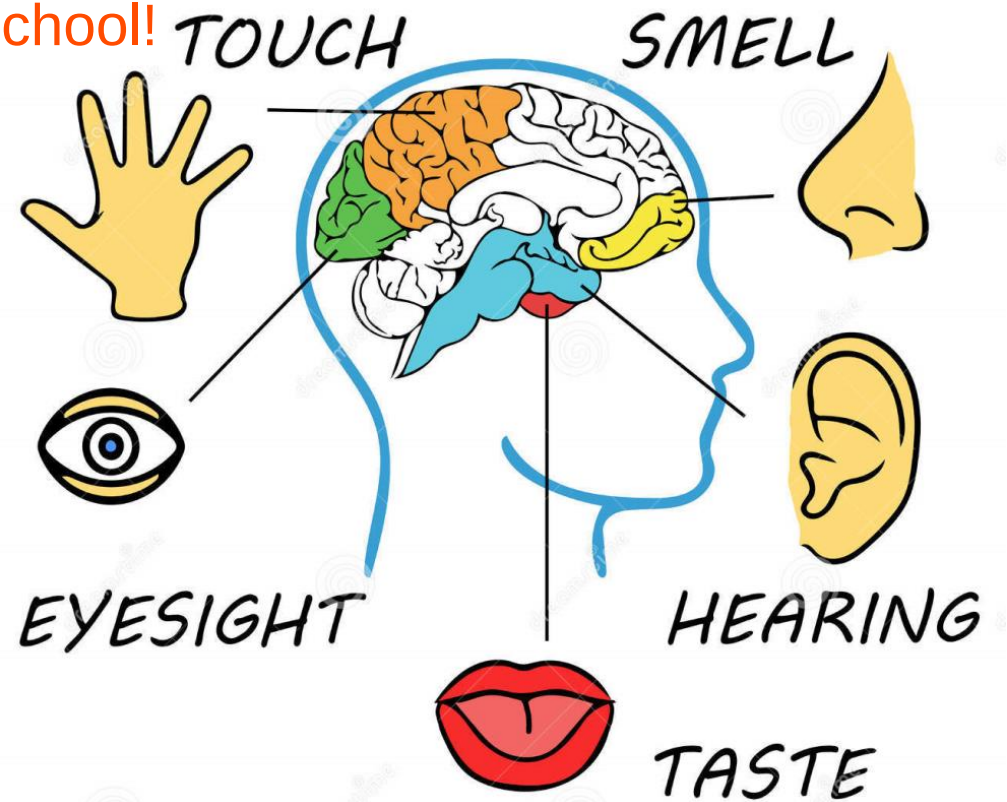
Sensors! Old School!



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Sensors! New School!

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Technology! Telematics as a start……?!

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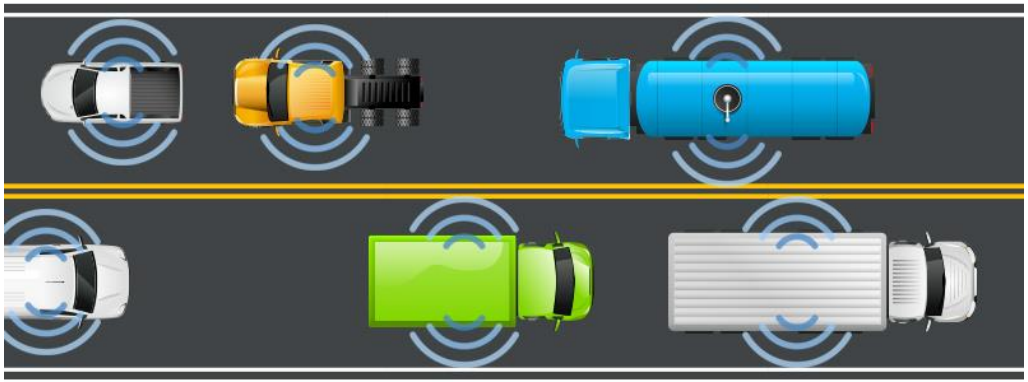
Where, how fast, how far….



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What if…..?

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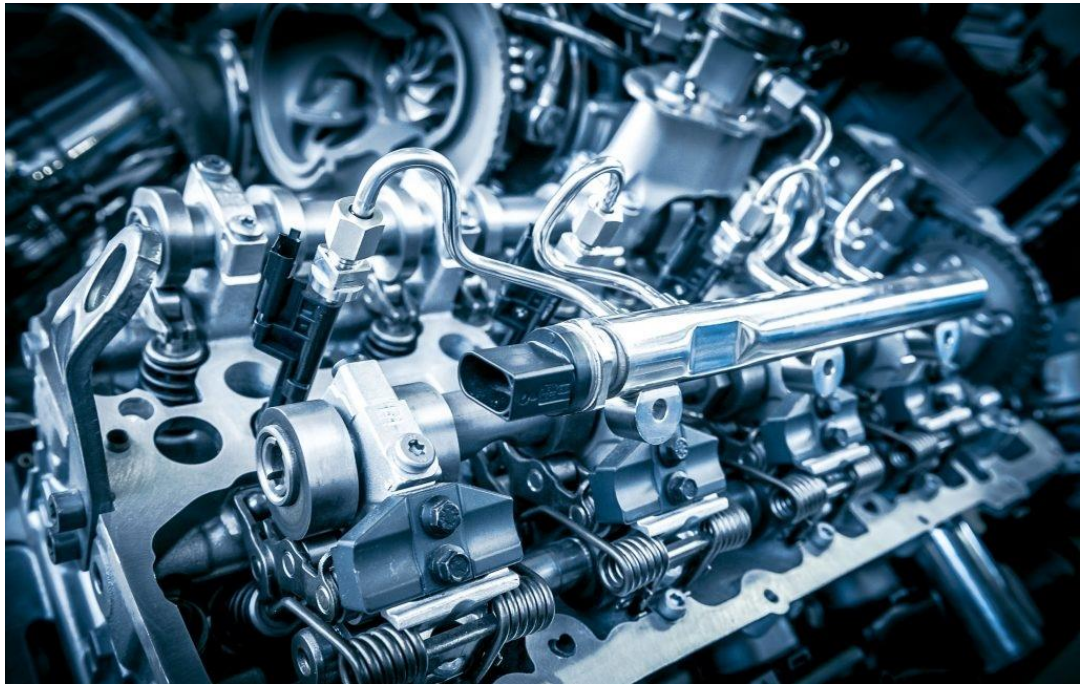
What if…..?



