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HINDUSTAN AERONAUTICS LIMITED (HAL)

DESIGN AND DEVELOPMENT (D&D) IN HINDUSTAN AERONAUTICS LIMITED (HAL)

[BASED ON CHAPTER II OF C&AG REPORT NO. 18 OF 2023]

DEPARTMENT OF DEFENCE PRODUCTION (MINISTRY OF DEFENCE)

COMMITTEE ON PUBLIC UNDERTAKINGS (2025-26)

TWENTY-SIXTH REPORT

(EIGHTEENTH LOK SABHA)

LOK SABHA SECRETARIAT

NEW DELHI

TWENTY- SIXTH REPORT

COMMITTEE ON PUBLIC UNDERTAKINGS (2025-26)

(EIGHTEENTH LOK SABHA)

HINDUSTAN AERONAUTICS LIMITED (HAL)

DESIGN AND DEVELOPMENT (D&D) IN HINDUSTAN AERONAUTICS LIMITED (HAL)

[BASED ON CHAPTER II OF C&AG REPORT NO. 18 OF 2023]

DEPARTMENT OF DEFENCE PRODUCTION (MINISTRY OF DEFENCE)

(Action Taken by the Government on the Observations/Recommendations contained in the Tenth Report (18th Lok Sabha) on Chapter-II of C&AG Report No. 18 of 2023 relating to Hindustan Aeronautics Limited)

Presented to Lok Sabha on 11 December, 2025

Laid in Rajya Sabha on 11 December, 2025

LOK SABHA SECRETARIAT

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2. Ms. Mriganka Achal - Director
3. Shri Dhruv - Under Secretary
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INTRODUCTION

I, the Chairperson, Committee on Public Undertakings (2025-26) having been authorized by the Committee to submit the Twenty-Sixth Report on their behalf, present this Report on Action Taken by the Government on the Observations/Recommendations contained in the Tenth Report of the Committee on Public Undertakings (18th Lok Sabha) on 'Design and Development (D&D) In Hindustan Aeronautics Limited (HAL)' [Based on Chapter-II of C&AG Report No. 18 of 2023].

2. The Tenth Report of the Committee on Public Undertakings (18th Lok Sabha) was presented to Lok Sabha and laid on the Table of Rajya Sabha on 27 March, 2025. The Action taken Replies to all the 09 recommendations contained in the Report were received from the Ministry of Defence on 21 April, 2025.

3. The Committee considered and adopted the draft Report at their sitting held on 05th December, 2025. The Minutes of the sitting are given in Appendix-I.

4. An analysis of the action taken by the Government on the Observations/ Recommendations contained in the Tenth Report of the Committee (18th Lok Sabha) is given in Appendix -II.

New Delhi;
08 December, 2025
17 Agrahayana, 1947(S)

Baijayant Panda
Chairperson
Committee on Public Undertakings

R E P O R T

CHAPTER I

This Report of the Committee deals with the action taken by the Government on the Observations/Recommendations contained in the Tenth Report of the Committee on Public Undertakings related to Chapter II of C&AG Report No. 18 of 2023 regarding 'Design and Development (D&D)' in Hindustan Aeronautics Limited (HAL)', which was presented to Lok Sabha on 18.02.2025. It contained 09 observations/recommendations.

2. Action Taken notes have been received from the Government in respect the 08 of the 09 observations/recommendations of the Committee. The introductory paragraphs (Sr. Nos. 1 and 2) were general observations, on which the Ministry did not offer specific comments.

(i)	Observation/Recommendations which have been accepted by the Government Sl. Nos. 1, 2, 4, 5, 7, 8 and 9.	**(Chapter II)** **(Total: 07)**
(ii)	Observations/Recommendations which the Committee do not desire to pursue in view of the Government's replies. Sl. No. Nil	**(Chapter III)** **(Total: 00)**
(iii)	Observations/Recommendations in respect of which replies of Government had not been accepted by the Committee and which require reiteration. Sl. No. Nil	**(Chapter IV)** **(Total: 00)**
(iv)	Observations/Recommendations to which the Government has furnished interim replies and final replies are still awaited. Sl. Nos. 3 and 6.	**(Chapter V)** **(Total: 02)**

3. The Committee desire the Ministry of Defence (Department of Defence Production) to furnish final Action Taken Notes/replies in respect of observations/recommendations contained in Chapter I of the Report. The Committee further desire that the final replies in respect of Observations/Recommendations contained in Chapter V for which only interim replies have been given by Government, should be furnished to the Committee expeditiously.

