

Irish Manufacturing Research PTMA Meeting Takumi May 2023

Technology Centre – EI IDA
collaboration



Irish Manufacturing Research

- Dublin



- Additive Lab – Mullingar
(40 minutes outside Dublin)





Why are we Set Up

- One of Biggest Threat to Manufacturing Jobs - Emerging Technologies
- IMR is a Mid to Late Stage TRL RTO



DEMYSTIFY, DERISK, DELIVER

emerging technologies
for manufacturing



WHAT WE OFFER



Industrial pilot
lines and test beds



Highly Skilled
Researchers



Prototyping
services



Industry
networks



Access to
national funding
and European R&D



Large-scale
collaborative
Research

Precision Engineering at IMR



Current Technology

- Doosan Puma 2600SY II Turning Center
- Fully automated production cell
- Fanuc Robodrill α D21LiB5
- Spindle balancing/offline tool setting
- Hypermill/Edgecam CAD/CAM
- Full suite of training capabilities



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MILLS CNC

TECHNOLOGY
CENTRE
ENTERPRISE IRELAND
IDA IRELAND SUPPORTED

New Technology



HEXAGON

- Hexagon Global S CMM with scanning
- As part of Membership offering
- Looking to explore CMM and quality engineer training offering/ PCDIMIS Training