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What if…..?

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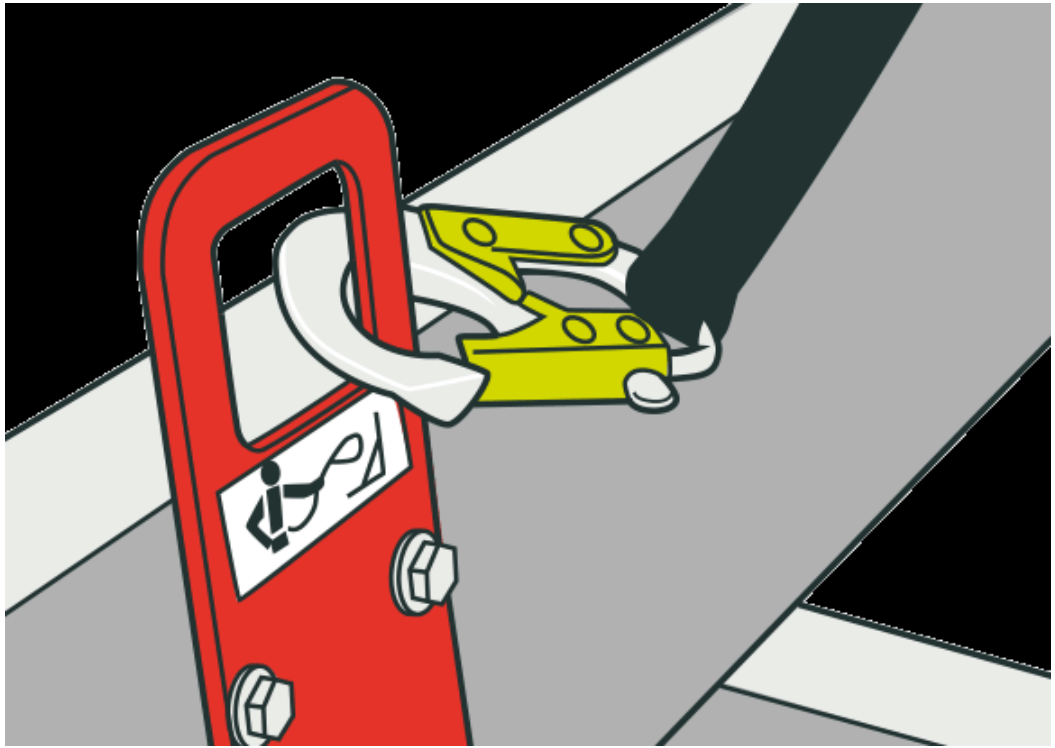
What if…..?



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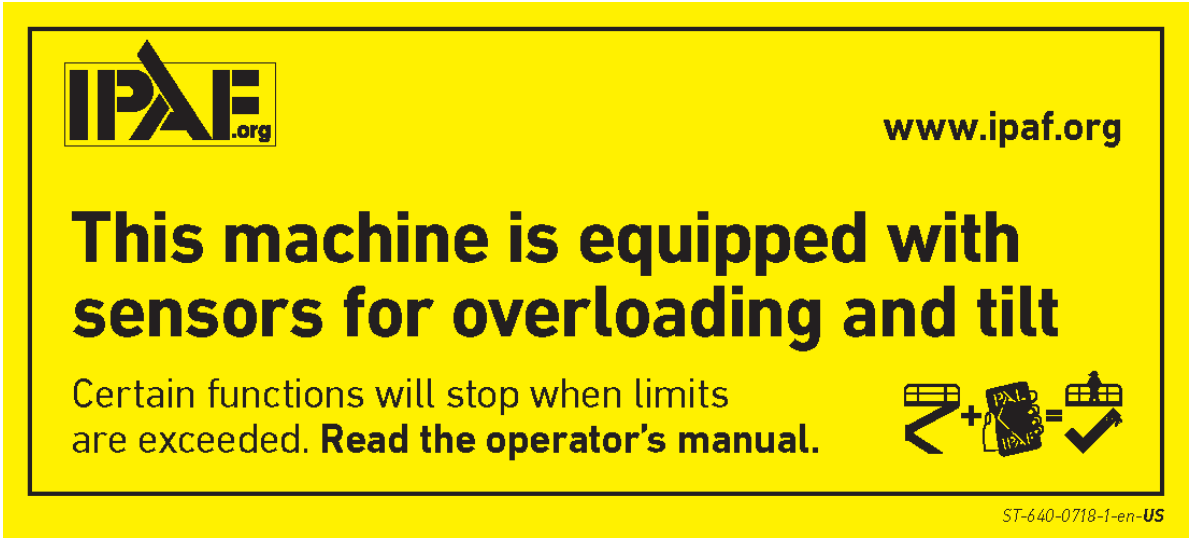
What if…..?