4. The Committee will now deal with the Action Taken by the Government on some of the Observations/Recommendations in succeeding paragraphs.

NON-COMPLIANCE WITH PRE-PROJECT PROCESSES AND R&D POLICY
(Recommendation No. 2)

5. The Committee, in their Tenth Report, had highlighted systemic weaknesses in HAL's project planning and recommended strict adherence to its R&D Policy:

> " The Committee observed that HAL has not adhered to its own R&D Policy and Manual in several critical pre-project processes. A review of 32 projects revealed that 18 projects (56.25%) lacked Project Feasibility Reports (PFRs), 29 projects (90.6%) did not have Detailed Project Reports (DPRs), and 21 projects (65.6%) failed to conduct Technology Gap Analysis (TGA). These lapses indicate systemic weaknesses in planning and risk assessment, leading to delays, cost overruns, and inefficient resource utilization. Furthermore, the Committee note that technical review meetings were conducted irregularly, with only 14 out of the mandated 42 Committee of Institutions Network (COIN) meetings were held, reflecting a 66.7% shortfall in oversight. This lack of structured project governance has led to several high-value projects suffering delays and financial impairments, including the Gas Turbine Engine project, Project 2 (Trainer Aircraft), and the Indigenous Helicopter Development Program. HAL has justified that Draft Cabinet Notes were used as a substitute for DPRs in customer-funded projects, and that feasibility studies were proportionate to project size. However, the Committee find that these practices compromise the integrity of project planning and increase the likelihood of project failures.
>
> The Committee recommend that HAL enforce strict adherence to the R&D Policy by making the preparation of PFRs, DPRs, and TGAs mandatory for every project, regardless of funding source or scale. Additionally, if HAL or the Ministry determines that these manuals are outdated, they should be thoroughly revised to incorporate new developments, technical advancements, and internationally approved standards. The Ministry of Defence should establish a review mechanism to ensure that all pre-project processes are followed, and corrective measures should be taken in cases of non-compliance."

6. The Ministry, in their action taken reply, have stated as follows:

> " The Design and Development (D&D) projects undertaken by HAL broadly fall into two categories viz. Customer that is Govt. funded projects and HAL funded projects. The Government funded projects are approved by the Cabinet Committee on Security (CCS) based on the requirements of the Defence forces. The HAL funded projects are undertaken to build indigenous capability in strategic Defence equipment/components through internal resources.
>
> About 85% of the projects undertaken by M/s.HAL are approved by Customer/ Government and sanctioned by Cabinet Committee on Security (CCS). The CCS note is prepared on the basis of forces requirement & feasibility assessments etc and contains justification, Inter-Ministerial consultations, factors like pre-feasibility etc.

Remaining about 15% projects taken up for Technology development at HAL with Internal funding, the detailed process of DPR / PFR / TGA are followed. For small projects, all the aspects which are required for scrutiny are covered in the project proposal itself, not as steps or document.

Therefore, though all projects go through adequate pre-project process which bring out the requisite and relevant aspects, however, as recommended by the Committee, guidelines have been issued by the HAL to its R&D centers to adhere to the laid down procedures for project approval & implementation, in R&D Manual 2022. Moreover, a consultant is being appointed to review HAL's R&D procedures & benchmarks it with best practices in Global Aerospace and Defense companies, and to revise R&D Manual of HAL.

HAL has also undertaken a transformation in its R&D approach by modernizing all its R&D centers, adopting digital workflows with recent roll out of Software tool to monitor the R&D projects as well as work flow.MoD has advised HAL to scrupulously follow all steps including pre-project processes as per their R&D Manual, particularly in view of deficiencies brought out by C&AG report No. 18 of 2023 regarding 'Design and Development (D&D)' in Hindustan Aeronautics Limited (HAL)."

