

# THE PLANT OF THE FUTURE PROJECTS IN PLANT TIANJIN

Tianjin plant  
2022 Nov

Internal

# AGENDA

1 5G

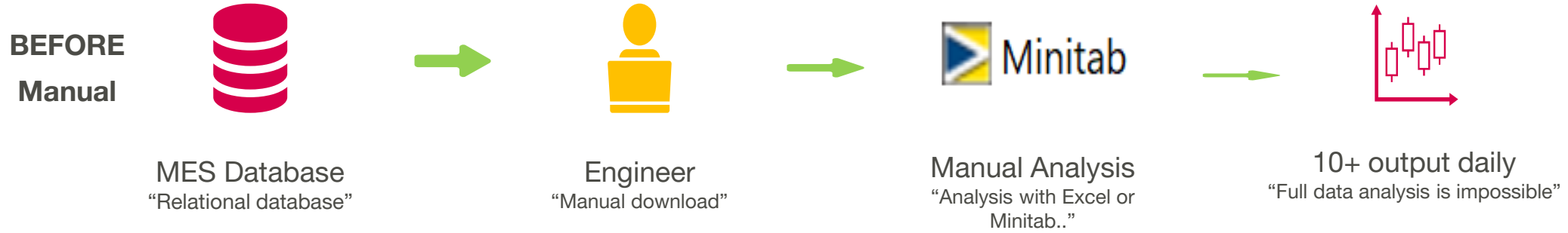
2 BIG DATA ANALYSIS

3 INFORMATION AUTOMATION

4 AI VISION APPLICATION

# BIG DATA ANALYSIS

## BEFORE VS AFTER



# BIG DATA ANALYSIS

## SUMMARY

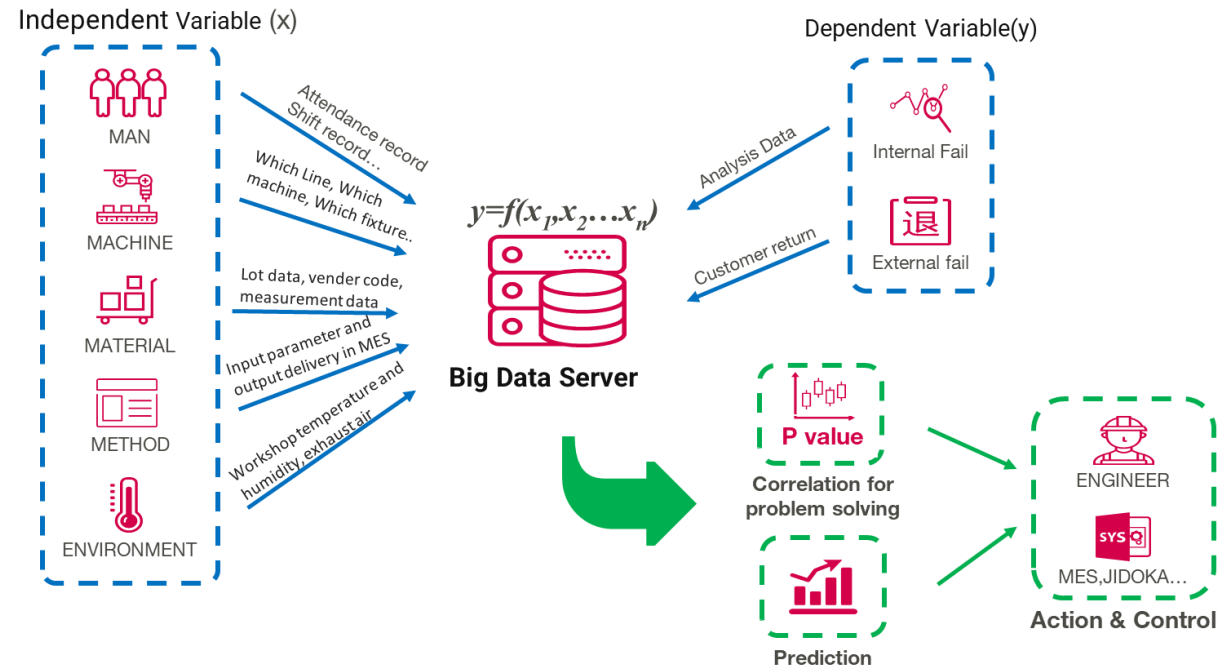


### Bigdata analysis

Analysis for Prediction  
and trouble shooting

#### In this initiative we achieved :

- 7+ billion hits data stored in database from Feb 2022.
- Engineer access and analysis data by self-service.
- Some pilot on automatically data analysis for trouble shooting and prediction.
- Tianjin is leading the data intelligence IE Hub in Asia; We have also shared it in IE Hub.