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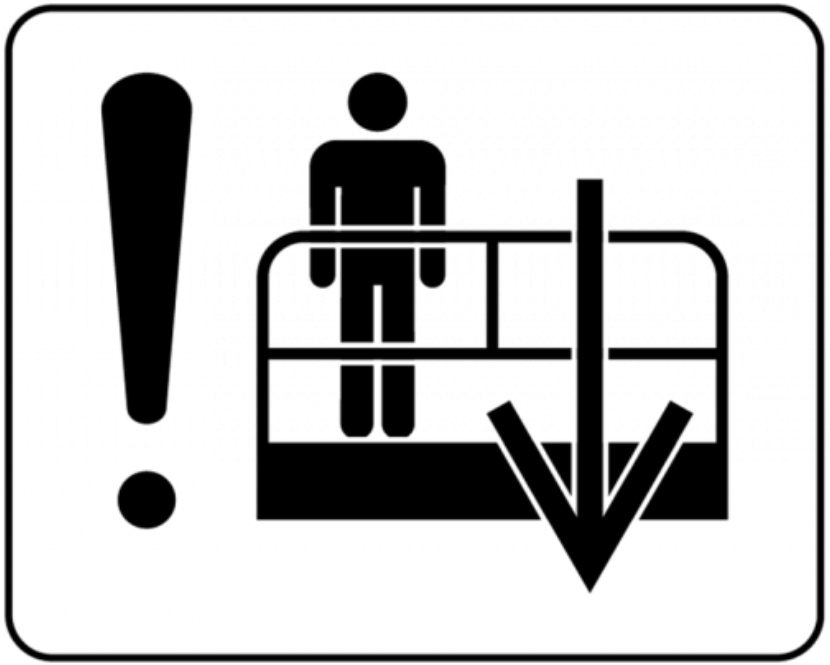
What if…..?



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What if…..?

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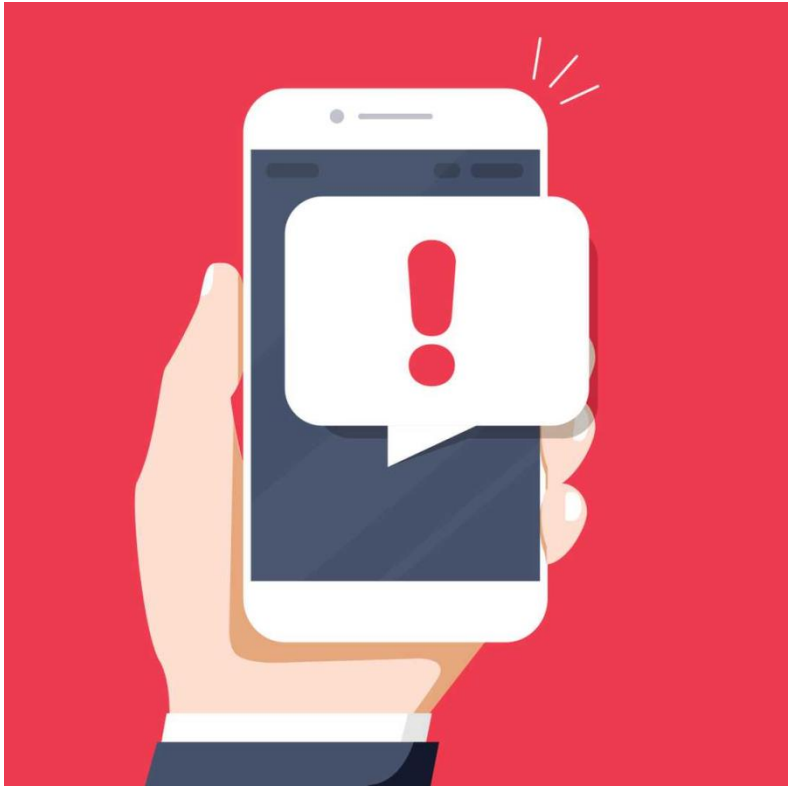

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Telematics and Rental…..

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Telematics and OEM…..

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Moving to this state…!

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This is OUR machinery! We know how to communicate with it!

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Usage

- Lift time, Drive time, run time

Time at height (true utilisation)

- Captures the elevated drive limit switch of the scissor as a single input, giving a record of the time the machine was raised

Machine charge history

- Captured through voltage history gives direct access to data on the machine circuit voltage.
- Ready to rent process then includes check to confirm machine is fully charged. Critical data to lower battery costs.
- Dead on Arrival (Delivery cost)
- Properly charged (battery replace cost)

“Ready to Operate”

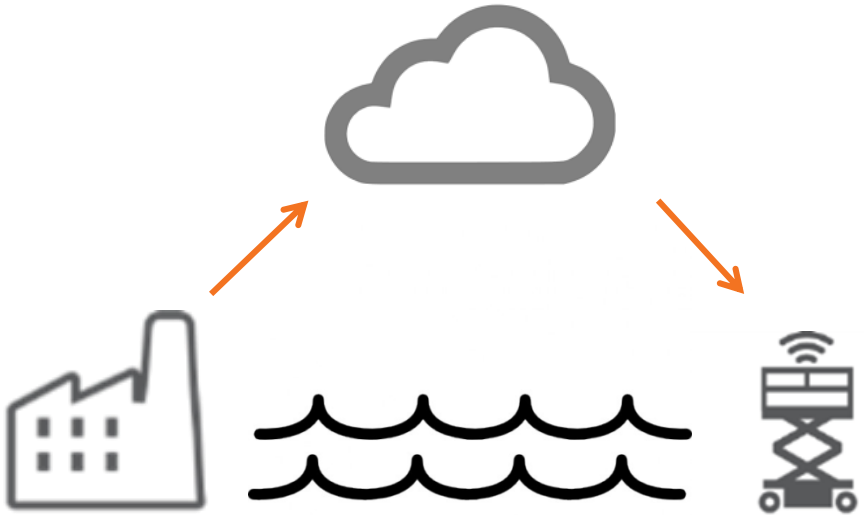
- Input captures the state of 5 machine properties as a single on/off notifier:
- Battery disconnect, base e-stop, ignition,
- Not-on-charge, breaker set.
- Updates live for trouble shooting