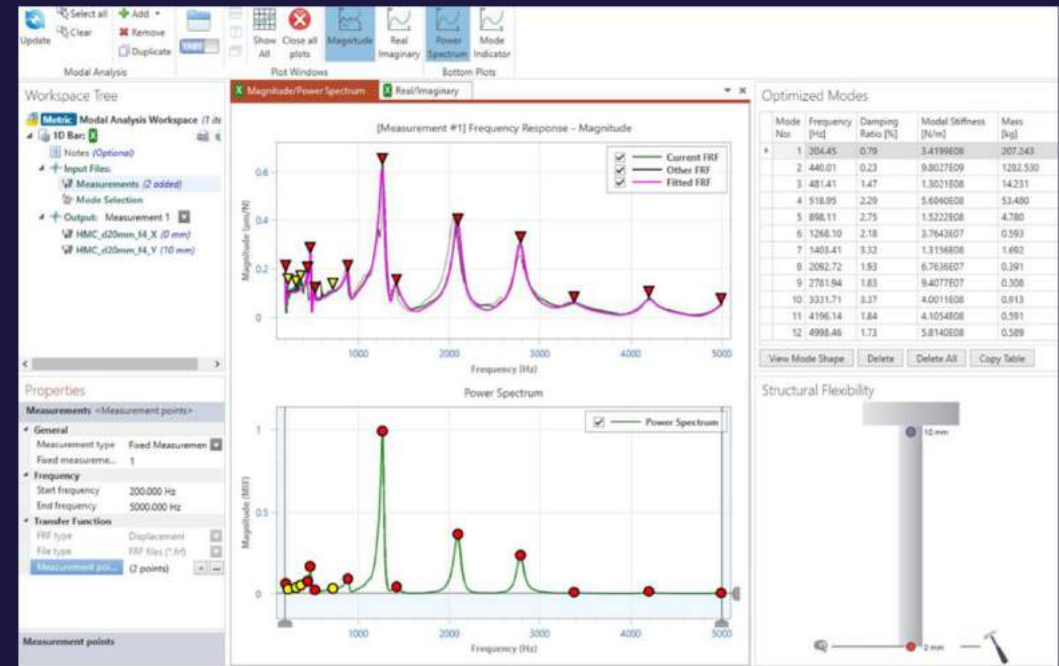




New Technology

Suite to tool optimization test capabilities

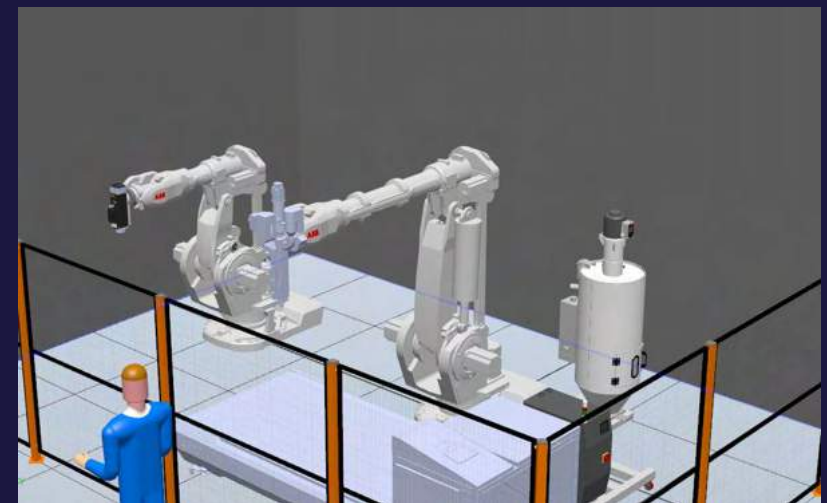
- Line to line comparison
- Cutting feed and speed optimization through MAL software.
- Stability Lobe simulation for calculating appropriate speeds, depths and cutter immersions
- Measurement of tool and machine frequency response functions





New Technology

- ABB Robotic Hybrid Machining Cell
- Capable of Printing and polishing applications
- Printing Materials – PEEK, PETG, PC, PEI, PIPG, Recycled materials, Carbon
- Print Capacity – 24 kg/h
- Build Volume – 2m x 1m X 1m
- 12,000 Rpm HSK63 Spindle





New
Technology

CNC Training at IMR

IMR Precision Engineering Training



- CNC Controller and Machine operation Training
- CAD/CAM hyperMILL Training
- GD&T Training

- In Partnership with well established training providers
- To help complement company training
- Developed with industry input
- All courses are **Engineers Ireland** CPD Certified
- Delivered in conjunction with **AMTCE**
- Full funding provided



CNC TECHNOLOGY



Controller Training

- Delivered through advanced individual simulators replicating machine controller
- 3 days full time at IMR Mullingar
- Max per class is eight
- Successfully ran multiple courses to date



Day 1 Module 1 Fanuc Milling ISO Code

1. Introduction
2. Explanation and Purpose of the Course
3. Machine Layout, work datums, G54~G59 & G28 Reference
4. Explanation of Absolute G90 & Incremental G91 Programming.
5. Tool Offsets. D & H Codes & Applying G43 Height & Radius Offsets
6. Movement Using the Rapid, Feed & Circular Commands ie: G0, G1, G2 & G3
7. Explanation of Feed-rates G94 mm/min & G95 mm/rev
8. Applying Cutter Comp G41 & G42 with Auto Corner Chamfer Function
9. Using a Sub-Program to Repeat Shapes etc.
10. Using Rounding & Chamfer Function & Facing Off & Adjusting Offsets.

Day 2 Module 2 Fanuc Milling ISO Code

1. G73, G74, G80~G89 Canned Cycles for Drilling
2. G84 & G74 Rigid Tapping
3. G10 Data Input for Offsets
4. G68 Co-Ordinate Rotation .
5. G16 & G15 Polar Command
6. Examples of using the above .
7. Thread Milling and G2 & G3 using I, J & K Function
8. Review of Examples done at Home/Work

Day 3 Module 3 Fanuc Milling NC Guide Conversational

1. Fixed Forms, Creating, Editing & Deleting .
2. Tool Data Base, Creating and Setting.
3. Billet Size, Start Menu, Cycles & End Menus.
4. Pocketing & Facing Cycles
5. Hole Machining & Thread Milling menus
6. Pocketing, Grooving Contouring Irregular Shapes
7. Copy, Rotate, & Mirror Shapes, Engraving
8. Time Studies, NC Conversion, Review of Examples done, Back Up Data.



