INSPIRING

Great British Manufacturing
IMPROVING PERFORMANCE AND PRODUCTIVITY FOR DEFENCE THROUGH ADVANCED MANUFACTURING TECHNOLOGIES
BACKGROUND

- Opened in 2011
- Independent RTO
- Secure facilities
- Prove innovative manufacturing ideas
- Manufacturing system solutions
- Training
The High Value Manufacturing (HVM) Catapult is the catalyst for the future growth and success of manufacturing in the UK.

We are developing extensive capability in manufacturing technologies and process expertise to grow the contribution of the manufacturing sector to the UK economy.

The MTC will:

- Identify and implement new technologies
- Undertake research and development
- Complete client or collaborative projects
- Increase operational efficiency
- Support the supply chain
- Provide technical training and employee upskilling
INDUSTRY CHALLENGES

You want to make something
- at a lower cost
- better quality
- quicker
- in higher volume
- you’ve never made before

You want to assemble something to
- minimise reject rate
- improve reliability
- improve consistency
- reduce waste
- reduce errors

You want to use data more effectively for
- improved design
- better quality
- efficient logistics
- new business models
MANUFACTURING INNOVATION

Component Manufacturing
- Additive Manufacturing
- Non-Conventional Machining
- High Integrity Fabrication

Assembly Systems
- Advanced Tooling and Fixturing
- Electronics Manufacturing
- Intelligent Automation

Data Systems
- Design and Simulation
- Manufacturing Informatics
- Metrology and NDT
Dr. Hannah Edmonds

- Technical Specialist in Digital Engineering at The Manufacturing Technology Centre and leads:
  - The Thermal Energy Research Accelerator (T-ERA) project for Factory In A Box (FIAB) Manufacture at MTC
  - The MTC’s Smart Manufacturing Accelerator (SMA), a service for delivering integrated manufacturing and supply chain solutions enabled by industrial digital technologies
Factory In A Box:
A disruptive supply chain solution enabled by industrial digital technologies

Dr Hannah Edmonds,
Technical Specialist / Digital Engineering,
The Manufacturing Technology Centre (MTC)
IN THE FUTURE...

DESIGN AND DEVELOPMENT WILL BE DECENTRALISED.

RISK AND UNCERTAINTY WILL BE MINIMISED IN VIRTUAL WORLDS THAT LEVERAGE LEARNING.
IN THE FUTURE...

FACTORIES WILL BECOME SELF-AWARE, HYPER-CONNECTED AND SELF-OPTIMISING.

AGILITY WILL BE SECOND NATURE IN MANUFACTURING.
IN THE FUTURE...

THE WORLD WILL LEARN TO DO MANUFACTURING IN A DIFFERENT WAY.

VALUE WILL SHIFT TO LESS TANGIBLE ASSETS AND WILL BE REDEFINED.
THE DEMONSTRATOR...
What is a Factory In A Box? Prior Art…

WW1 RFC Mobile Workshop

NOMAD demonstrator
Norwegian Defence Research Establishment

AMFaD Technology Demonstrator
European Defence Agency

Fablаб
United States Army’s Rapid Equipping Force
Factory In A Box
Distributed Manufacturing: A New Business Model

Rapidly deployable,
Remotely managed,
Modular,
Manufacturing supply chain network

Enabled by
Industrial digital technologies
Why Factory In A Box Manufacture?
The Value Proposition

INDUSTRIAL NEEDS
- Local capacity for remote manufacture / repair
- Increased product / process quality and traceability
- Quick to market
- Cyber secure manufacture
- Product variation

FACTORY IN A BOX (FIAB)
- Industrial digital technologies
- Disruptive supply chain solutions

INDUSTRIAL GAINS
- Shorter / more responsive supply chain
- Product / process digital twin
- Flexibility
- Quality assurance
- Product
Factory In A Box 1
Cryogenic Pipe Assembly Fabrication

Application:
• “Plumbing” for Dearman transport refrigeration unit.
• A range of pipe geometries required to fit different vehicles.

Manufacturing Challenge:
• Skills shortage.
• Stringent quality & safety requirements.
• Distributed customer base.

FIAB Benefits:
• Increased capacity to meet market requirements.
• Product & process traceability.
• Remote deployment & flexible production.
Factory In A Box 1
Cryogenic Pipe Assembly Fabrication
The robot connects to the subassembly end effector and moves the brazed assembly to a bending post.
Factory In A Box 1
ICT & Controls Systems

Remote Control Centre

User Interface

MTC Server

Simulation & Analytics Tools

Cloud ICT Applications

Shop Floor

Industrial Server

Real-Time Network

Controls and DAQ

Local ICT Applications

Cloud

Equipment and Sensors

ABB

BECKHOFF

Wonderware

United Kingdom

FICO Xpress

AVEVA

sensEye

witness

ULTIMO

PREDIX
Factory In A Box 1
ICT & Controls Systems

Remote Control Centre

Operations & Control  | Quality Assurance  | Production Optimisation

“10 steps to Cyber Security” Cyber Security Framework

IEC 62443
ISO/IEC 27000 Series

Security Standards

Shop Floor

Factory In A Box

L1 – Real-Time Network

EtherCAT

Profibus

TwinSAFE

Modbus

TwinSAFE

CNC

TwinSAFE

Ethernet

TwinSAFE

Pipe Marker

TwinSAFE

Bespoke Equipment

TwinSAFE

Sensors

Remote Control Centre

MTC Server

L2 - I4.0 enabling Network OPC-UA

Native OS Controls Server

VM 1 Database Server

VM 2 Applications Server

Wonderware Platform

Wonderware MES

Wonderware Enterprise Integrator

FICO Xpress Stock Use Optimisation

FICO Xpress Scheduling Optimisation

Wonderware Local Historian

WONDERWARE ENTERPRISE INTEGRATOR

WONDERWARE LOCAL HISTORIAN

Stock Use Optimisation

Scheduling Optimisation

FICO Xpress

TwinSAFE DAQ PROGRAMS

TwinSAFE Vision Inspection and Calibration Tool

Factory In A Box 1
Remote Control Centre
A framework for innovative manufacturing and supply chain solutions.

www.smartmanufacturingaccelerator.co.uk
- Mechanical system design & build.
- Factory design & layout validation.
  - Process design validation (3D Kinematic Modelling).
  - Virtual Reality based design review.
- Automation system design.
  - Controls architecture design.
  - Virtual commissioning of controls.
- ICT architecture & infrastructure design.
  - Systems down selection.
  - System architectures (cloud-based architecture).
- What if analysis using a virtual factory model.

- Flexible manufacturing
  - Automated robot path planning.
- Autonomous system management.
  - Cyber security.
- Operations real time visualisation.
  - Remote control centre.
  - Process simulation (3D kinematic model).
- Production Optimisation.
  - Schedule optimisation.
  - Stock use optimisation.
- Predictive maintenance.
  - Condition monitoring.
  - Computerised maintenance management system.
- Performance visualisation.
  - Process digital twin.
- Quality Assurance.
  - Operations data for traceability.
  - Production of certified products.
- Advanced visualisation
  - Remote process visualisation (Virtual Reality).
  - Maintenance support (Augmented Reality).
Factory In A Box
Project Delivery Team