7. The Committee appreciate the comprehensive reply provided by the Ministry and note the proactive steps taken by HAL to strengthen its pre-project processes. The issuance of new guidelines to R&D centers to ensure adherence to the R&D Manual 2022 is a welcome measure. The Committee further commend the forward-looking decision to appoint a consultant to review and benchmark HAL's R&D procedures against global best practices. This initiative to revise the R&D Manual reflects a strong commitment to incorporating technical advancements and international standards, which aligns perfectly with the Committee's original recommendation. The Committee are confident that these measures will address the systemic weaknesses previously identified and lead to more efficient project planning and resource utilization in the future. The Committee would appreciate being kept informed about the key outcomes from the consultant's review and the subsequent finalization of the revised R&D Manual.

Delays in Project 1 (Gas Turbine Engine) Development

(Recommendation No. 3)

8. The Committee, in their Report, had expressed concern over the significant delays in the Gas Turbine Engine project and urged HAL to secure critical infrastructure:

" The Committee note that the Gas Turbine Engine project, initially sanctioned for ₹441.41 crore, has been significantly delayed, causing an impaired expense of ₹159.23 crore. The project was divided into two stages: Stage I (Project Definition and Design) was originally scheduled for completion in September 2014 but was delayed to December 2015, and Stage II (Prototype Development, Testing, and Certification) has been ongoing since 2018 with no completion in sight. One of the primary reasons for the delay is the failure to secure critical components on time, due to procurement bottlenecks and delayed approvals for test-bed construction. Additionally, land clearance approvals were delayed due to bureaucratic inefficiencies, adding more than three years to the project timeline. The Committee also note that HAL did not anticipate the need for 3D technology and advanced material integration, leading to multiple redesign efforts and further pushing back project deadlines. The lack of indigenous expertise in medium thrust-class engine development forced HAL to rely on external consultants, increasing costs and extending the timeline. In this project the Committee note that the project, was handled in very casual approach wherein not even thorough research was done as HAL was not sure where to buy the critical component on time and it was delayed.

The Committee recommend conducting thorough research on the project and urges HAL to establish long-term strategic partnerships with both domestic and international vendors. This will ensure the timely availability of critical components and minimize procurement-related delays. Additionally, the Ministry of Defence should allocate dedicated funding for the early-stage development of test-bed infrastructure, ensuring that essential testing facilities are in place before project execution begins. The Committee would suggest that to accelerate technological readiness, HAL should invest in advanced material research and indigenous 3D technology capabilities to reduce dependency on foreign suppliers."

9. The Ministry, in their action taken reply, have stated as follows:

" HAL took up R&D of two engines pro-actively to become self-reliant in the engine technology and is developing Gas Turbine Engine which is very complex and highly iterative process where the progress is made stage wise incorporating lessons from earlier stage of design, testing. The engines taken up for R&D are 25 kilo newton engine able to power fixed wing aircraft of the class of Intermediate jet trainer and another class of Turbo shaft engine which will be powering Helicopters. The critical components for such engine are being designed and developed for the first time in the country and there has been delay from the estimated time in redesigning them. It is pertinent to bring out that very few countries in the world have matured gas turbine engine manufacturing technology and they do not transfer the complete technology. HAL is actively working towards establishing long-term strategic partnerships with global aerospace and defence companies to overcome the technology gap. HAL has long time relationship with Engine manufacturing companies like Rolls Royce & Safran for manufacturing of Aero Engines designed and developed by them. Further, HAL has formed a JV company named as SAFHAL with Safran Helicopter Engines, France to jointly develop engine for IMRH / DBMRH Project. However, even in these cases, none of foreign companies/ countries are ready to transfer 100% ToT.The core competence of HAL is in Research and Development of aircraft, helicopters, engines and accessories. The material research which is a critical factor for engine development is being taken up by DMRL (DRDO) and MIDHANI & private sector. HAL is working with these organizations for advanced materials required for aero-engine

development. HAL has placed orders on MIDHANI for Rs 757.82 Crs towards indigenization of raw material. As suggested, a gap analysis of ground facilities for testing of airborne systems is being carried out by the Ministry."

10. The Committee appreciate HAL's efforts in establishing strategic partnerships and collaborating with domestic entities like DRDO and MIDHANI for material research. However, the reply is interim in nature, as the core issue of developing dedicated test-bed infrastructure remains unresolved. The Ministry has only stated that a "gap analysis...is being carried out". The original audit highlighted that delayed approvals for test-bed construction were a primary cause for project delays. This gap analysis is a critical first step, but it is not the solution itself. The Committee, therefore, desire that the Ministry expedite this analysis and furnish a definitive action plan, with clear timelines and funding arrangements, for the establishment of the required testing infrastructure. The Committee would like to be kept informed of the progress in this regard.

