

訂閱 OT大講堂 頻道， 即時掌握產業最夯OT新知



透過影片下方**需求諮詢單**或**留言** 您的需求，將由專人為您服務!

Contact
需求諮詢

方案類別

數位科技 數位智 智能儲運 討論 智能品質

整線自動化 上下料 智能品質

智能加工 物件辨

需求諮詢單

諮詢內容

可輸入 500 字

留言

0則留言

我想 **留言**

0 0 收藏 分享

OT大講堂

每週10堂OT應用主題

週二10:00~週五17:00

 刀具管理

 MACHSYNC

機械觸覺於智慧製造之應用

無限次數回放觀看，彈性掌握學習時間

機械觸覺於智慧製造之應用

陳瑞騰 總經理
馬森科技股份有限公司



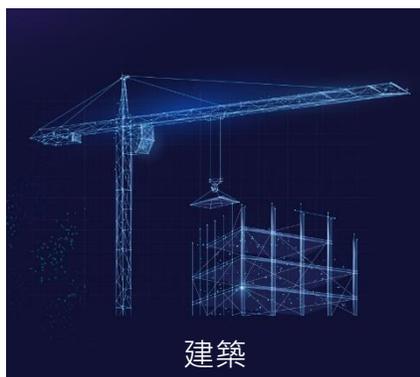
馬森科技的願景

MACHINE + SYNCHRONIZATION

我們勇於開拓不同的領域媒合，將物聯網與感測應用導入到工具機械、切削加工、建築、汽車與電機等領域，不僅只是改善產業的數位轉型問題，也賦予工具生命力，致力於打造萬物聯網的生活環境，因此「成就未來式」是馬森始終秉持的原則，我們所做的每件事、每個決定，都是為了締造未來任何可能發生的進步之事。



航太



建築



汽車



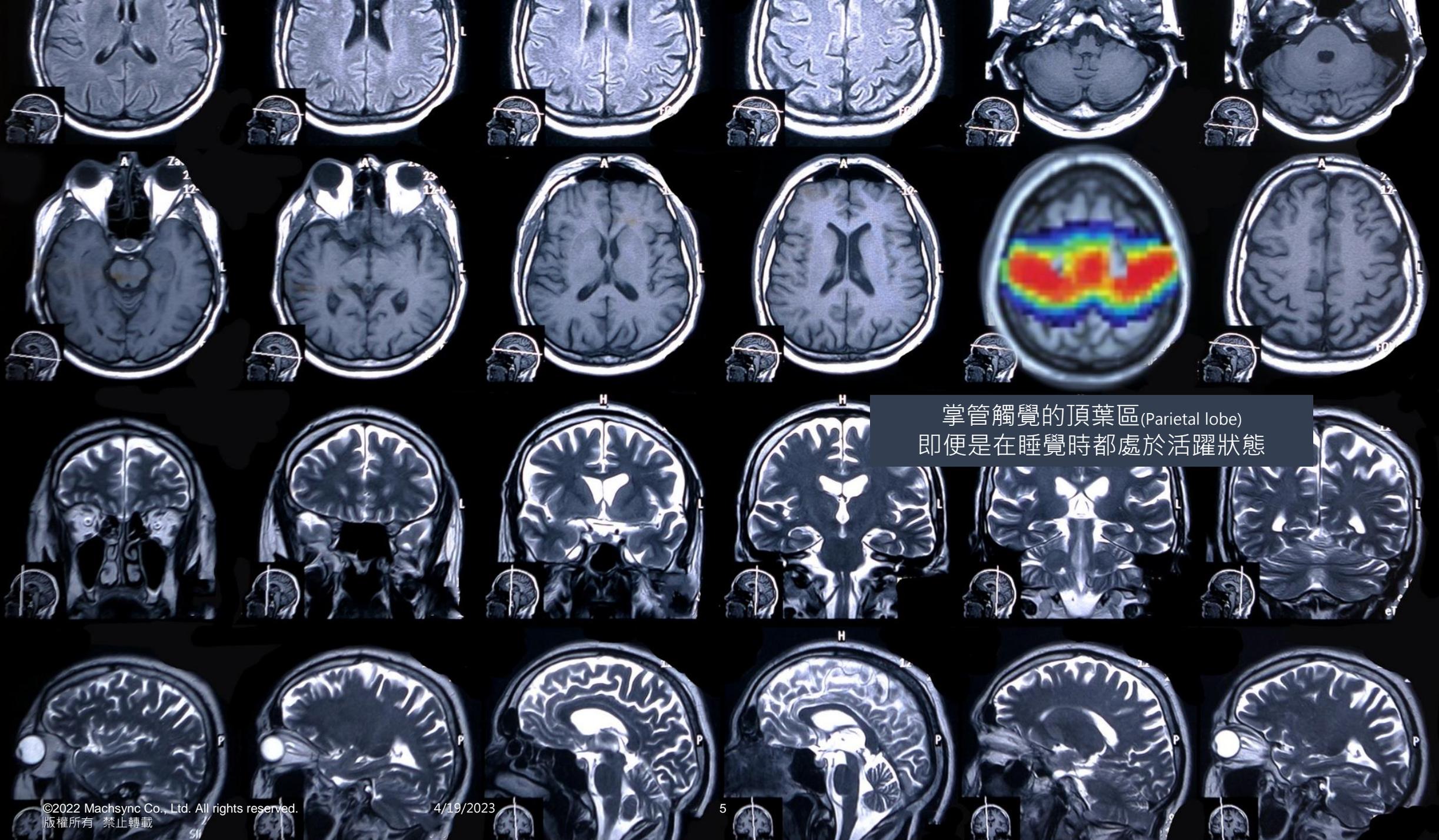
機械



硬體電機模擬

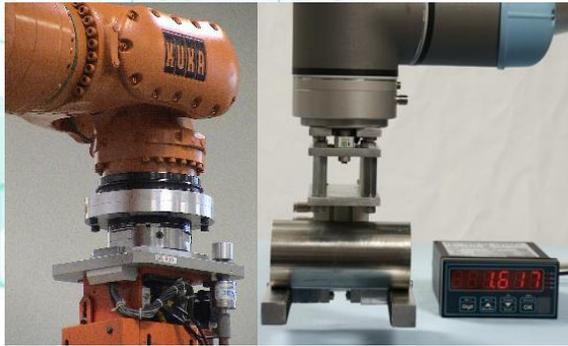


1960 珍古德 博士發現, 靈長類黑猩猩能藉由延伸肢體的外在感知「末梢觸覺」運用樹枝撈取白蟻, 懂得製作捕食工具, 能與人一樣理性思考、擁抱、親吻、拍背等行為。