Access Control

- Authorised access only (PIN)
- Last access
- Access time
- Active access

Remote Machine Updates

- Bug fixes
- Function times
- Productivity improvements
- All a degree of customisation
- Capacity changes
- Standard updates
- Battery profiles
- …… much more



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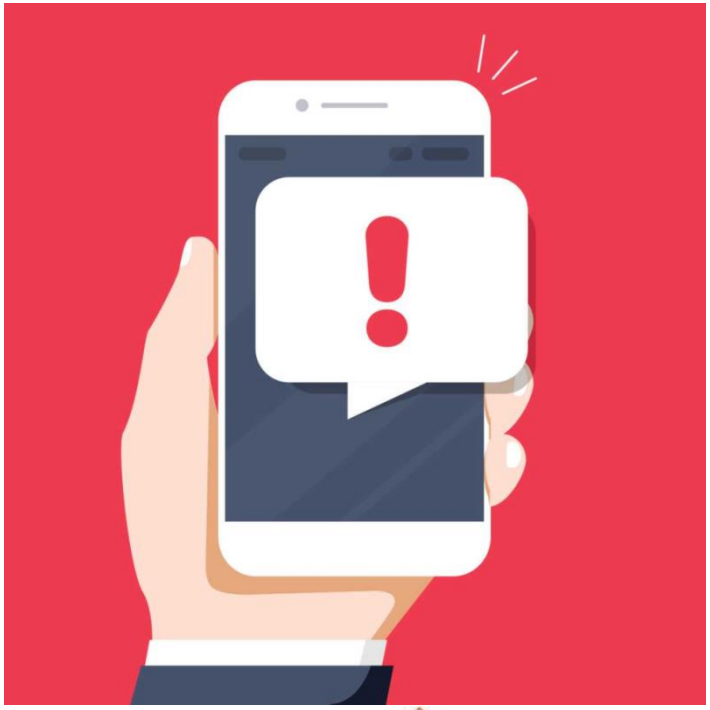
Information to the Operator/Maintainer



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Information to the Operator/Maintainer

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Information to the Operator/Maintainer

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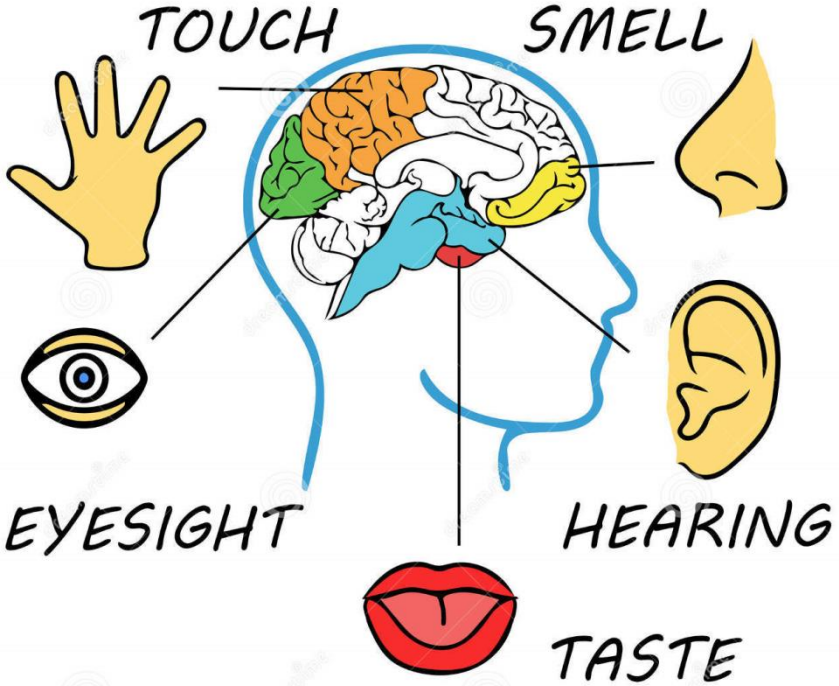
With Sensors…… Comes……?



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Data! Lots and Lots of DATA!

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Analytics! What is the MOST Important Data!