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CNC Milling Course #1 - Controller - Basic 3 Axis (X , Y & Z) Milling



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Day 1 Module 1 Machine types and milling basics

1. Machine health and Safety – PPE, interlocks, emergency stops
2. Standard machining configurations – 3, 4, & 5 axis – vertical, horizontal, VTC etc
3. Machine interface. Program start, stop, wear/off set pages. Edit/Auto pages, Program call up
4. Clearance areas within the machine – what to watch out for.
5. Types of work holding – Vice, hard jaw, soft jaw- setting up of single and multiple vices.
6. Zero point fixturing, self centring
7. Basic tools paths and how to identify –facing, shoulder milling, slot milling, climb milling V conventional milling. Typical parameters for each – what to/ not to do.
8. Basic machining strategies – tapping, thread milling, reaming, boring. Typical parameters for each – what to/ not to do.

Day 2 Module 2 Tool Management and Part inspection

1. Changing of tools and tips, proper placement, cleaning, care of tool and screws
2. Feeds and Speeds – calculation of
3. How to recognise when a tool is worn. How to identify wear patterns.
4. Changing of wear offsets. How to, why to, what happens when you don't
5. Cutting conditions – swarf control, sound of proper cutting/ boring, drilling, chip breaking.
6. Cutting conditions – coolant management, importance of coolant in the proper position and how swarf can impact.
7. Part inspection and proper use of inspection equipment – verniers, micro-meter, slips.

Day 3 Module 3 Part Setting and Prove out

1. Datums – what are they, how to set, how to check through MDI or auto run so as not to crash into part
2. Probing systems
3. Proving out of programs – approach to, interferences,
4. Optimisation of programs – reduced rapid movements, tool station configurations.
5. Each to develop check sheet for part setting
6. Scenarios and test cuts on parts.

CNC Milling Course #2 – Hands on Milling - Operator to Setter.





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Geometric Dimensioning & Tolerancing (GD&T)

Upcoming dates available:

8th May – GD&T ASME Level 1 SOLD OUT

3rd July – GD&T ISO Level 1

9th October – GD&T Level 2

AMT
CE

Lead Office
Rox Foshale
And O'Connell
Advanced
Manufacturing Training
Centre of Excellence



REGISTERED TRAINING PROVIDER 2021

Training Course



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Top plate specification:



SchuFI
innovative valves, precision engineering

Mc Donald
INTERNATIONAL LTD.

R Reynaers
Aluminium

Schivo

ZIMMER BIOMET

Shannon Precision
Engineering Limited

TÉCOMET.

MANN
ENGINEERING

KEY
Plastics

Prodieco

teg

TAKUMI

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Next Training dates and courses:



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Date From	Date To	Description
23-May	25-May	2 axis turning
06-Jun	07-Jun	Fanuc Custom Macro B (2 Day)
20-Jun	22-Jun	CNC Turning Course #2 – Hands on Turning – Operator to Setter (3 Day)
03-Jul	05-Jul	Geometrical Tolerancing to BS 8888 & ISO Standards – Level 1
12-Jul	14-Jul	Hypermill Part 1
25-Jul	27-Jul	CNC Turning Course #3 - Controller – Advanced 4 Axis Turning course covering C & Y on Fanuc control with ISO codes and NC Guide (3 day)
14-Aug	16-Aug	Geometrical Tolerancing to BS 8888 & ISO Standards – Level 1
16-Aug	18-Aug	Hypermill Part 2
21-Aug	23-Aug	Geometrical Tolerancing to BS 8888 & ISO Standards – Level 1
19-Sep	20-Sep	Fanuc Custom Macro B (2 Day)
03-Oct	05-Oct	Hypermill Turning
09-Oct	11-Oct	Geometrical Tolerancing to BS 8888 & ISO Standards – Level 2
17-Oct	19-Oct	CNC Milling Course #2 Hands on Milling – Operator to Setter (3 Day)
23-Oct	25-Oct	Geometrical Tolerancing to BS 8888 & ISO Standards – Level 1
15-Nov	17-Nov	Hypermill 5 Axis
21-Nov	23-Nov	CNC Milling Course #3-Controller-Advanced 4 Axis Milling Course covering the X, Y & Z and Additional 4th Axis