掌管觸覺的頂葉區(Parietal lobe)
即便是在睡覺時都處於活躍狀態

佛學六塵解釋機械如何開智慧



如:機械手臂施力感知於各項應用

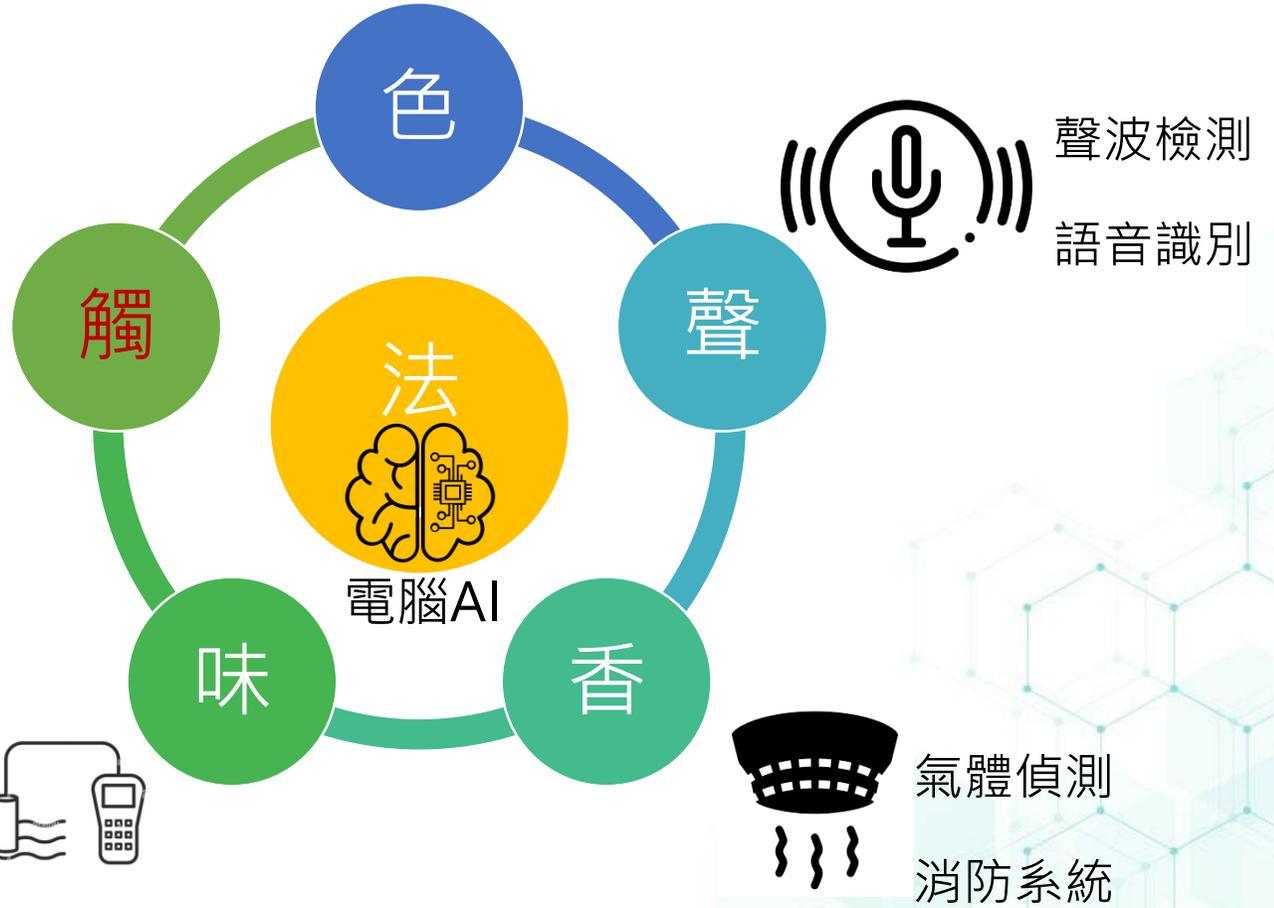
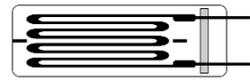
近接/溫度



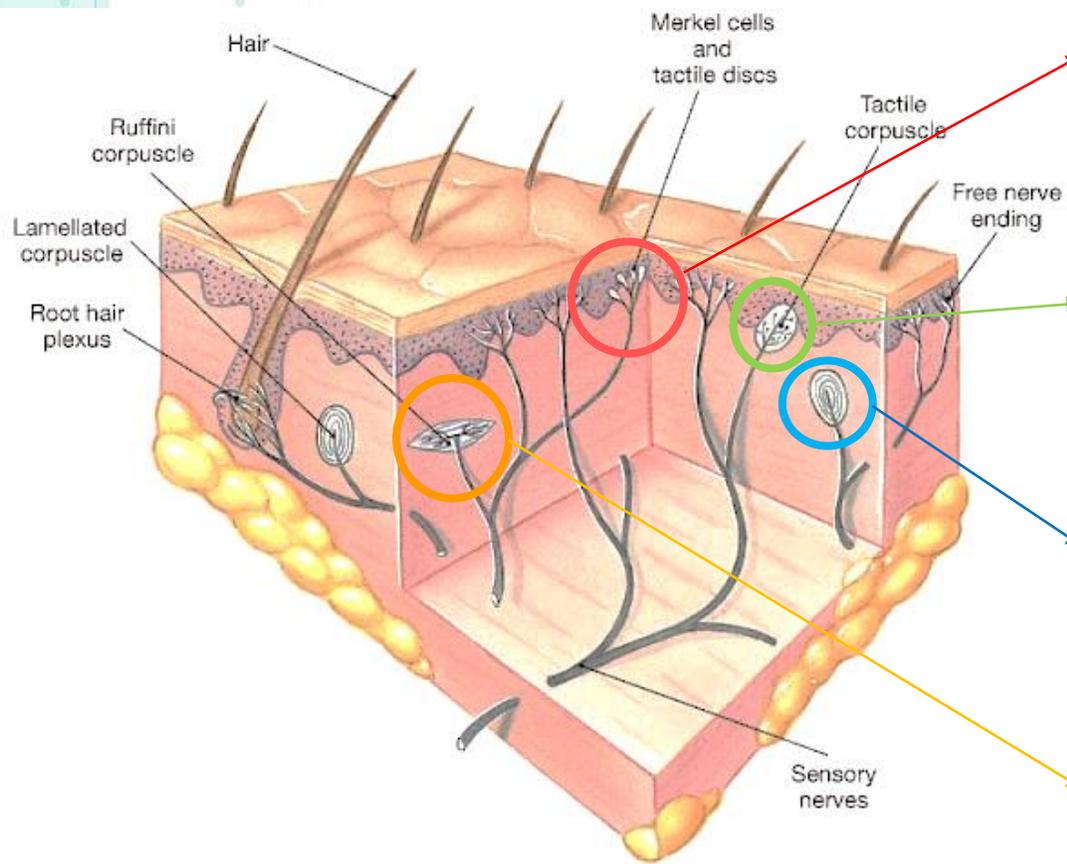
振動感測



應力應變



運用感測器開啟智慧的延伸基礎-觸覺



默克爾神經末梢 (觸覺盤)

形狀、邊緣辨識



邁斯納小體 (觸覺小體)

輕微觸覺



帕西尼氏小體 (環層小體)