DELAYS IN EASA CERTIFICATION FOR HELICOPTER 1 AND EXPORT CHALLENGES

(Recommendation No. 6)

11. The Committee, in their Report, had highlighted the decade-long delay in securing EASA certification and recommended concrete steps to address this:

" The Committee observed that HAL's attempt to secure certification for Helicopter 1 from the European Aviation Safety Agency (EASA) was delayed by over a decade, leading to ₹108.24 crore in impaired costs and significantly affecting its export potential. Initially, HAL anticipated that its extensive military certification experience would facilitate the EASA approval process. The lack of prior engagement with international civil aviation regulators resulted in prolonged testing and documentation delays. Consequently, HAL was unable to market and export Helicopter 1 in a timely manner. The Committee further note that the extended certification timeline not only impacted HAL's financial standing but also reduced its credibility in the international aviation industry.

Given the stringent regulatory landscape of civil aviation, the Committee strongly emphasize the need for HAL to integrate international certification requirements from the earliest stages of aircraft design. The Committee recommend that HAL establish a dedicated Civil Certification Task Force to ensure efficient coordination of all compliance-related activities and facilitate faster regulatory approvals. Additionally, the Committee urge the Ministry of Defence to strengthen bilateral agreements with key international certification bodies, including EASA, to fast-track approval processes for

future aircraft and helicopter projects."

12. The Ministry, in their action taken reply, have stated as follows:

" The majority of HAL's projects are for Indian Defence Services. The products which has a potential to be marketed as civil products would be taken up for Civil and International certification. The current R&D manual encompasses the requirements of both military and Civil certification (DGCA). Based on the requirement of the project undertaken, HAL will integrate international certification requirements at the design stage. At HAL, Civil Certification group already exists with the name of Airworthiness Group (AWG) and they are co-ordinating with DGCA and EASA.MoD will examine the feasibility of strengthening bilateral agreements with key international certification bodies, including EASA, to fast-track approval processes for future aircraft and helicopter projects through Ministry of Civil Aviation and DGCA."

13. The Committee note that a Civil Certification group already exists within HAL. While the Ministry's response to the Committee's key recommendation strengthening bilateral agreements to expedite international approvals is noted, the assurance to "examine the feasibility" of such agreements appears to reflect a cautious approach to a matter of considerable importance. Given that delays in securing international certifications have resulted in impaired costs exceeding ₹108 crore and missed export opportunities, the Committee believes that a more proactive stance is warranted. The Committee respectfully reiterates its recommendation and encourages the Ministry of Defence, in collaboration with the Ministry of Civil Aviation, to move beyond preliminary assessments and initiate concrete measures toward establishing bilateral agreements with key international certification authorities, including EASA. These agreements are essential to streamline approval processes for upcoming aircraft and helicopter projects. The Committee requests that specific steps taken in this direction be shared in the next Action Taken Notes, along with a clear timeline to ensure transparency and accountability in addressing this critical issue.

CHAPTER II

OBSERVATIONS/RECOMMENDATIONS WHICH HAVE BEEN ACCEPTED BY THE GOVERNMENT

OVERVIEW

Recommendation (No. 1)