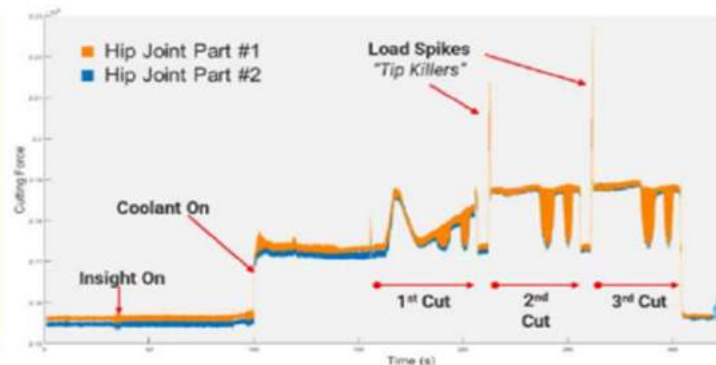
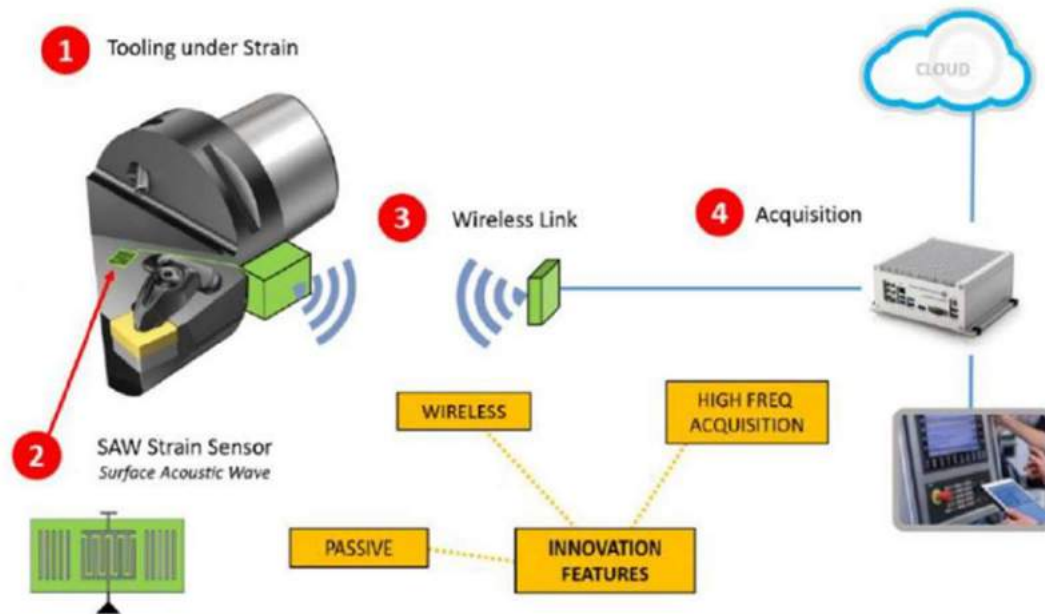
Course Costs:

For now courses are focused on delivery through companies only
Full Funding available through Skills to Advance Program

Register your interest and sign up to our CNC Training mailing list Training@imr.ie