壓力感知

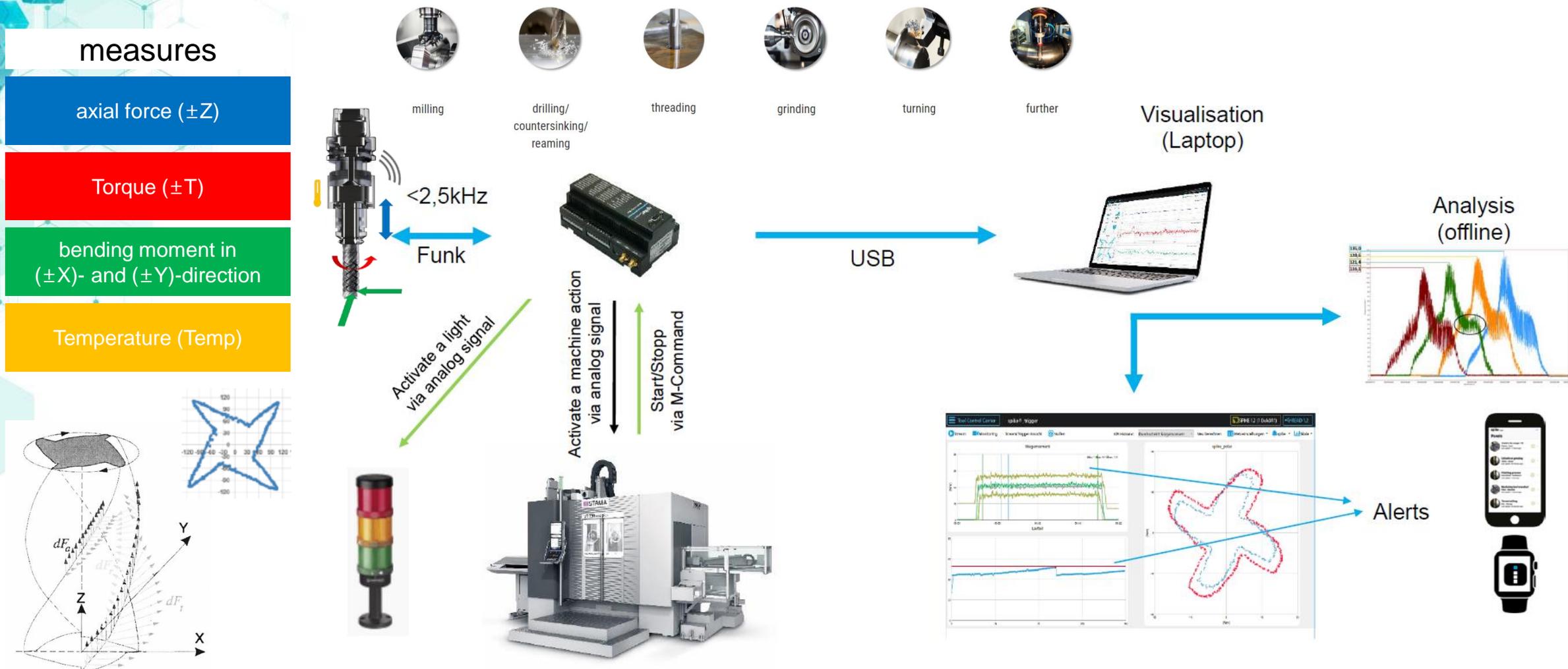


魯菲尼式小體 (球狀小體)

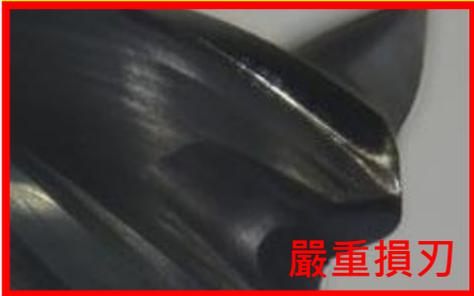
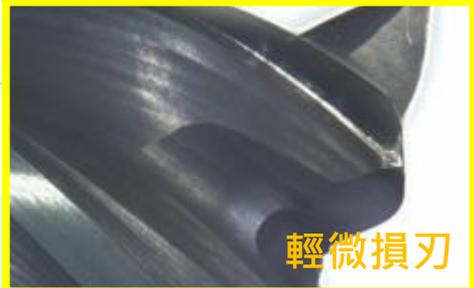
拉伸張力



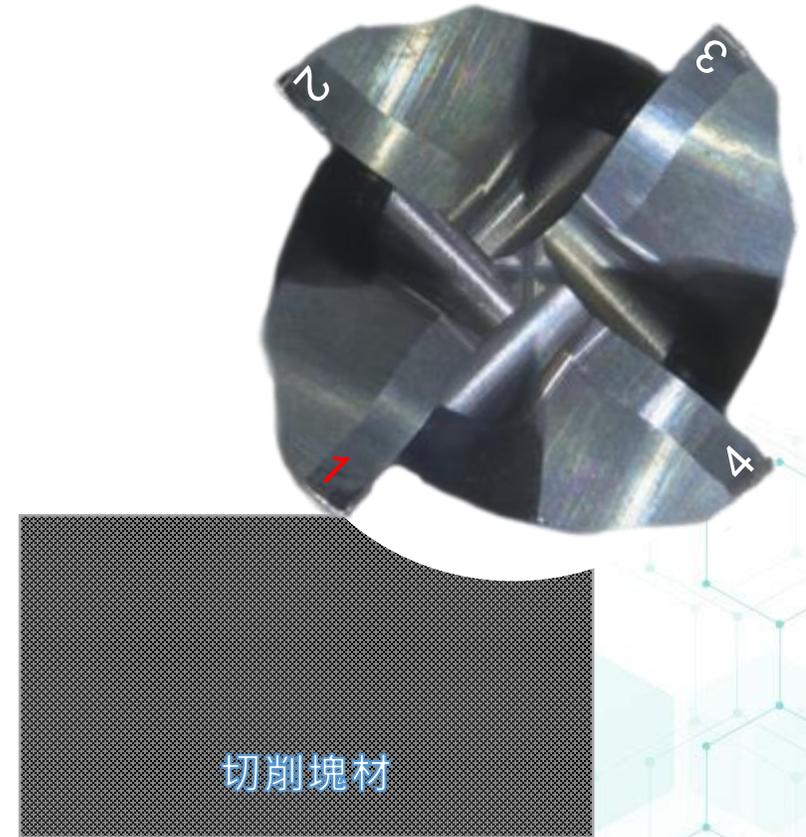
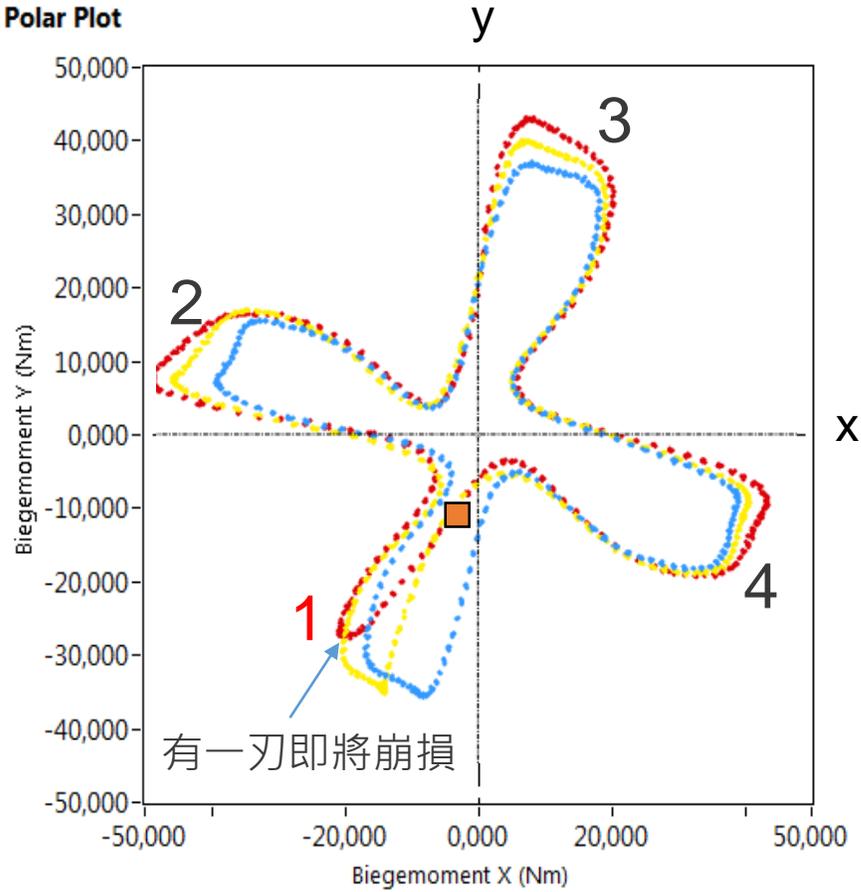
讓工具設備擁有觸覺就是擁有智慧的開端



