



**Production Readiness Review of
the HL-LHC AUP Series Coils
Fabrication at FNAL & BNL:
302.2.04/05/06**

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US HL-LHC Accelerator Upgrade Project

**Production Readiness Review of the HL-LHC AUP
Series Coils Fabrication at FNAL & BNL:
302.2.04, 302.2.05 and 302.2.06**



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1. Goal & scope

The HL-LHC AUP project is starting the fabrication of QXFA Series Coils to be used in MQXFA Series Magnets (MQXFA08-23). MQXFA magnets [1] are the low-beta quadrupoles to be used in Q1 and Q3 for the High Luminosity LHC. If QXFA Series Coils are fabricated according to the QXFA Series Coil Production Specification [2] they will be used in MQXFA Series Magnets. If these magnets meet MQXFA requirements [3] they will be used in Q1/Q3 cryo-assemblies to be installed in the HL-LHC.

QXFA Series Coils are fabricated at BNL (302.2.06) and FNAL (320.2.05), following the same procedures, and all coil parts are procured at FNAL by 302.2.04 in order to assure as much uniformity as possible. Several QXFA Pre-Series coils were fabricated at BNL and FNAL, and four of them were successfully tested in MQXFA03.


Production Readiness Review (PRR) is a major review step in the HL-LHC Accelerator Upgrade Project (AUP). It is held at start of series production, and is intended to be a largely technical review, but it also includes assessment of the planned cost, schedule, and personnel needs to complete the production.

Scope of this PRR are the following items for Series Coils:

- Parts and materials for coil fabrication
- Coil drawings
- Manufacturing and test procedures
- Interfaces.

Goal of this PRR for Series Coils:

- Approval of plans and procedures for QXFA Series-Coils manufacturing at BNL and FNAL

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2. Charges

The committee is requested to answer the following questions:

1. Scope and interfaces: is the L3 task scope for 302.2.04, 302.2.05 and 302.2.06 clearly defined? Are interfaces among these tasks, and with other tasks sufficiently well-defined for executing the series coils production?
2. Drawings: are all the coil assembly and component drawings released? Have they been provided to CERN?
3. Manufacturing: are the manufacturing work-flow documents and travelers — including scheduling, personnel needs, floor space, and facilities requirement — appropriate to execute the series coil production?
4. QA/QC: are the QA/QC plans adequate? Is there appropriate documentation for quality control procedures, manufacturing and inspection plan, and data reporting (including part and material traceability)? Are the coil fabrication MIPs complete and approved?
5. Cost and Schedule: are the cost and schedule estimates sufficiently well-defined and of adequate maturity to support the series production?
6. ES&H: Have all hazards been identified and addressed? Are ES&H policy and documentation sufficient for the series production?
7. Risk: are risks understood and appropriately managed for the series production?
8. Reviews: are all recommendations for these L3 tasks from previous reviews [4-5] addressed?
9. Are these L3 tasks ready for series production?



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3. Technical information

Committee

Steve Gourlay (LBNL), chairperson
Paolo Ferracin (LBNL)
Susana Izquierdo Bermudez (CERN)
Diego Perini (CERN)

Date and Time

April 29 and 30, 2020; starting at 7/9/10/16 (LBNL/FNAL/BNL/CERN)

Location/Connection

Video-link by Zoom, info by email.

Link to agenda with talks and other documents

<https://indico.fnal.gov/event/24020/>

4. References

- 1) *MQXFA Final Design Report*, US-HiLumi-doc-948.
- 2) *QXFA Series Coil Production Specification*, US-HiLumi-doc-2986.
- 3) *MQXFA Functional Requirements Specification*, US-HiLumi-doc-36.
- 4) *Report of DOE IPR January 14-16, 2020 Review*, US-HiLumi-doc-2983.
- 5) *Report of the MQXFA05 Coils Acceptance Review*, US-HiLumi-doc-2742.