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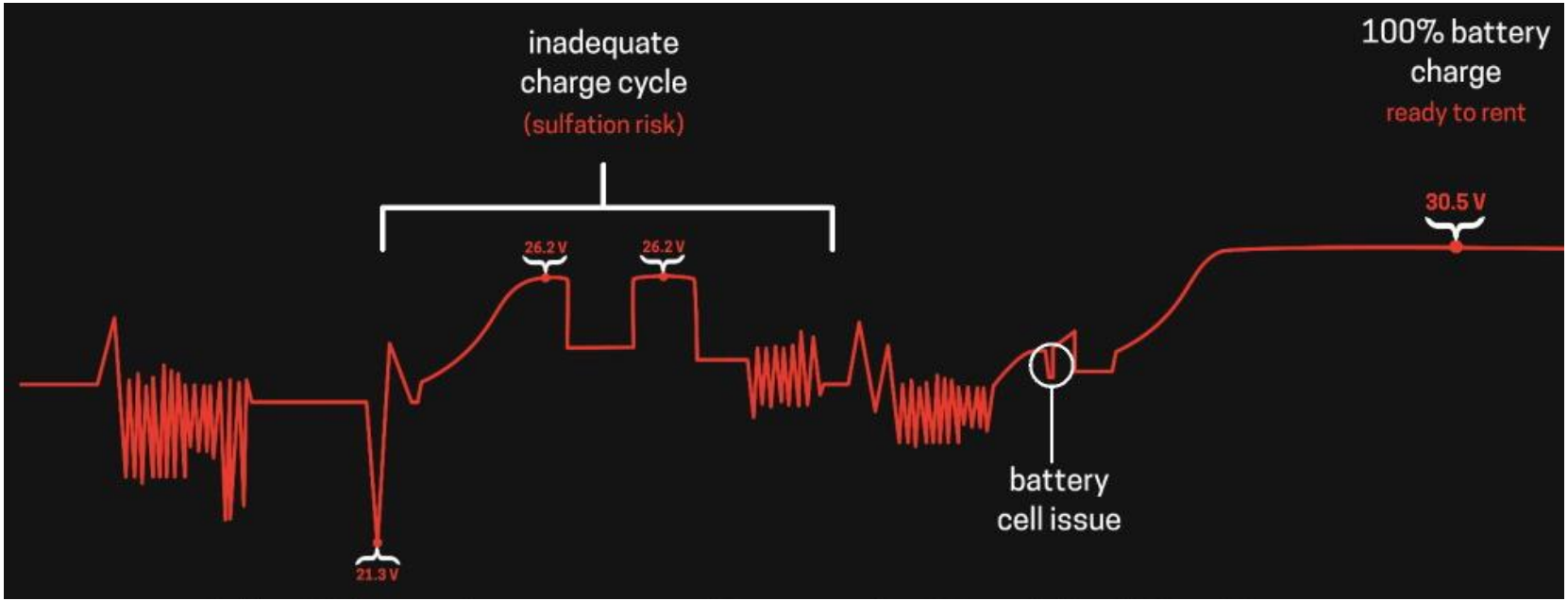
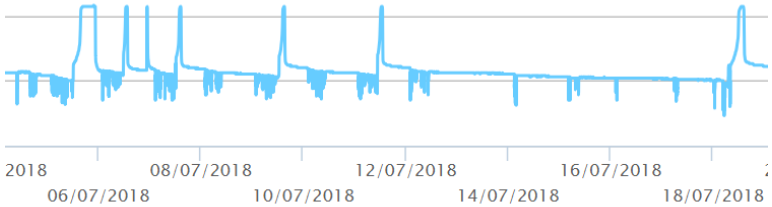
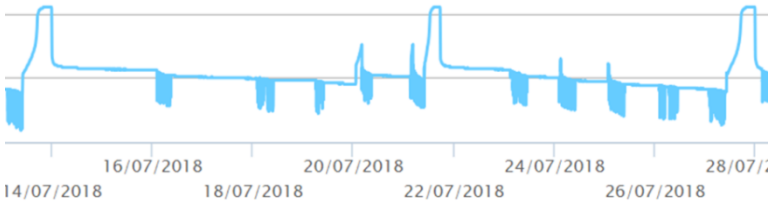
Example – Battery Charge



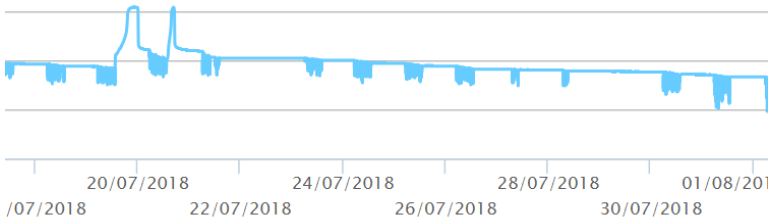
Example – Battery Life



3 Year battery pack life



2 Year battery pack life



1 Year battery pack life

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Predicting! = More Up Time!

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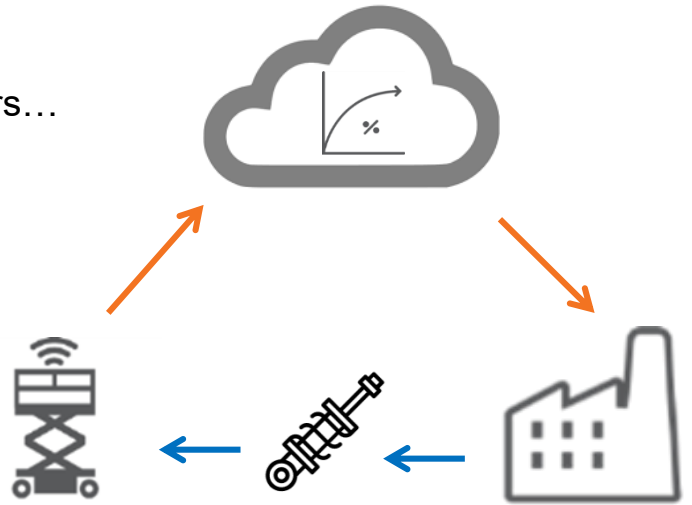
Predictive Maintenance and Parts Ordering

- Predictive NOT Preventative
- Advises when key components failure is imminent
  - Batteries, Chargers, Cylinders, Skycoded, Wheel motors…
- Customer is given options..
  - Investigate and shut off alert
  - Order components as normal
  - Accept that the “system” will order parts
- Skyjack undertakes stock holding for quick dispatch
- May mean SMART components



