

# S-af-EVR

Powered Industrial Truck Safety Training

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# Table Of Contents

1	Summary Of Project
2	Project Selection & Problem Identification
3	Innovation
4	Results Achieved
5	Standardisation
6	Review & Project Expandability

# Summary of Project

“The theme of this project is to **enhance safety** while operating Powered Industrial Trucks (PIT) in the warehouse.

We aimed to **improve the user knowledge** before even handling the reach truck **physically** for the first time and hence **drive down the overall incident rate** with regards to **reach truck usage** by using **Virtual Reality (VR)** technologies.”

# Project Selection & Problem Identification

**Reasons for selecting project** | Identifying root causes of problem | Defining project scope

- In recent years, **many incidents** related to PIT Operations have **occurred**.
- Any PIT related incident can cause:
  - Property & Product **Damage**
  - Delivery **Delays**
  - **Increased** Manhours (Reduced Efficiency)
  - **Negative Impact** on Safety KPIs
  - **Endangerment** of Human Life
- Hence, a need to **improve** quality of reach truck operation standards among factory operators.



PIT (Reach Truck) Operator using Reach Truck at SE Hub Asia

# Project Selection & Problem Identification

Reasons for selecting project | **Identifying root causes of problem** | Defining project scope

- The issues were that:
  - × **Poor Knowledge Retention of the Safety Aspects among the operators**
  - × **Too much Information Overflow during lessons**
  - × **Poor Safe behavior among existing operators**

# Project Selection & Problem Identification

Reasons for selecting project | Identifying root causes of problem | **Defining project scope**

- Hence, Project Scope is to:
  - Create a **training method on operating PITs** that is:
    - **Interesting and attention grabbing**
    - **Allow for better understanding of content and safety guidelines**
    - **Uses technology, allowing it to be used for a long term**



New model of Reach Truck at Hub Asia

# Innovation

## Our Solution | Alternative Solutions & Evaluations

- Using VR to **assess the operator safety behavior** while operating the PIT.
- With this VR training, mistakes can be simulated and practiced upon:
  - **Reduce the human errors of the staff and**
  - **Increase knowledge retention through “hands-on” simulations**