#### Data stored from:

mes\_eva\_v life: 2022/2/12.

mes\_eva\_t life: 2022/2/26.

mes\_material life: 2022/2/27.

mes\_packing\_log life(Carrier) : 2022/2/27.

mes\_matparts life: 2022/6/16

Facility data (Temperature, humidity, air pressure, compress air): 2022/7/29.

Operator data (shift, line and attendance)\_aligned with HR and work union: 2022/6/10.

# BIG DATA ANALYSIS

## DATA ACCESS AND ANALYSIS BY SELF-SERVICE



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AND PREDICTIVE

The screenshot displays the Vitesco Technologies web interface. A 'Create Ticket' modal is open, showing fields for 'Query Time Range/Date Period', 'Test Plan Group', and 'Defect Mode/Defect Mode'. Below the modal, a table lists 'Finished Tickets' (已完成表单/Finished Ticket). The table has columns for #, Ticket No, Create Time, User/Application ID, Applicant, UID Type, and Defect Mode. The table shows 9 rows of data, with the last row indicating 'Honda leakage'.

#	单号/Ticket NO	创建时间/Create Time	用户/Application ID	申请人/Applicant	UID Type	失效模式/Defect Mode
1	TJBD20226238017407985893999370	2022/6/23 11:22:19	uib70594		A2C7775580000	
2	TJBD202262283957149508385442854	2022/6/25 14:4:55	uidw8231		A2C7470852300	
3	TJBD202262878746169977999327747	2022/6/28 21:5:27	uib70594		A2C7775550000	dcb void面积超标
4	TJBD202262862416907363841999768	2022/6/28 21:17:16	uib70594		A2C7775550000	2-元件错位/翻面/漏起/少件
5	TJBD202262879448509615852837724	2022/6/28 21:40:7	uib70594		A2C7775550000	48-IGBT击穿
6	TJBD20226286068509515183470982	2022/6/28 21:57:43	uib70594		A2C7632800400	打螺丝不良——设备
7	TJBD20226301082477653155535165	2022/6/30 9:19:36	uib70594		AAA209520001	
8	TJBD20227632429587793737491748	2022/7/6 8:9:24	uidw8231	穆静	A2C7477030800	test Mode Data
9	TJBD202271240747657571289177972	2022/7/12 9:18:17	yinxm	尹雪梅	AAA9173550100	Honda leakage

Already 59 finished tickets in system

vitesco  
TECHNOLOGIES

Analysis Report No: TJBD202292652226589086820997591 Data:2022-09-26

This report is generated from 1# big-data engine automatically, the engine is developed by Tianjin Plant IE Team, this report is responsible for the sample provided only.

Applicant: uids3093  
Material No.: A2C7776210000  
Analysis Period: 9/19/2022 00:00:00 to 9/26/2022 00:00:00  
Defect\_Mode: EMR3 CE leakage  
Data Volume: 3,307,852pcs

Detail data:  
\\10.192.97.84\bigdata\estempdata\detaildata\TJBD202292652226589086820997591

The above information is provided by the applicant, we won't assume the responsibility for confirming the accuracy, adaptability and completeness of the above data

Potential related items:

Level A (identical variable):

PWM-USW\_RECIPID\_ID: same point:16  
PWMSTA\_320\_03240: same point:0.755370627836117  
PWMSTA\_320\_03250: same point:10.7115828792746  
PWM-CUR\_WatchdogTemperature\_Z10\_Top: same point:117

Level B: (Hypothesis test of normal data):

PWMSTA2\_320\_01060: p\_value:0.01698  
PWMSTA2\_320\_03130: p\_value:0.03584

Level C: (Hypothesis test of abnormal data):

PWM-LC\_laserpower\_laser: p\_value:0.0  
PWM-LC\_process\_time: p\_value:0.02341  
PWM-6265\_wshoot: p\_value:0.0  
PWM-6265\_cycle\_time: p\_value:1e-05  
PWM-MFA\_processtime: p\_value:0.01116  
PWM-USW\_TARGETDELTA\_H\_E38: p\_value:0.0  
PWM-USW\_TARGETDELTA\_H\_E22: p\_value:0.0  
PWM-USW\_CH\_PRODUCT\_E22: p\_value:0.01058