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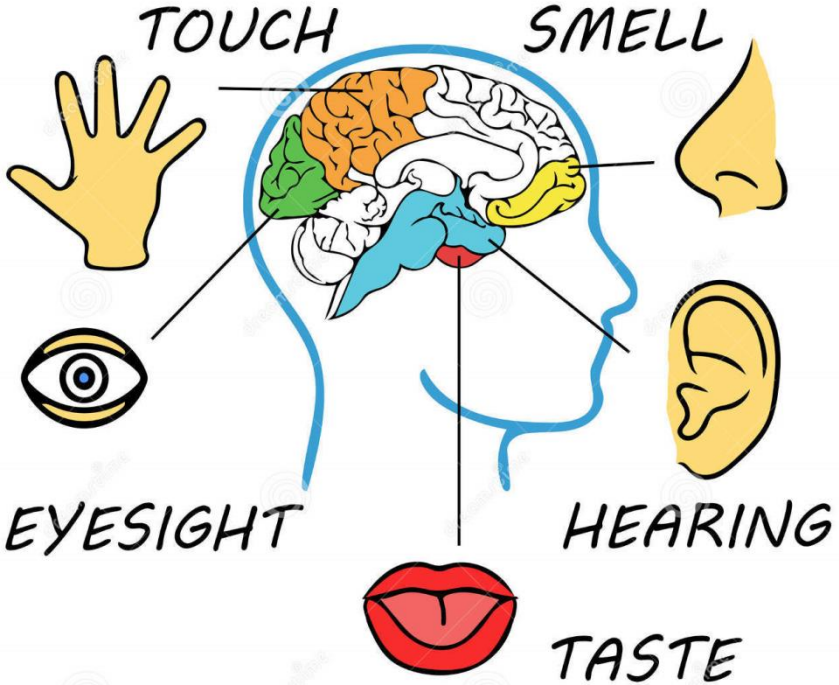
Sensors are Important – Allow Future Advancements!



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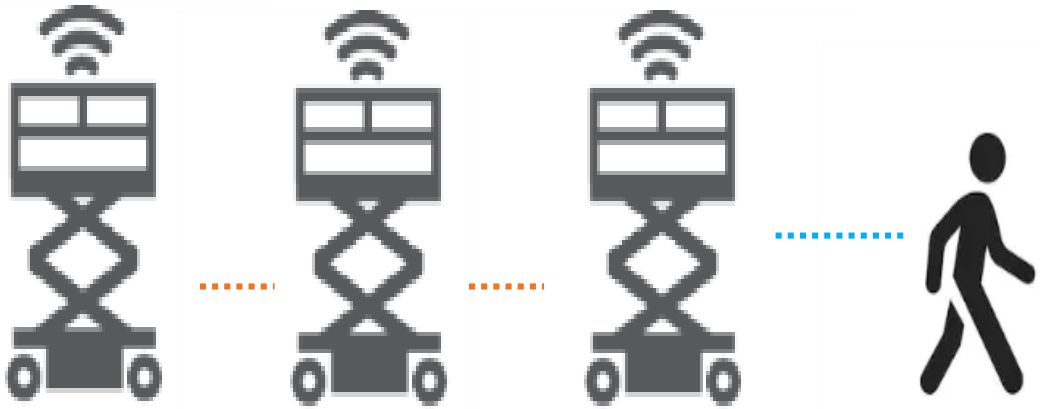
The Skyjack 2023 challenge

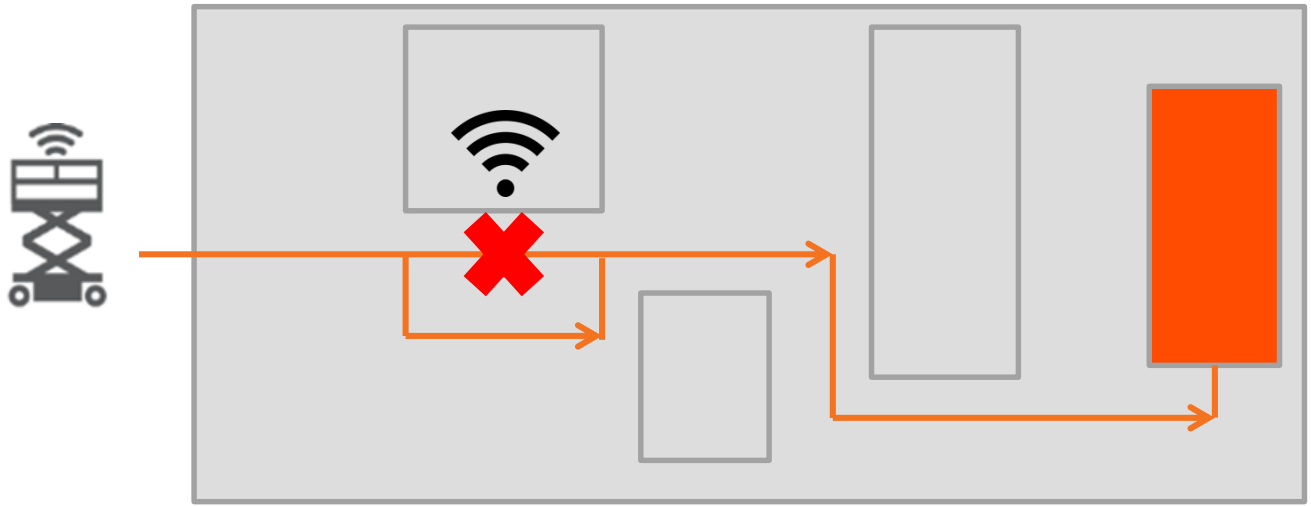
To develop autonomous solutions to a series of discrete tasks carried out by AWP and telehandler operators today, improving productivity for the rental company or taking the operator away from height or other risk