Team member trying out the prototype of VR headset



Simulation that operator will see when using VR headset



# Innovation

## Our Solution | Alternative Solutions & Evaluations

### Storyboard Overview

1. Reach Truck Operator puts on **VR headset** and starts simulation exercise





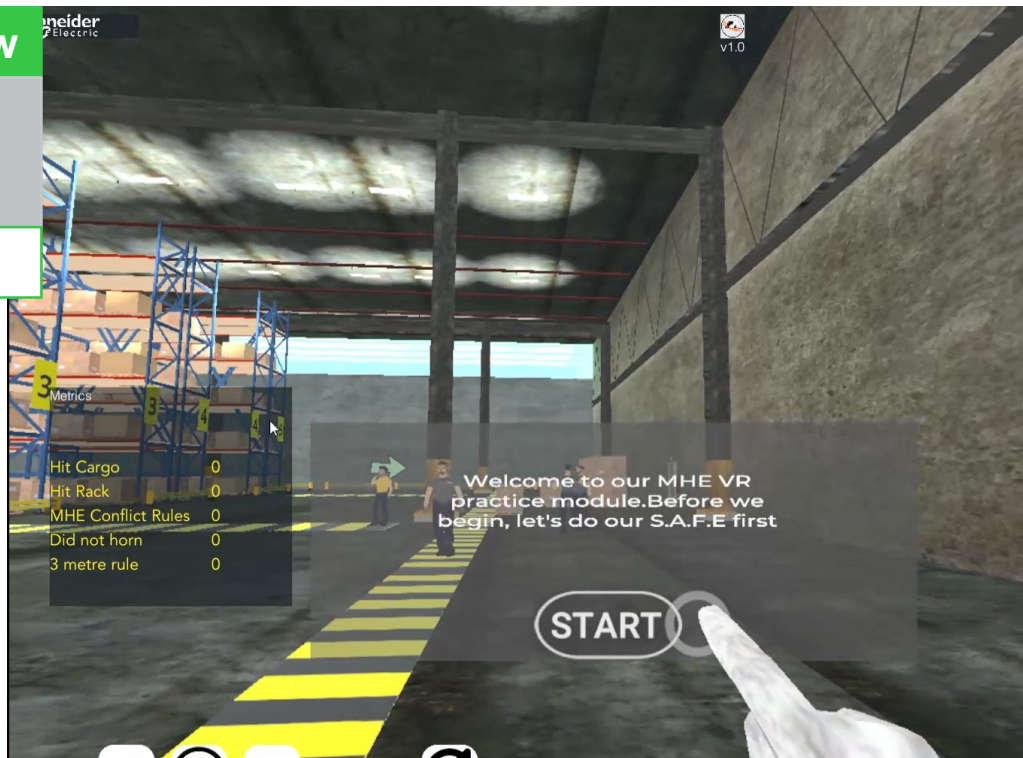
# Innovation

## Our Solution | Alternative Solutions & Evaluations

### Storyboard Overview

1. Reach Truck Operator puts on VR headset and starts simulation exercise

2. **S.A.F.E** First Awareness Check



# Innovation

## Our Solution | Alternative Solutions & Evaluations

### Storyboard Overview

1. Reach Truck Operator puts on VR headset and starts simulation exercise

2. S.A.F.E First Awareness Check

3. **P.P.E** Check



# Innovation

## Our Solution | Alternative Solutions & Evaluations

### Storyboard Overview

1. Reach Truck Operator puts on VR headset and starts simulation exercise

2. S.A.F.E First Awareness Check

3. P.P.E Check

4. MHE Equipment Check



# Innovation

## Our Solution | Alternative Solutions & Evaluations

### Storyboard Overview

1. Reach Truck Operator puts on VR headset and starts simulation exercise

2. S.A.F.E First Awareness Check

3. P.P.E Check

4. MHE Equipment Check

5. **Start Up MHE**



# Innovation

## Our Solution | Alternative Solutions & Evaluations

### Storyboard Overview

1. Reach Truck Operator puts on VR headset and starts simulation exercise

2. S.A.F.E First Awareness Check

3. P.P.E Check

4. MHE Equipment Check

5. Start Up MHE

6. MHE **Pre-Inspection** Checklist