1. The present Audit Para 2.1 of C&AG Report No. 18 of 2023, examined by the Committee on Public Undertakings, pertains to "Design and Development (D&D) in Hindustan Aeronautics Limited (HAL)." The Committee reviewed the audit findings concerning HAL's compliance with R&D policies, project delays, cost overruns, and procedural shortcomings in key development programs. HAL, a Maharatna company under the Ministry of Defence, plays a critical role in aerospace and defense manufacturing with 21 production centers and 9 R&D facilities across India. The audit highlights systemic lapses in HAL's adherence to mandated pre-project processes, including the absence of Project Feasibility Reports (PFRs) in 18 out of 32 projects and Detailed Project Reports (DPRs) in 29 out of 32 projects. Additionally, Technology Gap Analyses (TGA) were missing in 21 projects, affecting HAL's ability to identify technical shortfalls and mitigate risks. The report also raises concerns about delays in flagship projects such as the Gas Turbine Engine, Aircraft 2 Avionics Upgrade, and Indigenous Helicopter Development, attributing them to inefficient planning, procurement challenges, and shifting project requirements. Among the major financial concerns, the audit notes ₹100.68 crore in impaired costs related to System 1 redesign, ₹159.23 crore in cost overruns for the Gas Turbine Engine project, and ₹75.85 crore in excess expenditure on Project 2 due to initial engine selection issues. Additionally, HAL's failure to obtain European Union Aviation on Safety Agency (EASA) certification on time delayed the export potential of Helicopter 1, resulting in an impairment of ₹108.24 crore. In response, HAL acknowledged documentation and procedural gaps but justified its approach, citing flexibility in project approvals and the use of Draft Cabinet Notes for customer-funded projects as substitutes for DPRs. HAL also attributed delays to evolving defense requirements, complex integration challenges, and the need for indigenous technology development. The company has since revised its R&D manual (2022) to introduce sector-specific processes and issued compliance directives to all R&D Centers to strengthen project documentation. Before finalizing their observations and recommendations, the Committee carefully considered the

input from C&AG, HAL, and the Ministry of Defence. The Committee evaluated the evidence, project justifications, and remedial measures taken by HAL. Following thorough internal deliberation, the Committee reached the conclusions and formulated the recommendations outlined in the subsequent paragraphs.

Reply of the Government

"No Comments"

Non-Compliance with Pre-Project Processes and R&D Policy

Recommendation (No. 2)

2. The Committee observed that HAL has not adhered to its own R&D Policy and Manual in several critical pre-project processes. A review of 32 projects revealed that 18 projects (56.25%) lacked Project Feasibility Reports (PFRs), 29 projects (90.6%) did not have Detailed Project Reports (DPRs), and 21 projects (65.6%) failed to conduct Technology Gap Analysis (TGA). These lapses indicate systemic weaknesses in planning and risk assessment, leading to delays, cost overruns, and inefficient resource utilization. Furthermore, the Committee note that technical review meetings were conducted irregularly, with only 14 out of the mandated 42 Committee of Institutions Network (COIN) meetings were held, reflecting a 66.7% shortfall in oversight. This lack of structured project governance has led to several high-value projects suffering delays and financial impairments, including the Gas Turbine Engine project, Project 2 (Trainer Aircraft), and the Indigenous Helicopter Development Program. HAL has justified that Draft Cabinet Notes were used as a substitute for DPRs in customer-funded projects, and that feasibility studies were proportionate to project size. However, the Committee find that these practices compromise the integrity of project planning and increase the likelihood of project failures.

The Committee recommend that HAL enforce strict adherence to the R&D Policy by making the preparation of PFRs, DPRs, and TGAs mandatory for every project, regardless of funding source or scale. Additionally, if HAL or the Ministry determines that these manuals are outdated, they should be thoroughly revised to incorporate new developments, technical advancements, and internationally approved standards. The Ministry of Defence should establish a review mechanism to ensure that all pre-project processes are followed, and corrective measures should be taken in cases of non-compliance.

Reply of the Government

"The Design and Development (D&D) projects undertaken by HAL broadly fall into two categories viz. Customer that is Govt. funded projects and HAL funded projects. The Government funded projects are approved by the Cabinet Committee on Security (CCS) based on the requirements of the Defence forces. The HAL funded projects are undertaken to build indigenous capability in strategic Defence equipment/components through internal resources.

About 85% of the projects undertaken by M/s.HAL are approved by Customer / Government and sanctioned by Cabinet Committee on Security (CCS). The CCS note is prepared on the

basis of forces requirement & feasibility assessments etc and contains justification, Inter-Ministerial consultations, factors like pre-feasibility etc.

Remaining about 15% projects taken up for Technology development at HAL with Internal funding, the detailed process of DPR / PFR / TGA are followed. For small projects, all the aspects which are required for scrutiny are covered in the project proposal itself, not as steps or document.