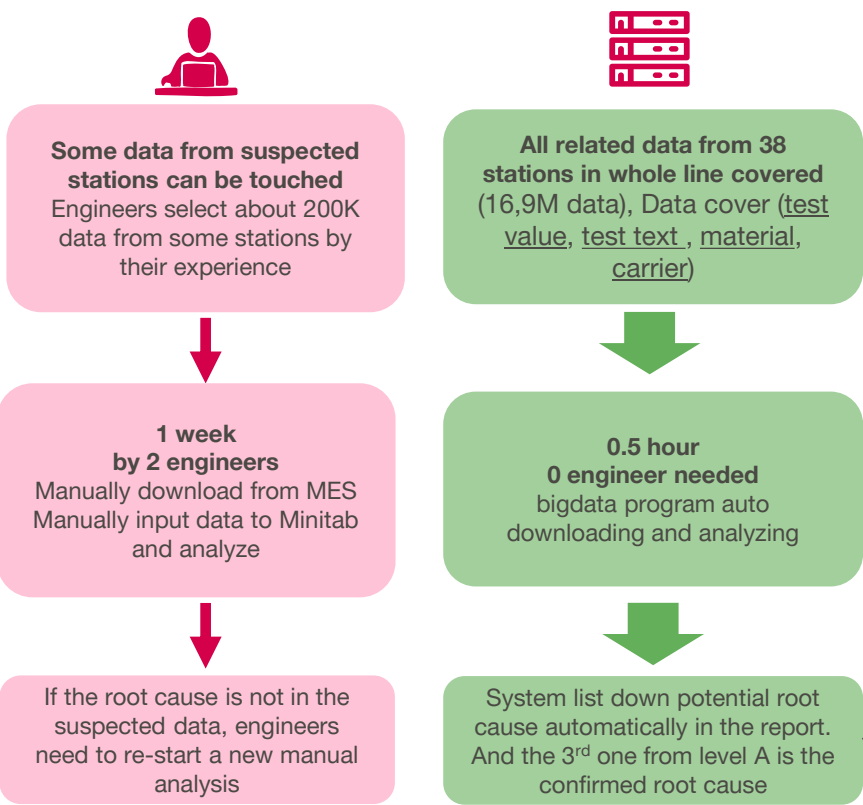
Page 1 of 4

# BIG DATA ANALYSIS

## USE CASE DETAILS



- In the DQ200 Gen2 Flex foil damaged case, 28 pcs was confirmed by lab.  
Bigdata analysis was used on root cause analysis for this existing case.



Bigdata analysis report of DQ200 flex foil damaged

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TECHNOLOGIES

Analysis Report

No: TJBD202291435185067159992705230

Data:2022-09-14

This report is generated from 1# big-data engine automatically, the engine is developed by Tianjin Plant IE Team, this report is responsible for the sample provided only.

Applicant:

uidj6393

Material No.:

A2C7676960800

Analysis Period:

8/9/2022 00:00:00 to 8/12/2022 00:00:00

Defect Mode:

Flex foil damaged

Data Volume:

16,946,080pcs

Detail data:

\\10.192.97.84\bigdata\estempdata\detaildata\TJBD202291435185067159992705230

The above information is provided by the applicant, we won't assume the responsibility for confirming the accuracy, adaptability and completeness of the above data

Potential related items:

Level A (Identical variable):

DQFERASE\_511024:

same point:12590

SEHO\_ROTARY\_TAB\_10:

same point:9.60000038146973

DQ\_SEHO\_CAR\_SEHO2:

same point:SEHO2B03

Level B: (Hypothesis test of normal data):

Level C: (Hypothesis test of abnormal data):



Flex foil damaged



SEHO Carrier SEHO02B03#

- This initiative is still not perfect, we will continue improve it to make the data analysis **better and faster**.
- By above big data initiative, yearly accumulated working hr saving would be equal to 1.3 H/Cs.