# Innovation

## Our Solution | Alternative Solutions & Evaluations

### Storyboard Overview

1. Reach Truck Operator puts on VR headset and starts simulation exercise

2. S.A.F.E First Awareness Check

3. P.P.E Check

4. MHE Equipment Check

5. Start Up MHE

6. MHE Pre-Inspection Checklist

7. Trainees can select from  
3 different scenarios



# Innovation

## Our Solution | Alternative Solutions & Evaluations

### Storyboard Overview

1. Reach Truck Operator puts on VR headset and starts simulation exercise

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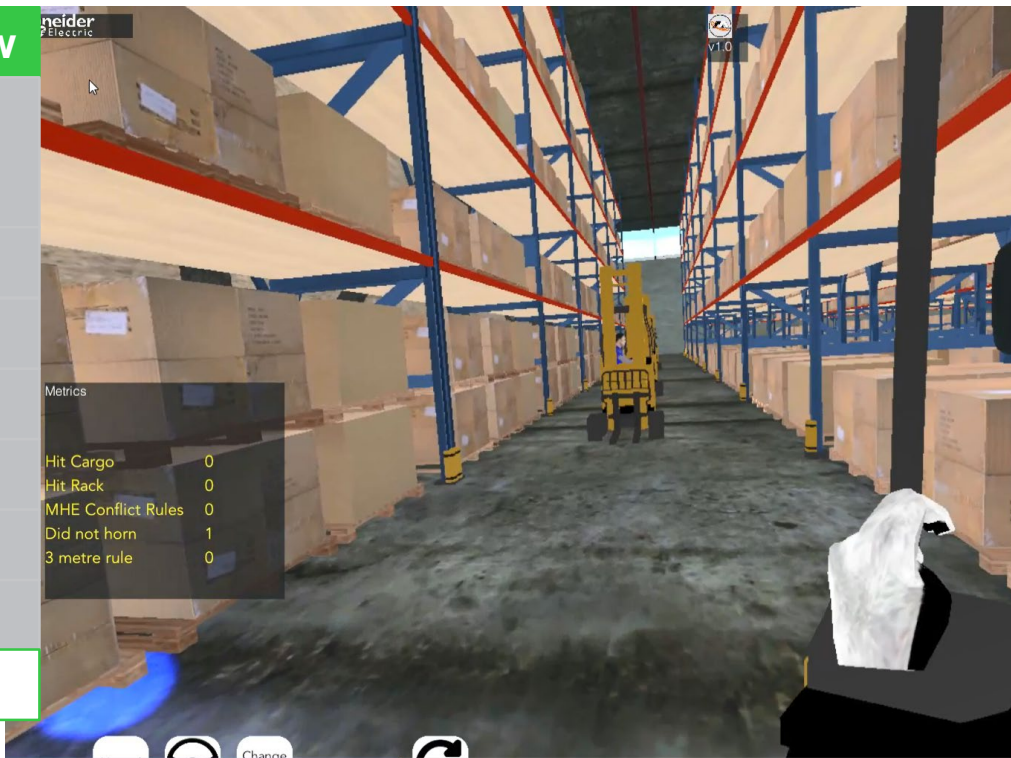
4. MHE Equipment Check

5. Start Up MHE

6. MHE Pre-Inspection Checklist

7. Trainees can select from 3 different scenarios

8. Trainees to be tested on safety cultures and habits





# Innovation

## Our Solution | Alternative Solutions & Evaluations

### Storyboard Overview

1. Reach Truck Operator puts on VR headset and starts simulation exercise
2. S.A.F.E First Awareness Check
3. P.P.E Check
4. MHE Equipment Check
5. Start Up MHE
6. MHE Pre-Inspection Checklist
7. Trainees can select from 3 different scenarios
8. Trainees to be tested on safety cultures and habits
9. Scoring metrics used to **assess trainee competency**



# Innovation

## Our Solution | Alternative Solutions & Evaluations

### Process Flow

PIT Operators to  
attend EHS  
induction &  
pass a quiz

Attend MHE  
Safety Induction  
& passed Theory  
Test

PIT Operators to  
go through VR  
Assessment

PIT Operators  
will undergo on-  
site practical  
training &  
assessment

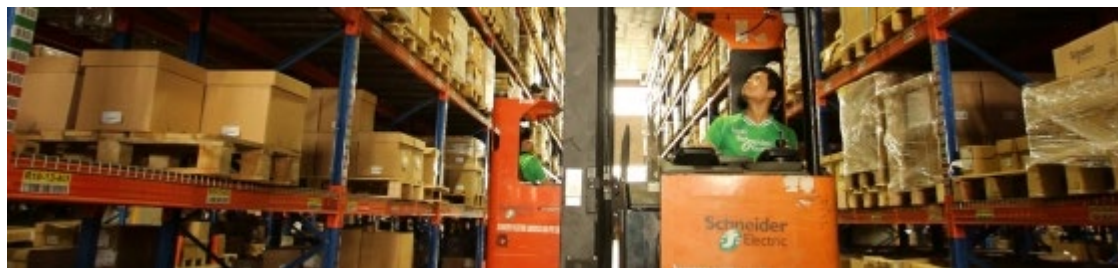
Yearly Theory &  
VR Refresher  
Training