Therefore, though all projects go through adequate pre-project process which bring out the requisite and relevant aspects, however, as recommended by the Committee, guidelines have been issued by the HAL to its R&D centers to adhere to the laid down procedures for project approval & implementation, in R&D Manual 2022. Moreover, a consultant is being appointed to review HAL's R&D procedures & benchmarks it with best practices in Global Aerospace and Defense companies, and to revise R&D Manual of HAL. HAL has also undertaken a transformation in its R&D approach by modernizing all its R&D centers, adopting digital workflows with recent roll out of Software tool to monitor the R&D projects as well as work flow. Mod has advised HAL to scrupulously follow all steps including pre-project processes as per their R&D Manual, particularly in view of deficiencies brought out by C&AG report No. 18 of 2023 regarding 'Design and Development (D&D)' in Hindustan Aeronautics Limited (HAL)."

[Ministry of Defence, Department of Defence Production]
(O.M No. 48040/08/2023-D(HAL-III)-Vol II dated 21.04.2025)

Comments of the Committee
(Please see para 7 of Chapter I of the Report)

<u>Incorrect Engine Selection in Project 2 & Aircraft Stall/Spin Issues</u>

Recommendation (No. 4)

3. The Committee observe that Project 2 (Trainer Aircraft Development), initiated in 1999 with an initial budget of ₹180 crore, has faced significant setbacks due to incorrect engine selection. HAL initially selected Engine 1, which was found to be underpowered and unsuitable for operational requirements. In 2005, HAL switched to Engine 2, a higher-thrust alternative, but this change required extensive modifications to the aircraft's structure. These modifications led to additional delays and cost overruns, pushing the total project expenditure to ₹710.08 crore, with a cost overrun of ₹75.85 crore. The Committee also note that the aircraft faced serious stall and spin issues, which were not directly linked to engine thrust but rather to aerodynamic configuration and aircraft inertia. To resolve these issues, HAL engaged external consultants and implemented modifications to the vertical tail and rudder parameters,

which further extended the project timeline. As of 2024, the aircraft has still not been certified, and its operational viability remains uncertain.

The Committee would like to suggest that HAL should conduct comprehensive market research and feasibility studies before selecting engines for indigenous aircraft programs, ensuring alignment with long-term operational and technical requirements. HAL should also invest in an advanced aerodynamic testing framework during the early stages of aircraft design to pre-emptively identify stall and spin issues and avoid costly modifications at later stages.

Reply of the Government

"The engine is selected based on the market survey of engines which are suitable for the aircraft. The critical design reviews are done to find suitability of the engine. At the start of this program, off the shelf engine with required power rating for the development of the aircraft was not available, hence, the nearest proven engine of lesser power rating available at that time, was selected to realise the programme and start the flight testing to prove the technologies of the aircraft Subsequently, as per established commercial procedure, a composite committee with members from MOD, IAF and HAL was initiated for selection of adequate power rating engine required for the program. The aerodynamic issues are part of any R&D of highly complex Aircraft design. The same was overcome through consultation with global firm and all issues have been addressed. The aircraft was successfully modified post consultancy from International Firm and successfully flown in recently held Aero-India. Customer demonstrations were held during Aero-India and the aircraft received encouraging response.

HAL has a well-defined process for comprehensive feasibility studies in all future projects. A detailed chapter wise circular has been issued to all R&D Centres outlining the necessary steps for market research, feasibility analysis and long-term operational requirement before selecting critical components such as engines.

HAL acknowledges the importance of robust aerodynamic testing in aircraft development and as recommended by the Committee, it is planning to invest in an advanced aerodynamic testing framework. This will include enhanced computational fluid dynamics (CFD) capabilities, dedicated stall and spin analysis methodologies, and improvements in wind tunnel testing to identify aerodynamic challenges at an early stage and minimize design iterations. High Power Computing Lab for computational fluid dynamics (CFD) studies has been established in HAL. Nasik in Dec 2024 being utilized by all R&D Centre."

[Ministry of Defence, Department of Defence Production]
(O.M No. 48040/08/2023-D(HAL-III)-Vol II dated 21.04.2025)

FINANCIAL OVERSIGHT AND COST RECOVERY MEASURES FOR SYSTEM 1 REDESIGN

Recommendation (No. 5)

4. The Committee note that HAL incurred ₹100.68 crore in redesign costs for System 1 in Helicopter 1, but delays in certification prevented cost recovery through existing contracts. As a result, HAL had to write off ₹21.31 crore as an impaired expense, impacting financial sustainability. The project was initially designed to enhance component reliability, but multiple setbacks—including design flaws, late validation tests, and unexpected prototype development issues—pushed the timeline significantly beyond expectations. The Committee note that HAL's approach to amortizing redesign costs against future orders is highly dependent on securing new contracts, which poses financial risks if future demand does not materialize.