將銑削力視覺化的Polar Plot



spike® Polar Plot



從加工時就已經完全監控品質

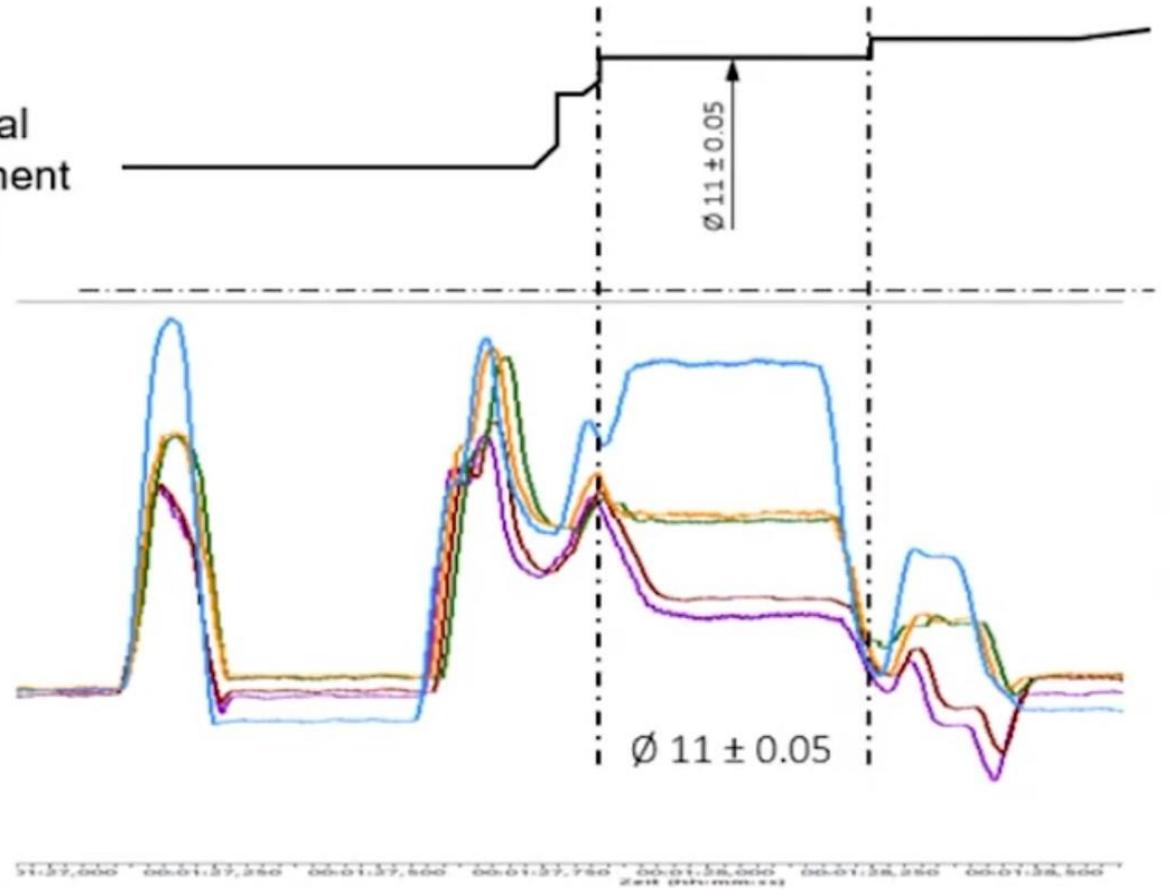


Main Goal: Correlation between the dimensional accuracy of the component and spike[®] force levels

Actual Dimension:

- Comp. 1: 10.5484
- Comp. 2: 11.0021
- Comp. 3: 11.0006
- Comp. 4: 11.1023
- Comp. 5: 11.1103

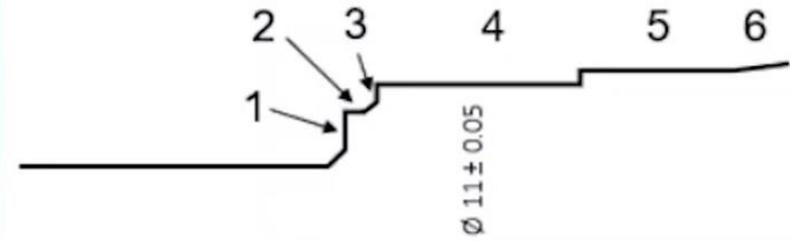
加工件的尺寸隨著刀片耗損而產生改變，在不停機生產的原則下，為了維持緊配的公差標準而定錨出公差帶的切削力監控，讓工具機得以自動做到尺寸補償機制，讓刀具壽命充分用盡，也不會產出不良品。



從加工時就已經完全監控品質



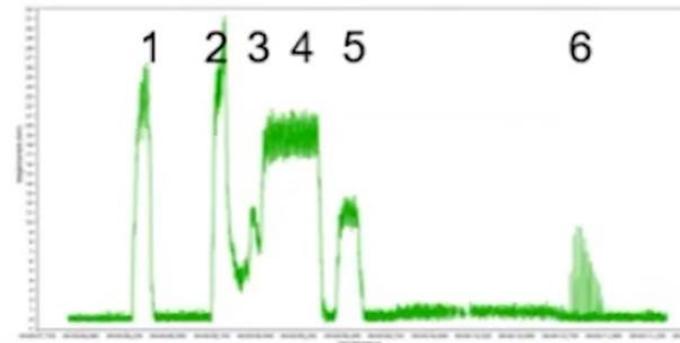
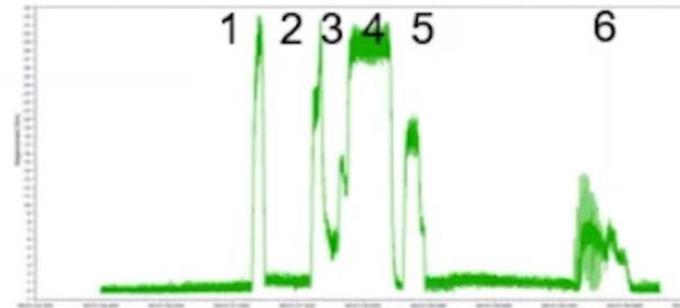
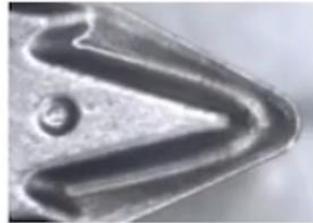
Process fluctuation
 due to cutting edge breakage
 → force level significantly reduced (area 6) shows cutting edge breakage



Optimization	
Actual tool life time	350 h
Optimized tool life time	500 h

Facility Data	
Number of machines	8
Additional parts with less spot checks per machine per day	60 Pt.
Production days per year	215 d
Additional producible parts per year	103,200 Pt.

