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| **EIC197 Project Execution Plan** | | | |
| **Document Number:** | EIC197-PL-001 | **Approval Date:** | 11 Mar 2025 |
| **Revision Number:** | 2 | **Periodic Review Date:** | N/A |
| **Project Coordinator:** | Naeem Huque | **Department Owner:** | SRF Operations |

# Scope, Description, And Cost

SRFOps will fabricate, process, and test a 197 MHz Crab Cavity Design Verification Component (DVC) as part of the ongoing effort for the Electron Ion Collider (EIC) Hadron Storage Ring (HSR). This DVC cavity will be used to verify the cavity’s RF design and performance.

# Milestone Schedule

The DVC cavity is to be fabricated and tested by September 2025.

# Customer Requirements

The EIC RF group has provided SRFOps with the cavity acceptance criteria:

* Nominal Frequency: 197.0508 ± 0.025 MHz
* Deflecting Voltage: 12.65 MV/m
* Q0: 6.31 x 109

# Risk Plan

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| **Risk Subject** | **External / Internal** | **Type**  **(C, S, T)** | **Potential Impact**  **(If… then statement)** | **Mitigations** |
| Cavity does not meet the EIC HSR specification | External | C, S, T | If the cavity does not meet the EIC HSR specifications then the project will have to make design changes to the cavity. | Every step of the project is carefully monitored to identify potential problems early. |
| Work center availability | Internal | C, S | If multiple projects require use of work centers or if work centers do not have sufficient staff or tooling for the requested work load to support all SRFOps projects, the EIC project may be delayed due to lack of available resources. | Maintain project representation at scheduling meeting and weekly priorities and planning meetings to coordinate work at all work centers to reasonably meet project milestone dates. |
| Damage of Tooling or of Cavity Sub-Components | Internal | C, S | If damage is found on the tooling needed to fabricate the cavity or the cavity sub-components then the project will be delayed by however long it takes to replace the tool or remake the component | The tooling made will be tested first and will be partnered with a procedure on how to use it safely.  Cavity components will be carefully tracked through all work centers to minimize damage. |
| Injury during cavity handling due to size | Internal | C, S, T | If large/heavy cavity parts are mishandled, staff members may get injured. | Specialized tooling will be designed and procured to handle all components over 30 lbs. |

# ES&H Plan

SRFOPs will follow the JLab ES&H Policy and all relevant ePAS documents. SRFOPs will be supported by the Accelerator Division Safety Officer.

# Fabrication Plan

As part of the customer deliverables, SRFOPs has generated a fabrication plan that will cover all the steps that will be performed during the assembly and processing steps.

The key work station tools that are used are:

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| --- | --- | --- |
| Work Center | Work Station | Tools |
| Fabrication | Tech Shop | 450 Ton Press |
| Furnace Room | Brazing furnaces |
| EBW Room | Electron Beam Welder chamber and controls |
| Machine Shop (ext.) |  |
| Inspection | CMM Room | CMM, Profilometer, Borescope |
| Structures Lab | FARO Arm |
| Test and Measurement | Electronics Shop | Fabrication area with soldering stations and test equipment |
| Cavity Tuning | Tuning Room | RF Vector Network analyzers |
| Chemistry | Chem Room | Small ultrasonic tanks, chemistry hood and workstation |
| Water Room | Triple rinse sinks, ultrasonic sink, large ultrasonic tank, pressure washer (DI water), and nitrogen drying oven |
| Lapping Room | Room for surface finishing and polishing containing equipment and manual tools |
| Cavity/String Assembly | Cleanroom | Production Cleanroom (ISO 4 classification) for cavity assembly |
| Vertical Test Area | Vertical Test Area | Cryogenic facility using vertical dewars of liquid helium to process, measure, and qualify cavity |

# Inventory and Traceability Plan

All raw materials will be tracked by the Project Coordinator, including but not limited to: Copper, Aluminum, Niobium, and Niobium-Titanium. All fabrication steps and utilization of raw material will be tracked by the Pansophy Traveler system and PRIMeS.

An EIC specific storage area will be created to store all tooling and raw materials to allow easy access during fabrication; this area will be located in the TED high-bay. Those items that cannot be stored in the TED high-bay shall be stored in either in the Test Lab high-bay if the part is needed within a week or shall be stored at Blue Crab if not.

All parts fabricated for the DVC cavity will be serialized as per the Inventory and Traceability procedure, SRF-09-PR-003.

# Staffing Plan

The SRFOPs staffing plan for the EIC 197 MHz DVC cavity project will be documented in the AWP.

Skills sets external to SRFOPs required to support the project include:

* SRF S&T RF simulation experts
* Mechanical Engineering design and simulation support
* EH&S support
* Procurement
* JLab Machine Shop staff

# Procurement Plan

All parts and tooling procurements and nondestructive examinations will be carried out by SRFOPs following standards set-out by the vendor managements document. For rare material purchases (NbTi, Nb) either CERN or ASTM specs will be used to ensure the proper material is delivered.

# Engineering Design Plan

The engineering design for the DVC cavity is provided by EIC.

# Quality Plan

SRFOps will follow the SRFOPs Quality Management System for fabricating the 197 MHz DVC cavity.

# Project Controls Plan

The EIC CAM will provide an official monthly update to the Project Controls group for Earned Value Management System (EVMS) tracking.

# Customer Communication Plan

The Project Coordinator will hold weekly meetings with the EIC L2 for RF systems to update on design status.

# Document and Records Plan

The Project Coordinator will create and maintain an EIC 197 MHz DVC Cavity Document Register to include customer requirements relevant to SRFOPs, documents produced by SRFOPs to support the project, and other documents deemed critical to quality by SRFOPs.

The Project Coordinator will create and maintain an EIC 197 MHz DVC Cavity Work Control Document Register to include the travelers and procedures produced by SRFOPs to control work activities.

The Project Coordinator will create and maintain an EIC 197 MHz DVC Cavity Records Register to include the records produced by SRFOPs or used by SRFOPs to verify work activities and inspection and test results.

All EIC 197 MHz DVC Cavity registers are located in the DocuShare EIC 197 MHz DVC Cavity project folder.

# Shipping Plan

N/A

# Authorization for Release

The Authorization for Release form will be used to ensure all work and documentation is complete after the final cold test of the cavity. The SRF OPs Coordinator will be responsible for obtaining the approval signatures for the Authorization for Release form.

# Customer Deliverables Plan

## Hardware

* A fully welded and processed 197 MHz DVC Cavity as requested by EIC RF Systems group.

## Data

* Full CMM data of the critical components.
* VTA Test Results.
* Lessons Learned document

# Revision History

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| --- | --- | --- |
| **Revision** | **Description** | **Date:** |
| 1 | Initial version, based on SRF-11-FM-001 Project Execution Plan Template R3 |  |
| 2 | Updated template | 11 Mar 2025 |
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# Approvals

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| --- | --- | --- | --- |
| **Approved by:** | **Name:** | **Signature:** | **Date:** |
| Project Coordinator | N. Huque | In DocuShare | Project Coordinator |
| Process Owner for Project Execution | J. Buttles | In DocuShare | Process Owner for Project Execution |
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