# AGENDA

1 5G

2 BIG DATA ANALYSIS

3 INFORMATION AUTOMATION

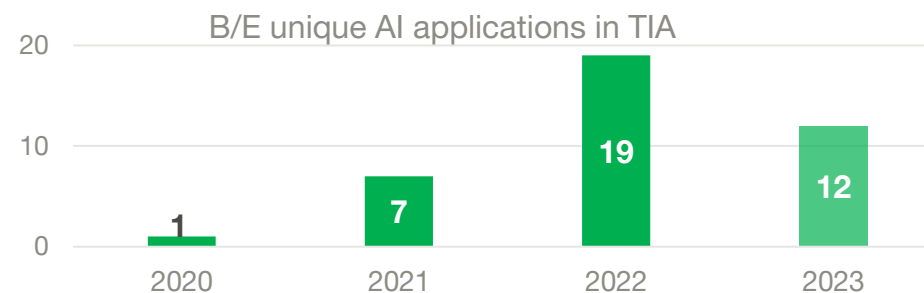
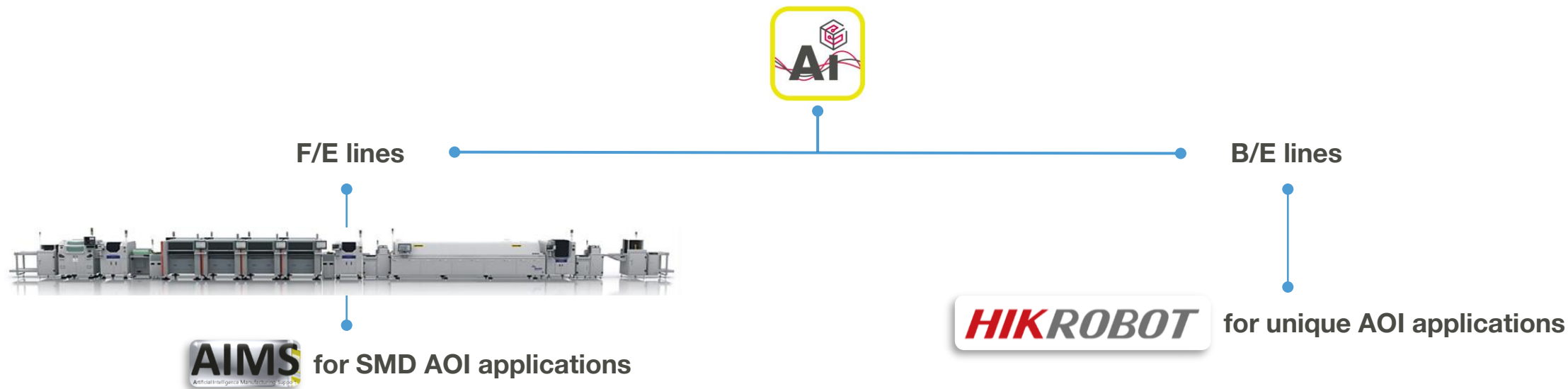
4 AI VISION APPLICATION

# AI VISION APPLICATION

## SUMMARY



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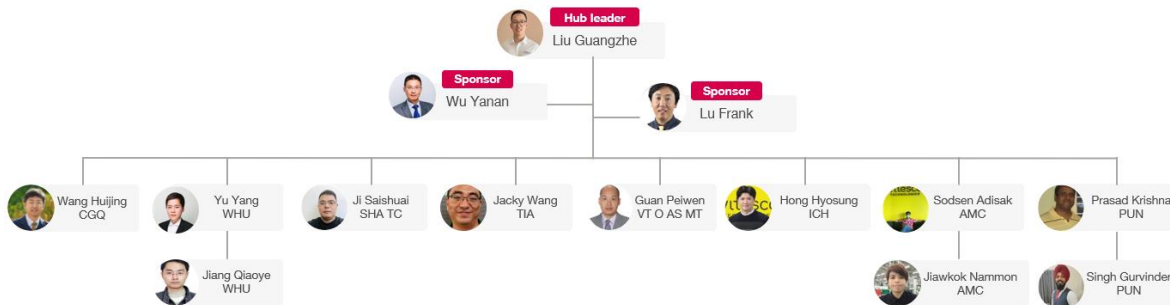
# AI VISION APPLICATION