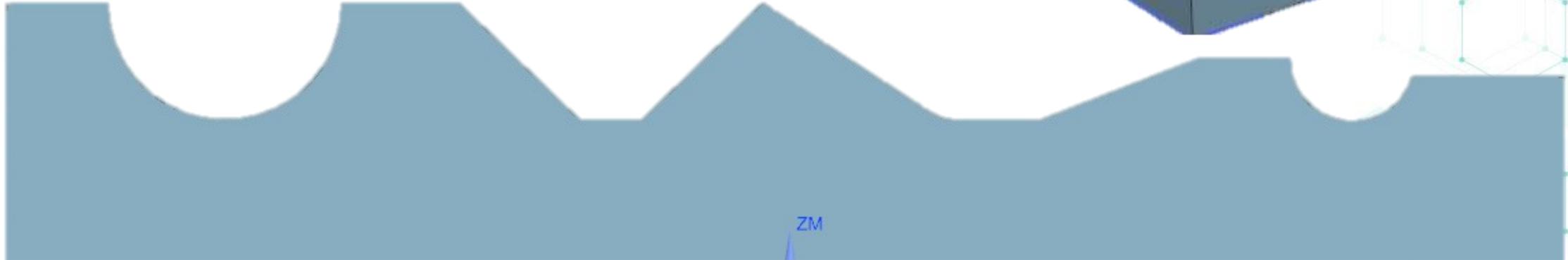
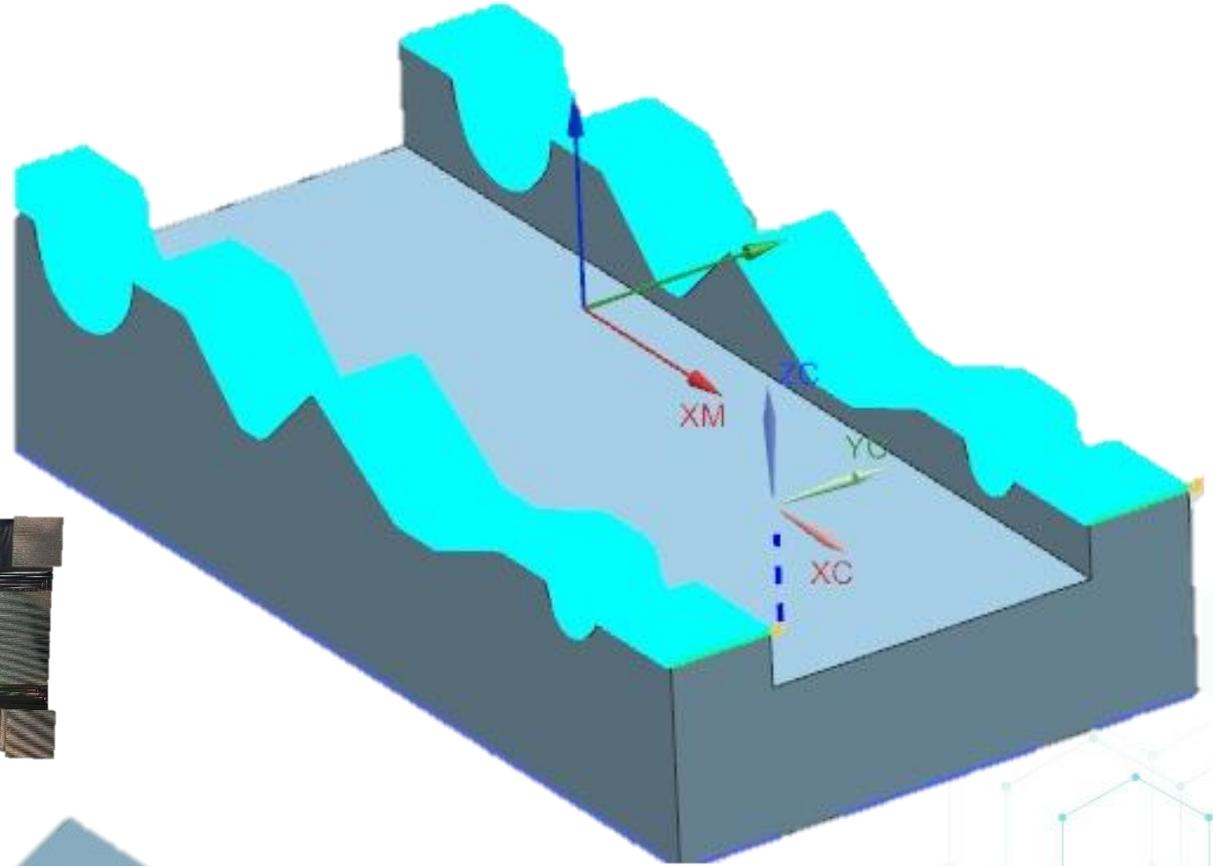
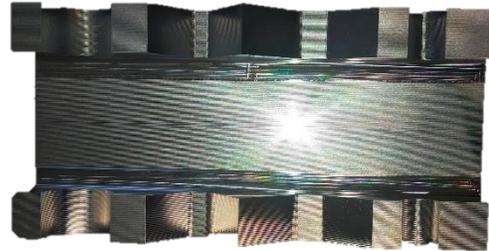
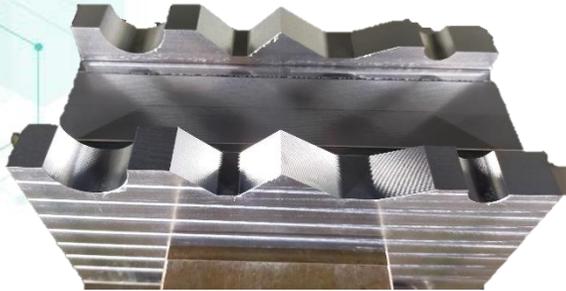
Calculation of Cost Savings	
Tool cost	7,714 €
Machine cost	21,250 €
Tool test cost	26,280 €
production error cost	121,200 €
QA cost	309,600 €
Savings potential saved per year	486,044 €