# Innovation

## Our Solution | **Alternative Solutions** & Evaluations

- Since we are tackling the issue of improving training methods, our alternate solutions were in that category. They included:
  - **Better quality videos and explanation slides**
  - **Hand-on miniature model of warehouse with toy reach trucks to simulate**



Reach truck operator reaching for packages carefully

# Innovation

## Our Solution | **Alternative Solutions** & Evaluations

- **Hand-on miniature model of warehouse with toy reach trucks to simulate**



Our miniature model that we used to simulate safety precautions



# Innovation

## Our Solution | Alternative Solutions & Evaluations

	VR Training	Miniature Models	Better Video and Slides
Cost (Short Run)	✗	✗	✓
Cost (Long Run)	✓	✗	✗
Use of Technology	✓	✗	✓
Generating Interest	✓	✗	✗

Though the initial costs of VR training may be high, in the **long term it would increase savings** due to its best performance **at improving operator knowledge** on reach truck safety operations.

This would hence, **reduce incidence rates** the most and reducing costs in the long run, proving **VR to be the ideal solution**.



# Results Achieved

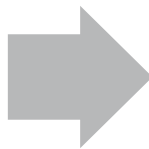
## Risk Assessments (Before & After Implementation) | Tangible & Intangible Results

### Risks: Before

Information overflow due to vast content taught at a very fast pace by instructors/ trainers.

This might cause operators to **completely forget what they were learning**

Knowledge retention was poor, as “old-school” techniques of learning **like pictures and videos** were not enough to **keep operators’ attention**



### Risks: After

No such issue as now **VR takes care of safety aspects while physical trainers only need to concentrate on technical aspects.**

Thus, they can teach slowly, allowing operators to fully understand the lessons

**Novelty factor of VR training increases interest** among all operators.

This makes them very eager to practice using the VR headsets, making them **retain more information**

# Results Achieved

## Risk Assessments (Before & After Implementation) | Tangible & Intangible Results

### Risks: Before

Danger to trainer and property when **inadequately trained operators** attempt to take the final physical reach truck operating test.



### Risks: After

The VR simulations need to be **passed by all operators before they can proceed to the physical test.**

Thus, this makes them have a higher chance of passing the physical test, **reducing risk of property or personal damage**



# Results Achieved

## Risk Assessments (Before & After Implementation) | **Tangible & Intangible Results**

➡ **Decrease** in Reach truck related incidents from operators who went thru VR training

Introduction of VR saw a **55.50% decrease** in incidents requiring recovery time off work from 84.03 manhours in 2018 to 37.48 manhours in 2019.

➡ **Decrease** in property and product damage due to reduction of incidents

➡ **Increase** in operators passing the reachtruck driving test after practicing with VR.



Team members trying out the VR system and taking down all feedback

# Results Achieved

## Risk Assessments (Before & After Implementation) | Tangible & Intangible Results

- Overall **increase** in Safety Awareness
- **Increase** in understanding of all SOPs and rules at a faster rate.
- **Increase** in operators taking an interest in their own learning and self-improvement



Operator practicing using the VR simulation

# Review & Project Expandability

## Future Improvements | Future Expansions

- We realized that the driving practical aspects were better taught using a real reach truck, for obvious purposes.
- Hence, we decided to concentrate fully on the Safety Awareness and Safety Reaction + Response aspect of reach truck operations.
- We decided that we should improve this program such that it is a purely situational program which will assist operators in making the right choices when faced with some commonly made safety errors.
- Furthermore, we would increase the content to showcase all latest changes in SOPs as soon as possible.

# Review & Project Expandability

## Future Improvements | **Future Expansions**

- The tool of VR in operational and safety behavior training **has no limits.**
- Once we get the hang of it in reach truck operations, a key part of warehouse operations, we **would be well-equipped to create other similar programs.** Some examples that we are looking into are:
  - Switchboard and Electrical Wiring Operations
  - Emergency response (CPR/AED/Firefighting)
  - Training with Safe Distancing Rules in place
  - Many SE Product simulations
- among numerous other plans!

Life Is On

