Tender

4846/AMRC/ATR/JS/25 – Autonomous Tool Room Cell (Phase 1)

UNIVERSITY OF SHEFFIELD

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Scope

Reference

4846/AMRC/ATR/JS/25

Description

4846/AMRC/ATR/JS/25 - Autonomous Tool Room Cell (Phase 1)

The University of Sheffield wishes to invite tenders for an 'Autonomous Tool Room Cell' on behalf of the Advanced Manufacturing Research Centre, Castings Group at Catcliffe, South Yorkshire.

Scope of Requirement

The AMRC has launched an innovation challenge to develop a digital framework to explore autonomy in subtractive manufacturing process planning. This focuses on industrial software interoperability and the improvement of modelling predictions through real-time data. The innovation challenge to develop a reconfigurable tended subtractive manufacturing cell initially centres around a three-axis mill CNC.

A phased investment approach is applied to the innovation challenge, within Phase One, an automation cell (herein referred to as the 'Autonomous Tool Room (ATR) Cell' and/or "Cell") will be purchased. This will include a seven-axis robot with a range of part tending routes, tool management options, representing current affordable and accessible physical automation solutions. Within Phase One, the 'Cell' will be installed on Factory of the Future (FoF) shopfloor requiring the rerouting of services, both physical such as air and power and also data connectivity, including sustainability focused monitoring solutions.

In the coming years further investment will be made around the 'Cell' to build capability in the autonomy space. This will provide an AMRC sandpit to physically demonstrate technologies for autonomy in tool room/job shop activities which represents a significant part of the UK supply chain. This work will focus on key strategic priority areas around workforce development, supply chains and SME support.

To this end the 'Cell' should be designed with a fundamentally modular architecture which allows for future adaptation and expansion (see section G4).

The Vision

To create a secure, traceable, and interoperable end-to-end digitally connected manufacturing system. This system will integrate human knowledge, real-time process data, and advanced virtual models to optimise subtractive process planning, remove the mundane and time wasteful processes, improve machining performance, automate decision making and support certification of parts by analysis in order to reduce time-to-market and address the skills shortage in the workforce of the future.

This is a cross AMRC proposal including The Machining Group (TMG), Integrated Manufacturing Group (IMG), AMRC North West, and AMRC Metrology.

This is a multi-phased, multi-year project which may be procured over the coming years.

General Specification

Key Objectives of the 'Autonomous Tool Room (ATR) Cell'

-Implement an end-to-end digitally connected manufacturing system from CAD to final part inspection.

-Implement a cyber-secure digital infrastructure to protect sensitive manufacturing data during real-time operations and in cloud environments.

-Implement cloud and high-performance computing (HPC) infrastructure to manage and analyse large datasets, with 5G technology ensuring fast, seamless communication between systems.

-Develop an integrated and automated CAD/CAM environment which is digitally connected to the shop floor.

-Utilise the latest Generative AI and Digital Twin systems for real-time process improvement, model validation and to eliminate trial-and-error on both the shop floor and in the CAM office.

-Deploy multi-model machine tool connectivity to integrate supply chain data and monitor machine and process performance.

-Close the loop between metrology and the machining process by integrating metrology equipment within the 'Cell'. For the avoidance of doubt, integration of metrology equipment is outside the scope of this tender (see G4: a).

This tender is for the supply, installation, commissioning, integration, and support over the product lifetime of an autonomous cell playing a key part of the Autonomous Tool Room (ATR) vision. ATR is a key initiative within the AMRC and forms one of their Subtractive Manufacturing Innovation Challenges to develop the interconnected shop floor of the future. This tender specifically addresses Phase One of the ATR vision, the machining cell (the "Cell") which focuses on enabling physical automation and autonomy. The 'Cell', destined for the AMRC Factory of the Future shopfloor in Sheffield, will ultimately integrate multiple machine tools (note that within Phase One, the scope of this tender, only one machine tool is considered*), a multi-axis robot and rail for diverse functionalities such as part/vice/pallet and tool loading, AMRC owned hardware integration (Alternative vices, Dynamometers, etc.), autonomous guided vehicle (AGV) / autonomous mobile robot (AMR) integration (example system Iconsys IAM-R), safety cell, and a metrology zone, all overseen by a central controller station.

*For the avoidance of doubt it is envisaged that the machine tool will be a new 'DNM6700' (https://www.millscnc.co.uk/product/dnm-6700/) and should be on site at the AMRC's Factory of the Future by the end of April 2026. This will be confirmed for certain as soon as possible.

Phase One will consider the integration of a single machine tool (Machine Tool 1) to be accessed from the right-hand side by the robotic arm alongside part/vice/pallet and tool loading.

The ATR Cell

In summary the ATR Cell will be comprised of various pieces of Equipment, and Cell Controller Software and Cell Controller Station (HMI) as detailed below:-

Equipment

The proposed 'Cell' must have the capability to move part/vice/pallet and tooling between key 'Cell' elements which include:-

-Machine Tool 1 (DNM6700) - sourced seprately from this tender

-Multi-Axis Robot on a Rail

-Part Storage

-Tool Storage

-Pallet Storage

-Pallet In/Out

-Vice Storage

-Gripper Storage; and

-Safety Cell (including industrial safety fence, sensors, light curtains etc.)

The 'Cell' must be designed to enable expansion in later phases to integrate an additional machine tool (Machine Tool 2), an AGV / AMR, metrology equipment, and other capabilities as the scope of the 'Cell' increases. To this end flexibility and adaptability are key capabilities that are required within this tender as this hardware will form the backbone of a multi-year investment / development programme. Please see section G4.

Tender Process and Documentation:

This procurement is an open procedure conducted in accordance with the Procurement Act 2023

The ITT can be downloaded by registering and expressing your interest on the University`s e-tendering system https://in-tendhost.co.uk/Sheffield

If you have any questions or comments in relation to this tender they must be submitted via the In-tend System, this can be accessed at https://in-tendhost.co.uk/Sheffield

Completed tenders must be returned through the same e-tendering system.

Closing date for receipt of tenders: Monday 1st December 2025 at 12:00 noon (UK time)

Total value (estimated)

- £260,000 excluding VAT
- £312,000 including VAT

Above the relevant threshold

Contract dates (estimated)

- 19 January 2026 to 18 January 2029
- 3 years

Main procurement category

Goods

CPV classifications

- 42997300 - Industrial robots
- 48921000 - Automation system
- 42600000 - Machine tools

Contract locations

- UKE3 - South Yorkshire

Submission

Enquiry deadline

20 November 2025, 5:00pm

Tender submission deadline

1 December 2025, 12:00pm

Submission address and any special instructions

please submit your tender proposal at the following address - https://www.intendhost.co.uk/sheffield/

Tenders may be submitted electronically

Yes

Languages that may be used for submission

English

Award decision date (estimated)

5 January 2026

Award criteria

Name	Description	Type
Simple description	Scoring criteria (including weighting) is included in the Invitation to Tender document	Price

Weighting description

Scoring criteria (including weighting) is included in the Invitation to Tender document

Other information

Conflicts assessment prepared/revised

Yes

Procedure

Procedure type

Open procedure

Documents

Associated tender documents

https://www.in-tendhost.co.uk/sheffield/aspx/Home

All tender documentation can be accessed on the above URL

Contracting authority

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Organisation type: Public authority - sub-central government