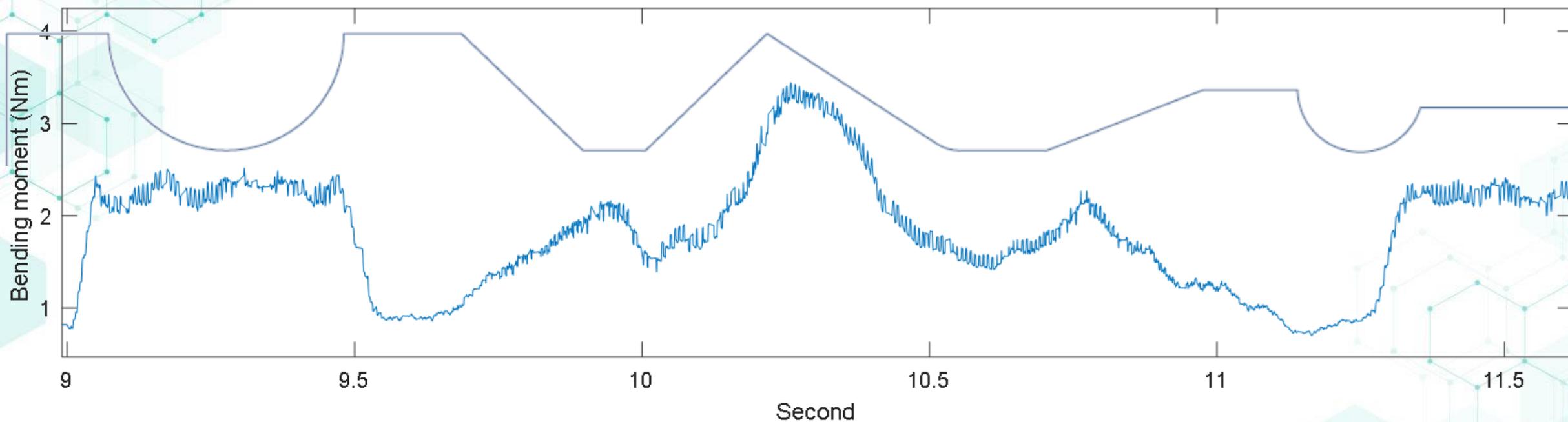
總共成本節省約：17,000,000 NTD/年

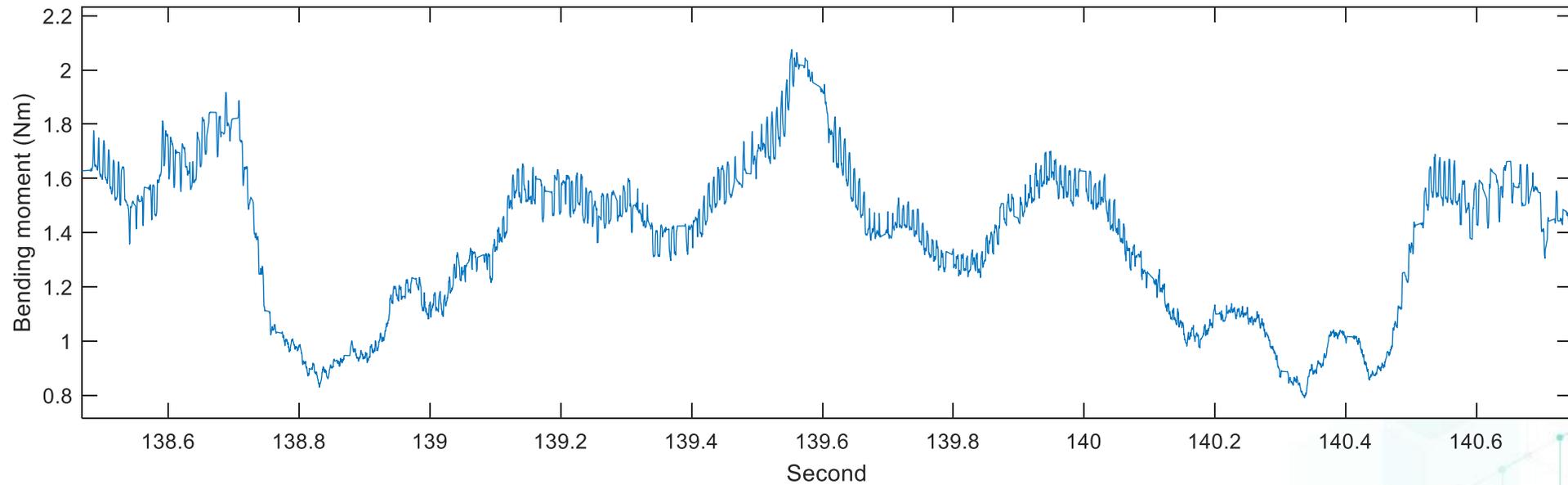
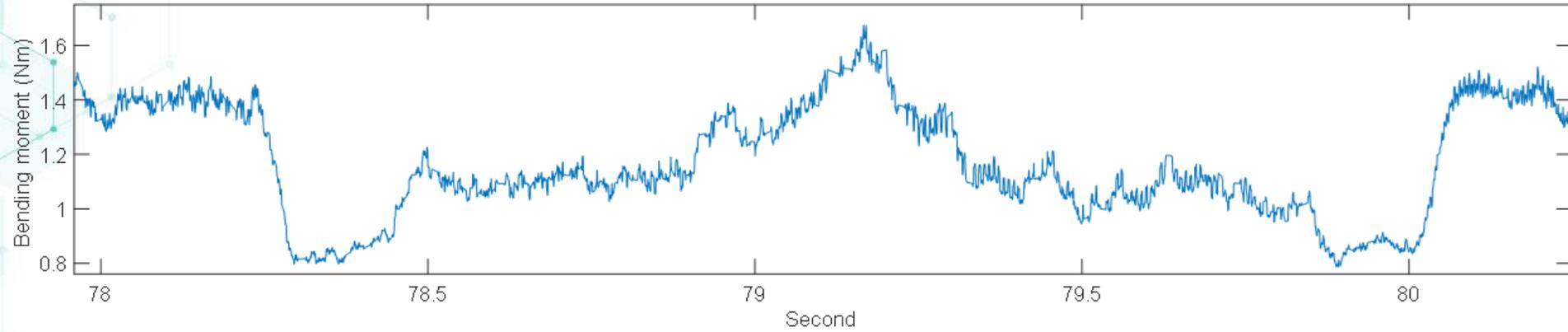
展示切削加工參數與工件

D6球刀. 順逆銑
F=1,600mm/min
S=8,000rpm
ae=0.35mm
ap=0.2mm



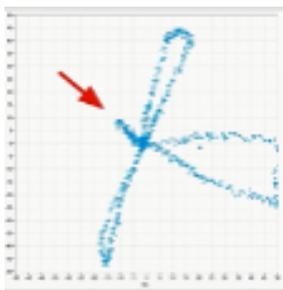
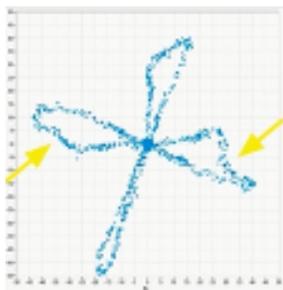
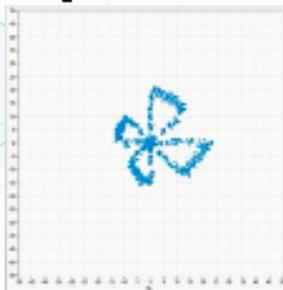
主軸空轉下 智慧刀感測的現象



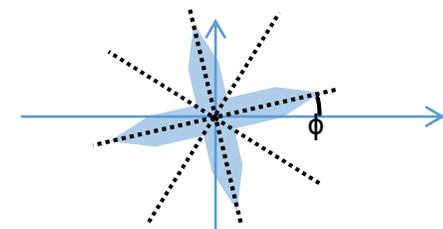
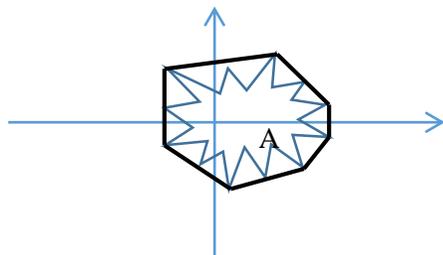
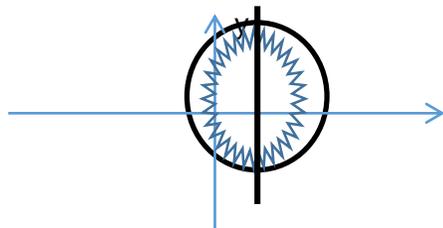