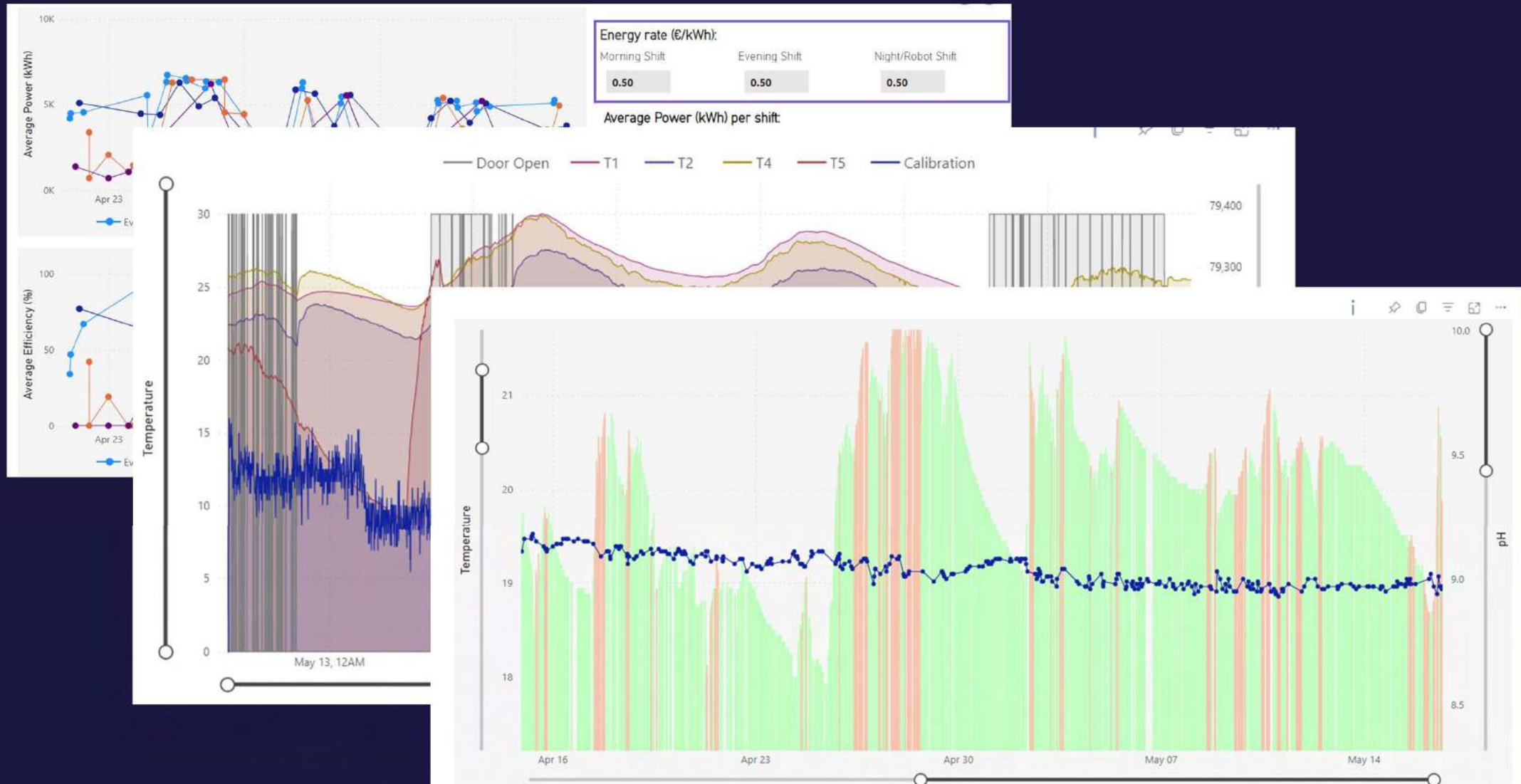
Precision Engineering Research at IMR

Cutting Tool Monitoring
Wireless Production ready solution

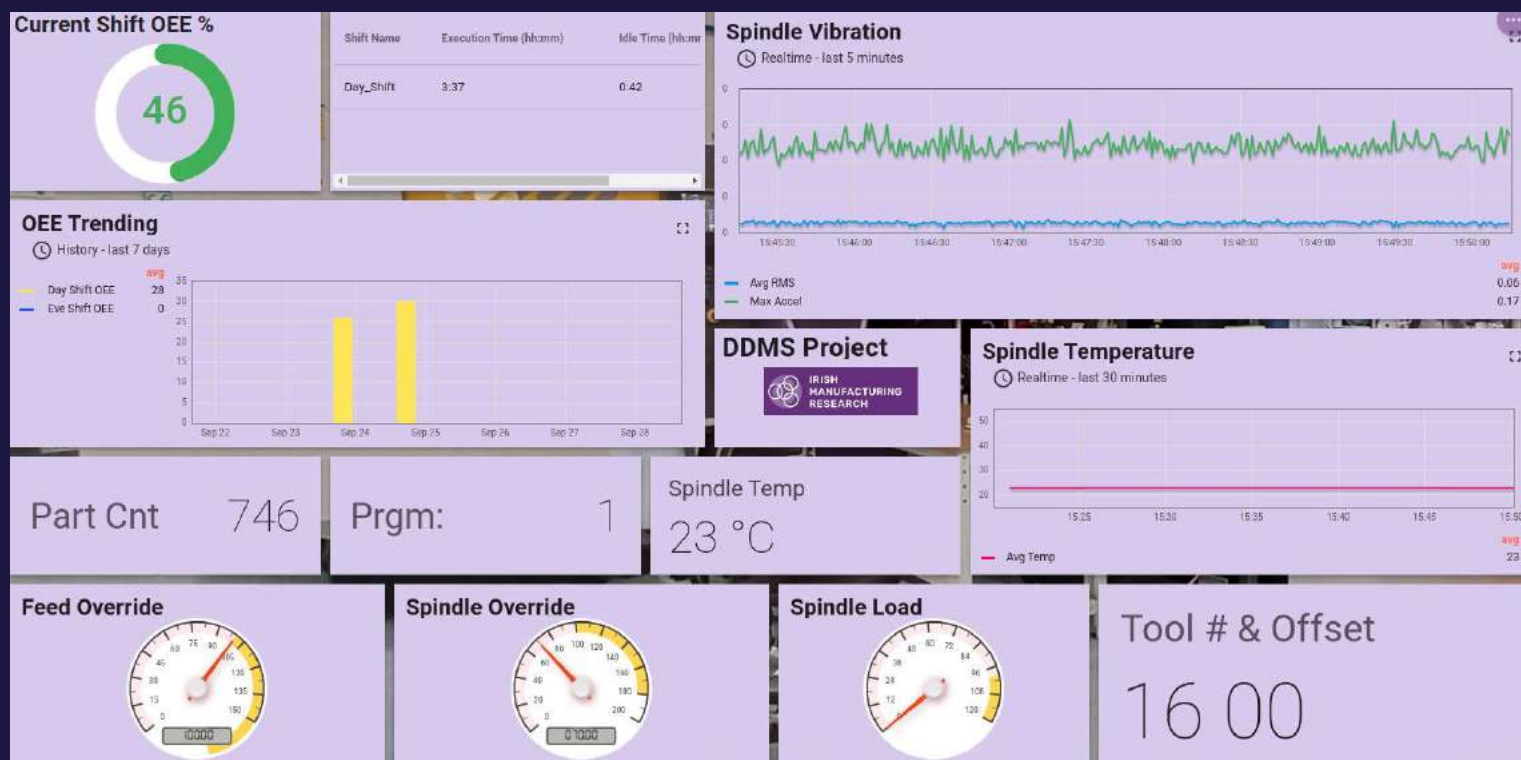


Already
producing
real-world
results:
hip joints

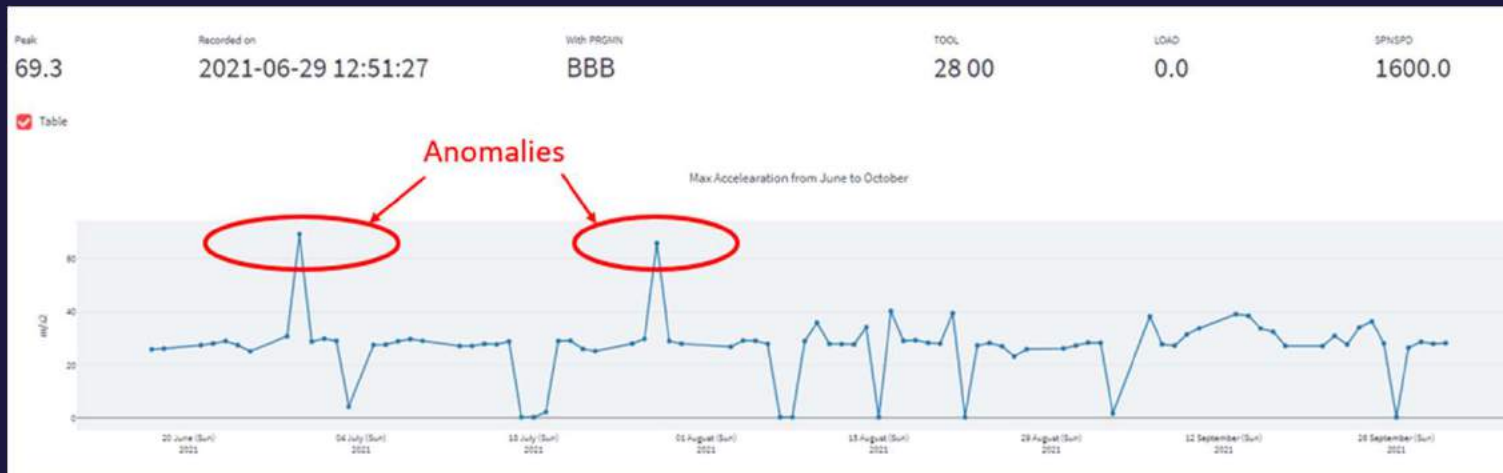
Current Research Projects



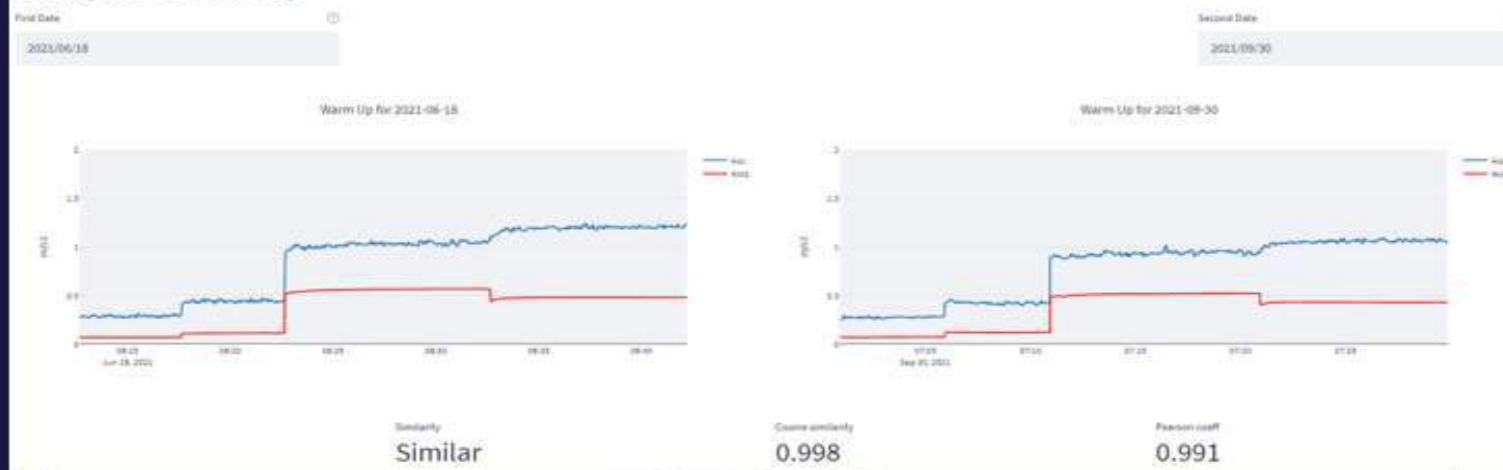
Digital Driven Maintenance Service



Spindle Analysis



Compare Warm Up



How to engage with IMR

Membership Program

- Tier 1
- Tier 2
- Tier 3

Competitive Funding

- National Funding
 - Enterprise IRE
 - Feasibility
 - IPP
 - Innovation Vouchers
 - SEAI
 - EPA
 - IDA Feasibility
- European Funding
 - H2020
 - LIFE
 - Smart Eureka

Direct Contract research

- 1:1 research with the company

Proposed September PTMA Event at IMR

Automation for Precision Engineering

How to automate your CNC process

- Part loading
 - Bar feed/robotics options
 - Requirements to deploy.
- Part inspection
 - In-machine inspection
 - CMM
- Tool Life and Swarf Management
 - Balancing tool life
 - Importance of swarf management

Format:

- Presentations by vendors & IMR
- Demonstrations of the technology



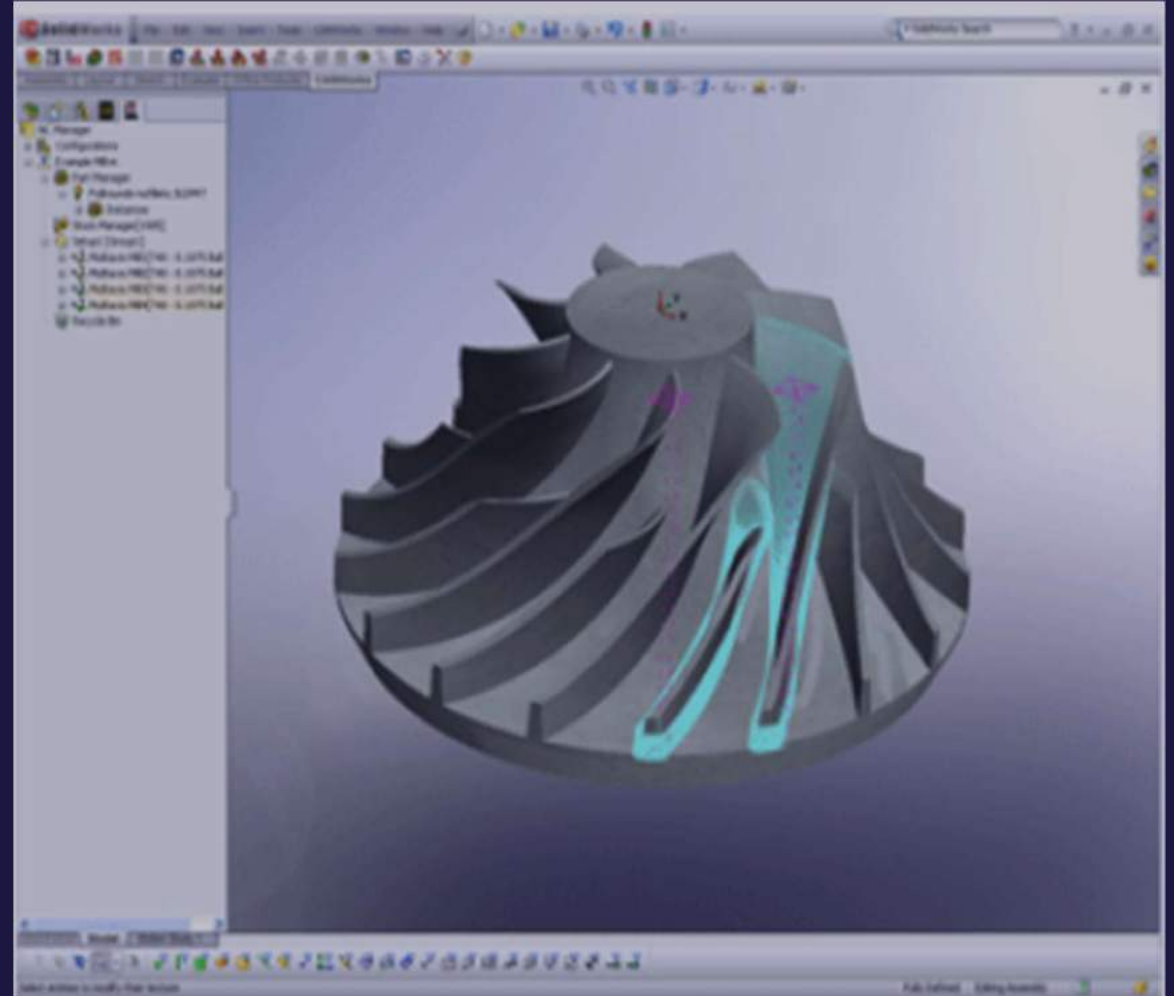
Advances in CAD/CAM technology

CAD/CAM technology

- Automated Programming
 - What is required and the possibilities
 - Parametric Programming
- Program simulation and optimisation
 - How much can we gain from automated program optimisation
- Mill-turn Programming
 - Approaches

Format:

- Presentations by Vendors and IMR
- Demonstrations of the technology
 - Program and optimise a part then run on the machine.



THANK YOU!

Any questions?

Chris.Judge@imr.ie