## B/E SUMMARY

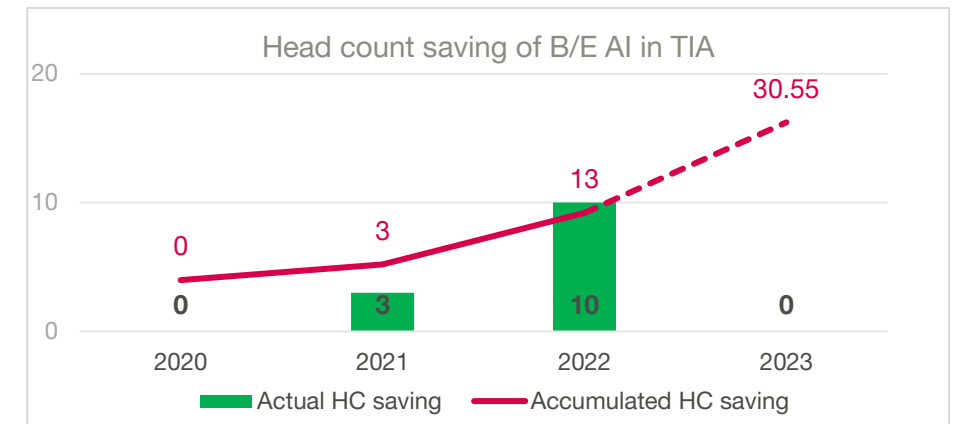
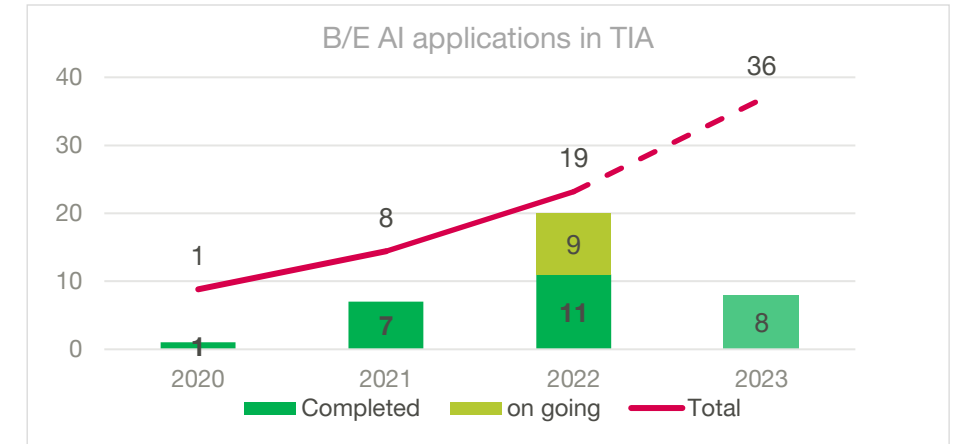


### AI analysis B/E lines

- Total implemented **19** B/E AI vision inspection by station , 9 AI vision projects are on going.
    - We program the UI, MES and do the model training by ourself. (average 4K Euro per setup)
    - Enhanced test coverage, reduced operator workload.
  - Roll out concept for new production line.
    - in upcoming new lines , there are 63 stations with vision inspection and 8 of them planned with AI algorithm
    - New mode: Analysis pictures from other machines without adding new camera.
- Checking all existing 84 non-AI vision stations, figure out 7 potential stations to enhance test cover by AI algorithm.
- Lead B/E AI topic IE Hub in Asia.



\* Regular meeting with VT O MT and communication with VT O IE.



# AI VISION APPLICATION

## B/E AI SUMMARY

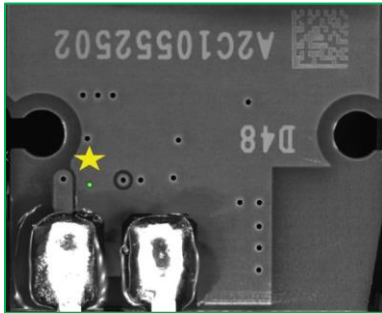


B/E lines



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### Soldering Inspection Applications