從數據化邁入演算法學習

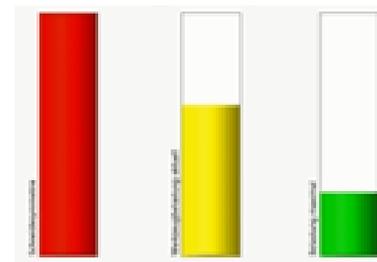
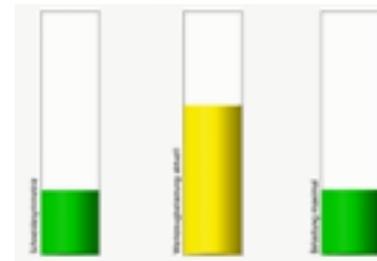
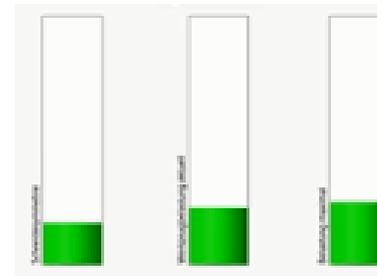
spike[®]_polar



spike[®]_AI



spike[®]_kpi

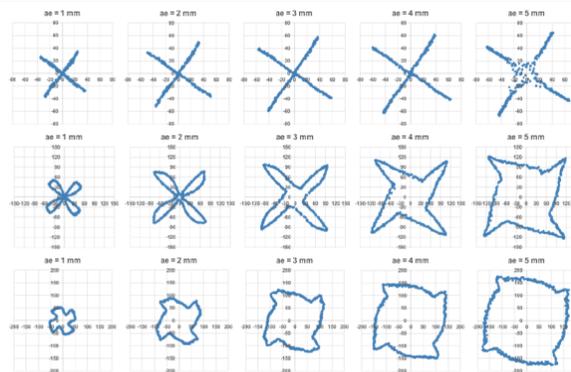


將演算法自主學習而真正邁入智慧化應用

$$f(\text{Diagram of a gear with x and y axes}) = \text{machining quality} \begin{cases} \text{Good} \\ \text{Not good} \end{cases} \%$$

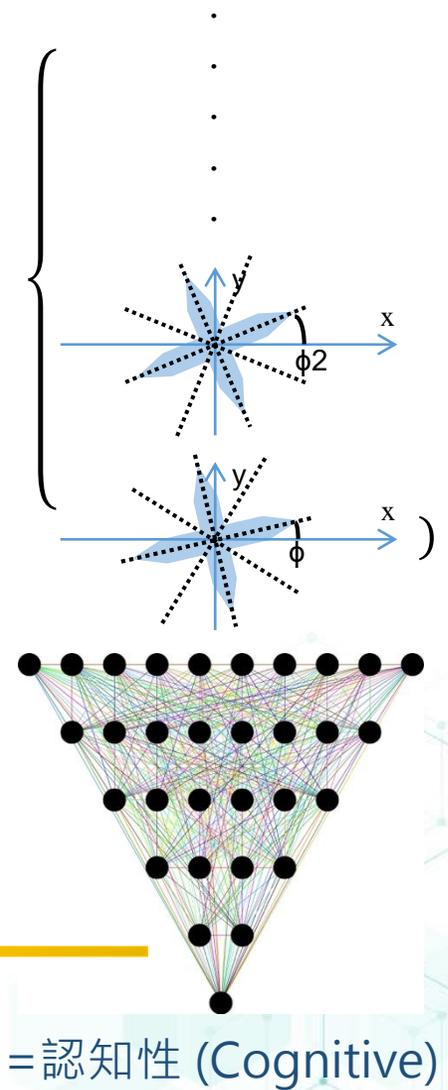


Learning Algorithm (

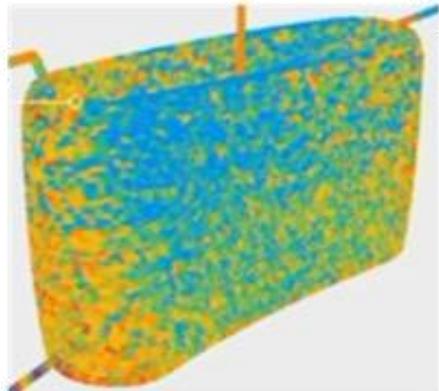
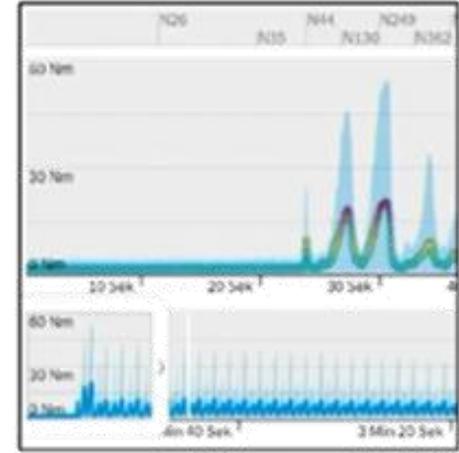
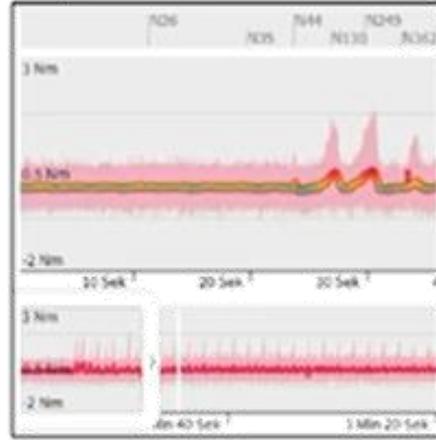
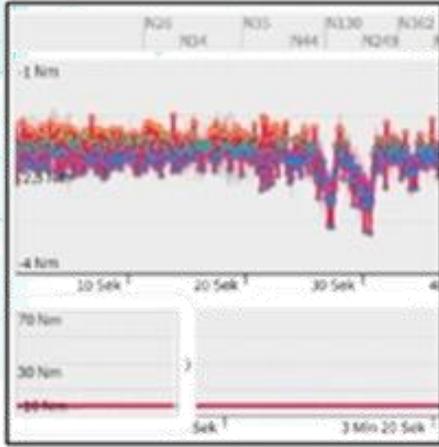


) = f(train

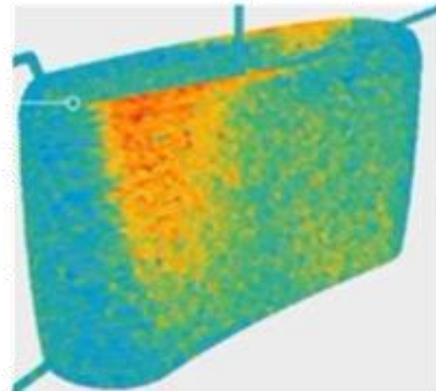
No error	Label tool wear	Label run-in error	Label tool run out	Label chip removal error	Label cooling error
Quality					
Tool load					
Stability					
Bending moment B _{xx} cutting tool retract					
Torque M					
Axial force F _x					



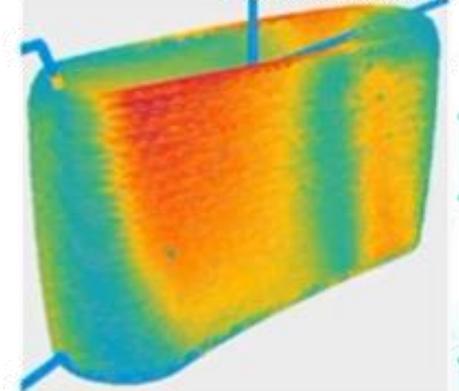
首件品質量測(量測參考基準)