Auto Load/Unload

Auto Muster



Auto Muster



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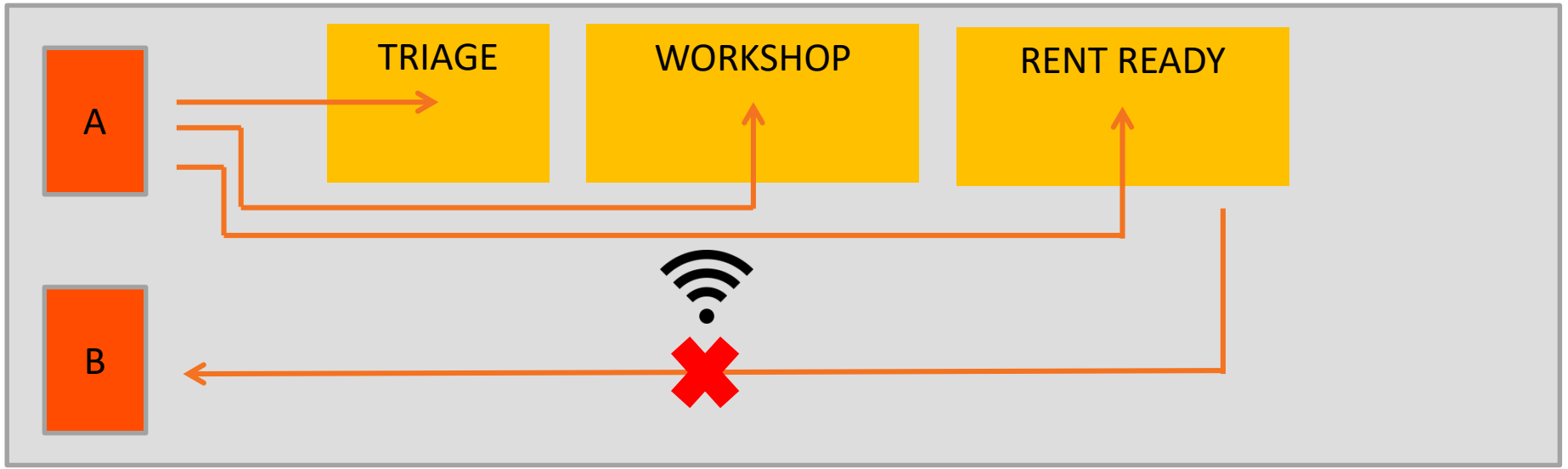
Depot Autonomy



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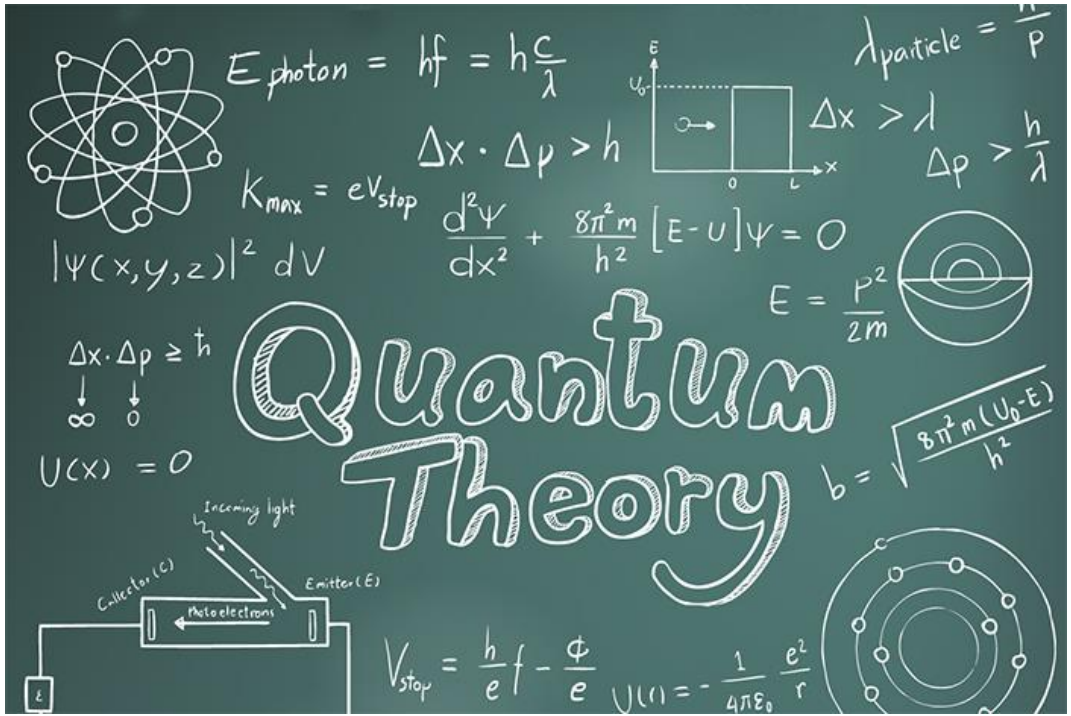
Quantum Sensing