TPMS - 2020.8

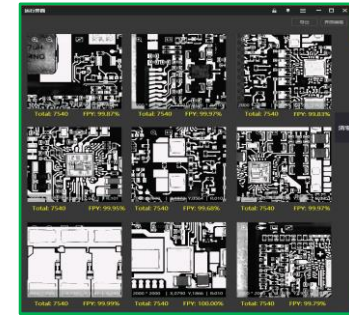


Inverter middle line - 2021.7



DQ200 hot gas - 2021.10

### Analysis on existing pictures applications



DQ200 ECA short - 2022.9

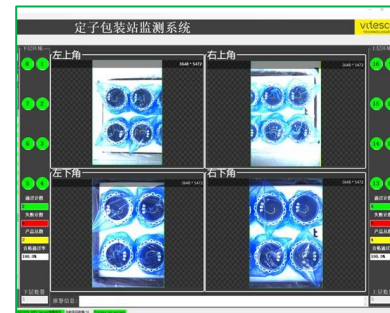
### Unique Applications



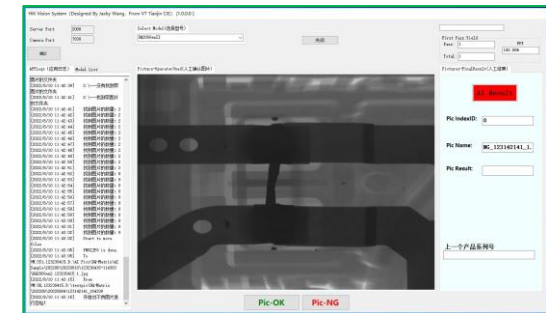
LPS - 2021.4



T76 FAA - 2021.10



Stator package station - 2022.6



DQ200 matrix AXI - 2022.10

# AI VISION APPLICATION

## B/E UNIQUE APPLICATION



B/E lines



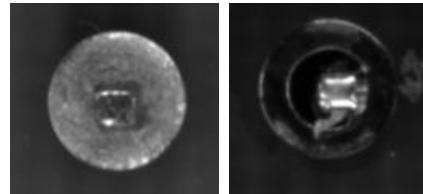
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AI for backend soldering process inspection

Inverter middle line - 2021.7

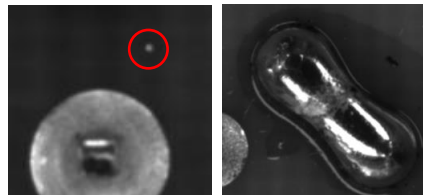
Solder ball, insufficient/ bridge soldering

Roll out for to 2 stations to replace Viscom 2088



OK

Insufficient  
soldering



Solder ball

Bridge  
soldering





## B/E UNIQUE APPLICATION



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## Roll out to 2 stations



# AGENDA

1 5G

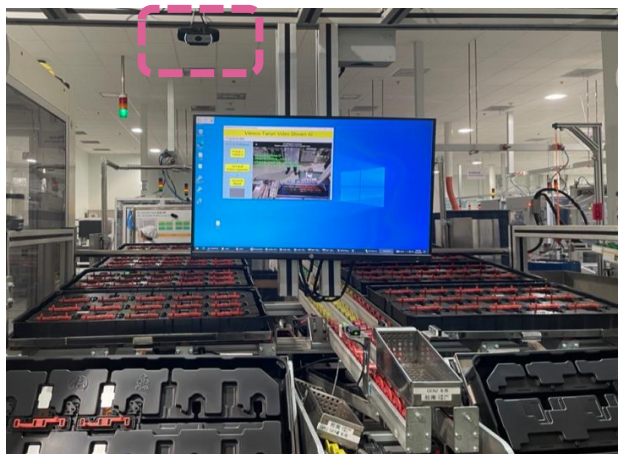
2 BIG DATA ANALYSIS

3 INFORMATION AUTOMATION

4 AI VISION APPLICATION \_\_\_\_ VIDEO STREAM AI

# VIDEO STREAM AI

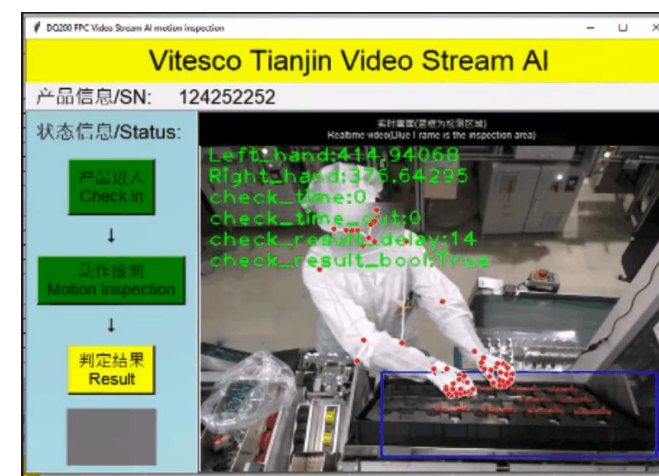
## CONCEPT



Video Camera



Beta version



Released version with MES



Video stream

Tianjin video stream AI is developed 100% by our engineer to detect some abnormal operator manual handling