馬達

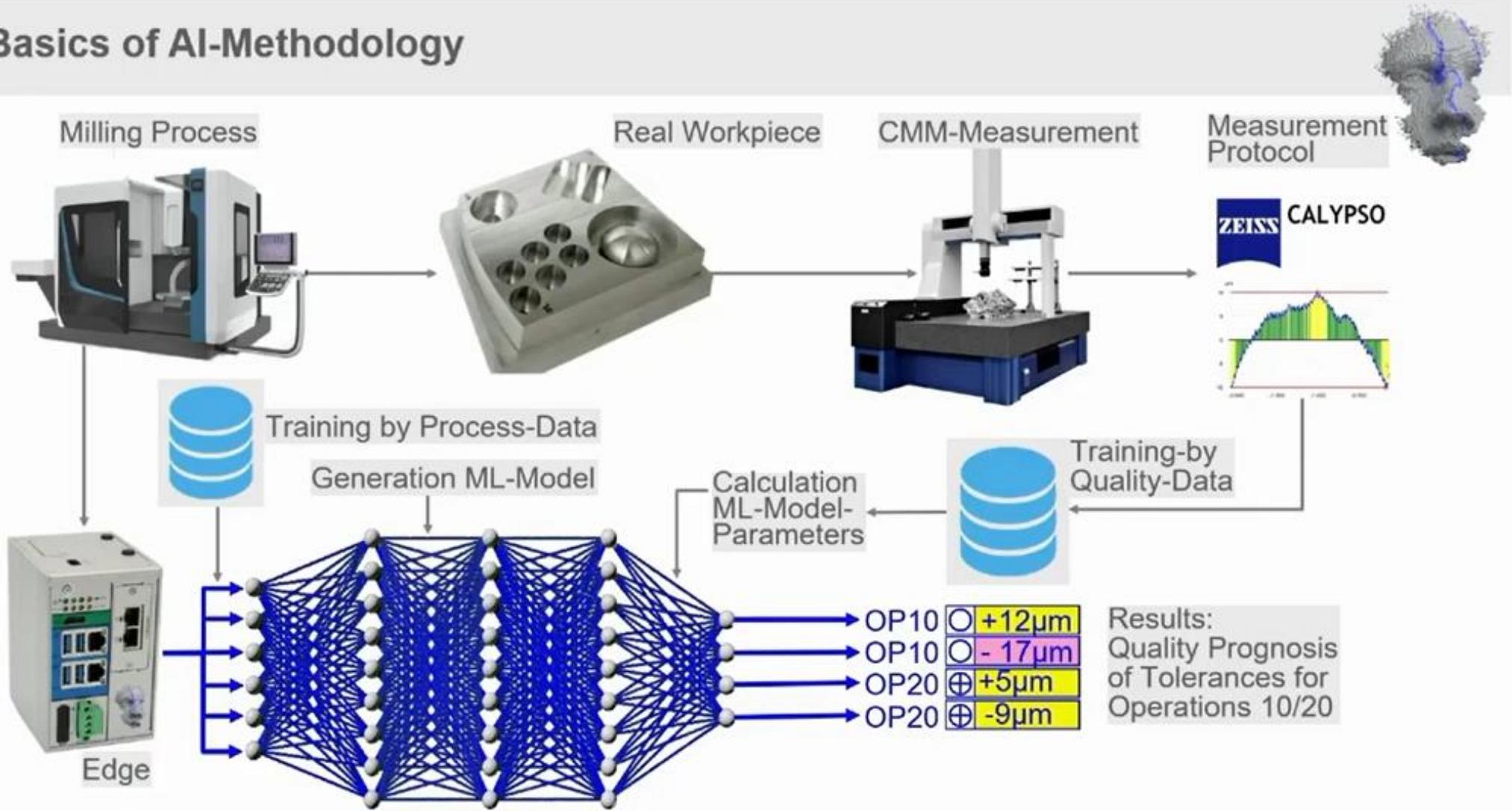


扭力

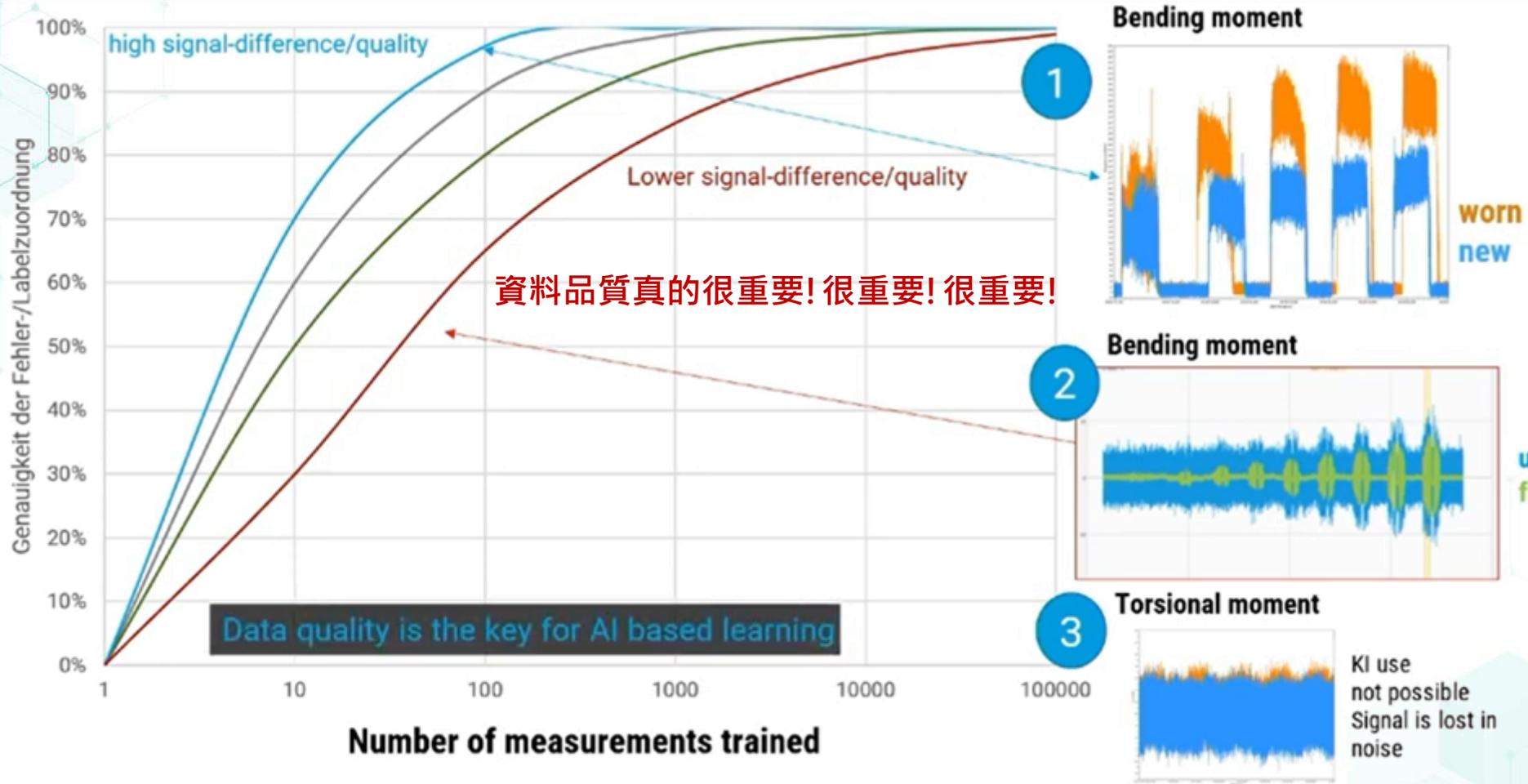


彎矩力(觸覺)

Basics of AI-Methodology



自動形態辨識關鍵要素





Thank You

 MACHSYNC

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 AGV

 AOI

 機械手臂

 機聯網

 能源管理

 元宇宙

 系統整合

 刀具管理

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