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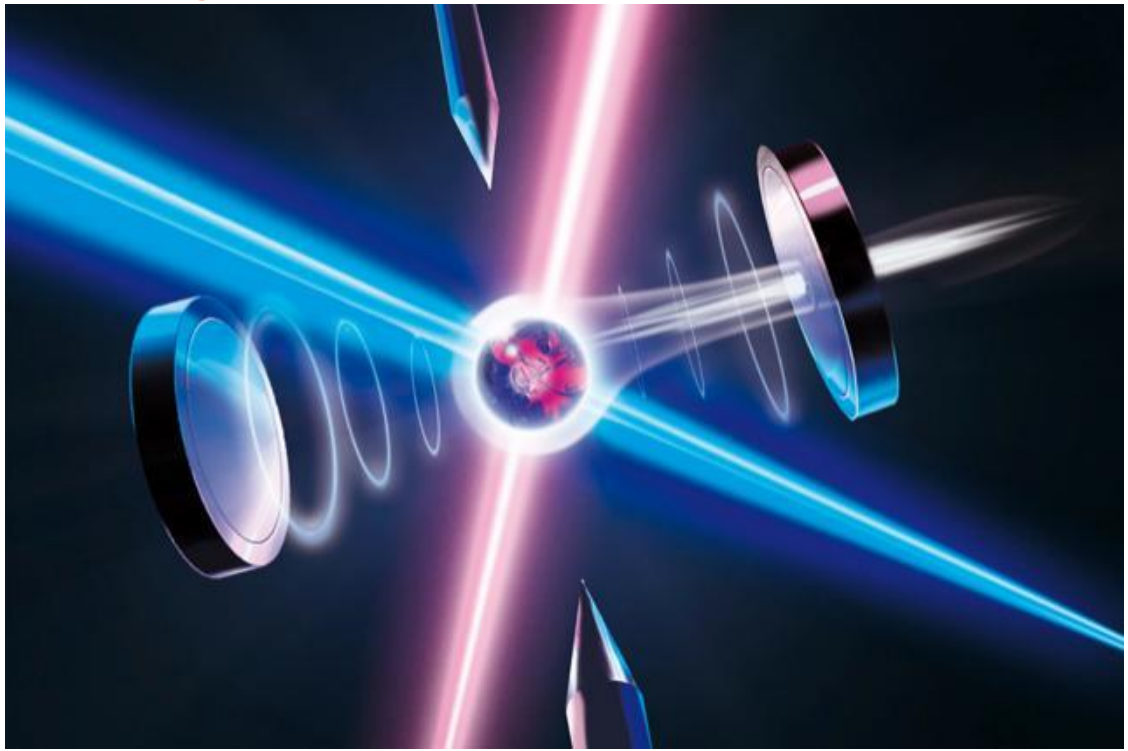
Quantum Sensing



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Quantum Sensing

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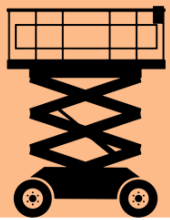
Where Will We Go?

Electrical	Plumbing	Roofing	General	Painting	Mudding	Auto loading	Auto muster	Obstacle avoid	Window washing
36%	9%	6%	20%	17%	13%	new value			



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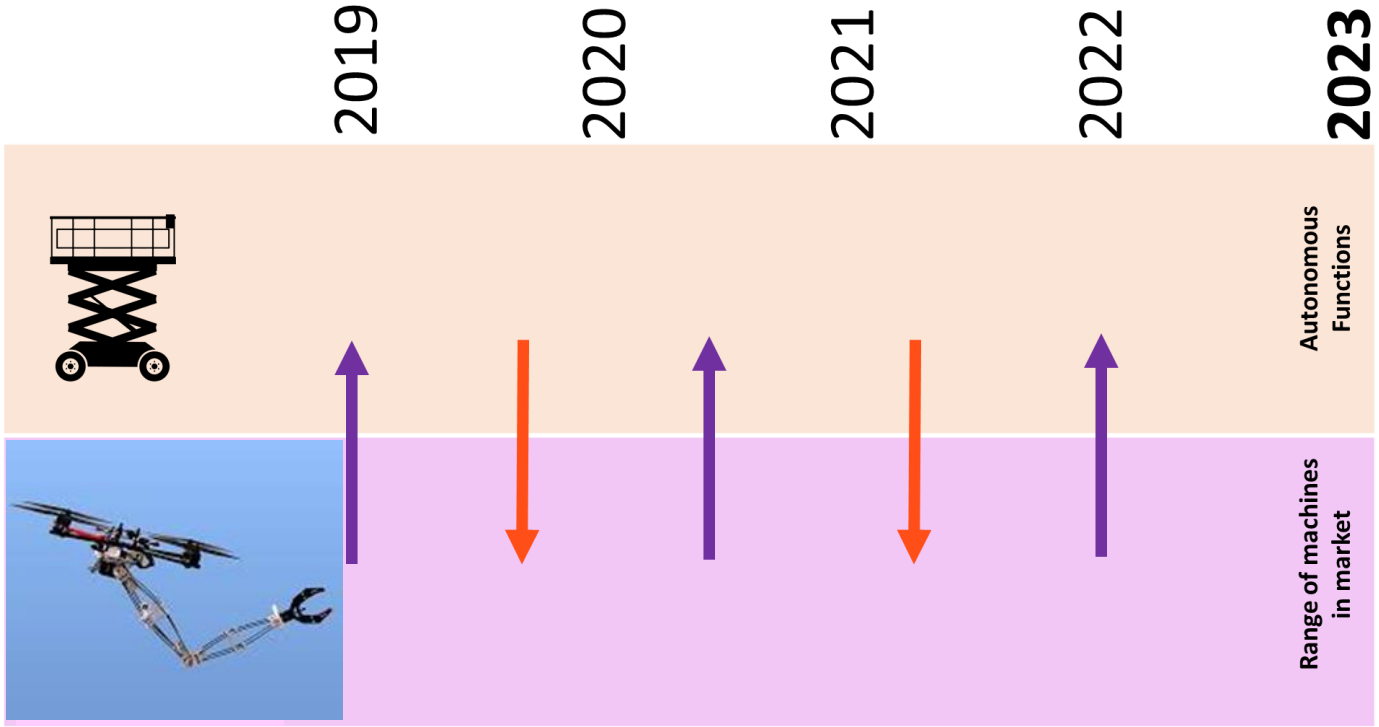
Two Cross Fed Streams



Conclusion… At Skyjack, nothing happens unless it is…

- Focused on Equipment
- Focused on Achieving a Productive Task
- Focused on Rental….
  - Equipment Cost
  - Utilisation
  - Maximisation of uptime
  - Low life cycle costs
  - Return on Investment
- Simple, Reliable, Easy

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THANK YOU

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