- Camera: ~100 €, a normal USB video camera
- PC: Can share with Machine or MES PC
- S/W: Total developed in house by Tianjin plant IE engineer
- MES: Total developed in house, MES information include text and short video clip link



TESTS											
ID #	Testrun	Type #	P. #	B. #	S. #	Run Date #	R. #	Group #	Testplan	Version #	Station #
124252119	DQ000_FAA	P	0	Id		21.10.22 13:48:58	P	A2C7878940800	DQFPLS	2	DQFPLS
124252119	DQ000_FAA	P	0	Id		21.10.22 13:50:40	P	A2C7878940800	CELL_B	1	DQFVACB
124252119	DQ000_FAA	P	0	Id		21.10.22 13:52:03	P	AI_GROUP	DQFHV	1	DQFHV
124252119	DQ000_FAA	P	0	Id		21.10.22 13:54:02	P	A2C7878940800	CELL_C	1	DQFSCB

\\10.192.97.84\VT\_video\_stream\_AI\_save\DQFHV\20221021\124252119.mp4



# VIDEO STREAM AI

## CONCEPT



Video stream



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# VIDEO STREAM AI

## ROLL OUT

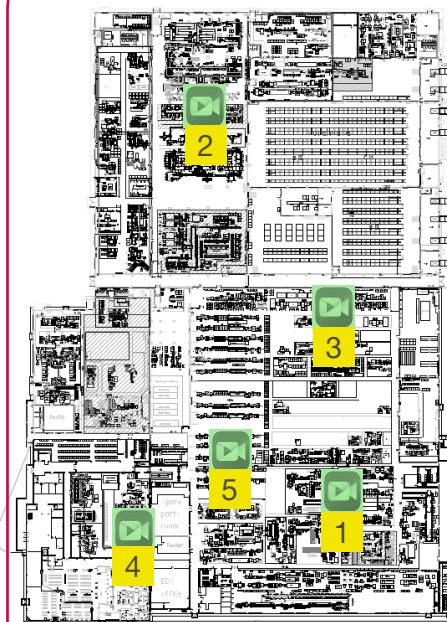


Video stream



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### Roll Out Plan In Plant Tianjin

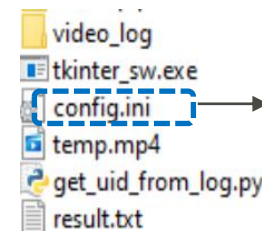


1 pilot case released.

21 usage case in plan until now.

- FF1 DQ200 FPC pick motion inspection : 9 (1 released ,8 in plan)
- FF1 Cover pressing turn inspection: 3
- FF1 PM inspection: 1
- FF2 Motor Gauge using inspection : 1
- FF2 Motor ring assembling inspection : 1
- FF2 Motor manual photograph inspection: 1
- FF3 Inverter bond inspection : 1
- FF3 cable pulling inspection : 1
- FF3 GP12 inspection: 1
- FF1 T76 heavy product handling inspection : 1
- SMT splice tape inspection : 1

### Roll Out Potential In Other use cases or locations



```
config.ini - Notepad
File Edit Format View Help
[trigger_mode]
#触发检测的条件:
#MES 为根据GHP log的check in进行触发, 会根据check in的结果上传MES数据
#VIDEO 为根据视频检测, 如果有手进入检测区域, 如果在time_out时间内有双手拿取的动作, 就会输出结果
trigger_mode=MES

[log_file_path]
#mes log文件的路径
path=D:\MES\DQFVAC with Adapter 2.18\Logs\tracer.txt

[monitor_rect]
#检测的矩形框范围
x_left_top=250
y_left_top=330
x_right_bottom=630
y_right_bottom=450

[check_time_out]
#超时就直接fail, time_out的数值是帧数
time_out=500000

[check_time_out_start]
#如果已经检测到一只手, 缩减time_out的时间到这个参数
time_out=100

[hold_time]
#需要保持的时间(帧数), 超过保持的帧数, 判定成功
time_hold=2

[camera_no]
#摄像机的ID, 一般默认是0
camera_no=0

[mes_info]
station_id=DQFHVI
test_plan_group=AI_GROUP
test_plan_name=DQFHVI
```

- For easily roll out to different use cases or locations, the S/W of video stream AI have been developed with a config file.
- It is easy to adjust parameters ( from config file) by process engineer himself/herself who with limited coding knowledge.





# THANKS FOR YOUR TIME



Passionate



Partnering



Pioneering