The Committee would like to recommend that HAL should establish a financial risk assessment framework before initiating large-scale redesign projects to ensure cost recovery strategies are built into project planning. Also, the Ministry of Defence should integrate amortization mechanisms into procurement contracts to reduce financial exposure and ensure that redesign costs are recovered through structured payments. Additionally, HAL should strengthen its financial modelling process by securing advance commitments from potential buyers before undertaking high-cost redesign investments.

Reply of the Government

"HAL takes up re-design projects depending on the requirement of product improvements, component and system improvements. These projects are taken up pro-actively based on the working of the product in real environment and feedback received from customers.

R&D involves uncertain outcomes. Many projects do not result in commercially viable products. Therefore, full cost recovery project wise is not always possible. Even successful R&D may not give returns if the market is not ready or if regulatory approval/certification is delayed. By its very nature, R&D is a strategic/public good investment rather than a profit-guaranteed expenditure. But it is well understood and imbibed by HAL that overall investment in R&D shall result into overall profitable operations/outcomes & HAL follows that model. HAL follows financial modeling through cost amortization approach, where expenditures incurred on design and development efforts are systematically recovered through future orders. HAL has a well-defined Risk Management Policy framework, which is already in place to assess technical and financial risks. This is reviewed periodically by a Risk Management committee, a subcommittee of the Board.

Further, in the upcoming consultancy work being taken up for benchmarking of HAL R&D policy & procedures with Global aerospace companies, the assessment of risk management methodology followed by global companies is included in the scope of work. Lessons learnt with such bench marking would be included in the new R&D Manual. The Defence Acquisition Procedure (DAP) 2020 already provides for amortization of R&D cost.**"**

[Ministry of Defence, Department of Defence Production]
(O.M No. 48040/08/2023-D(HAL-III)-Vol II dated 21.04.2025)

PROJECT 3 (UAV DEVELOPMENT) AND MARKET RESEARCH DEFICIENCIES

Recommendation (No.7)

5. The Committee observed that HAL undertook Project 3 (Rotary UAV Development) without conducting a detailed market survey or demand assessment, leading to financial losses and lack of defense contracts. The project, initially sanctioned at ₹23.18 crore, aimed to develop a technology demonstrator for future surveillance platforms. However, HAL failed to align the project with actual defense requirements, leading to a product that did not meet operational standards. The UAV had a payload capacity of only 2.5 kg, an endurance of one hour, and a range of just 8–10 km, making it unsuitable for defense applications. Due to this mismatch, HAL failed to secure any defense orders, resulting in an impairment of ₹9.54 crore. Additionally, the Committee note that no comprehensive "Lessons Learned Report" was prepared, which prevented HAL from utilizing the project experience to improve future UAV programs.

The Committee recommend that HAL should establish a dedicated Market Research and Demand Forecasting Division to assess potential buyer interest before investing in technology demonstrators, ensuring that projects are commercially and operationally viable. HAL should align all future pilot projects with existing defense procurement roadmaps to maximize contract potential and avoid resource misallocation. Additionally, HAL should ensure that Letters of Intent (LoIs) from potential buyers are secured before initiating large- scale UAV development projects to guarantee a clear market pathway for new products. Furthermore, the Committee recommends that as suggested by C&AG HAL should conduct mandatory post-project evaluations, including a "Lessons Learned Report", to refine project planning and risk assessment for future UAV programs.

Reply of the Government

"HAL takes up futuristic projects on its assessment of the technology needs of the defence aerospace sector of the country. Some of these projects are taken up pro-actively to evaluate the technology. HAL's strategic planning department regularly

studies Technology Perspective Capability Requirements (TPCR) and other similar documents to strategize and plan the roadmap.

Market survey may not always be possible for the projects taken up only for technology development because the concepts are new and yet to be proven and there is no market, at that time, available for such concepts. Though for other D&D projects, market assessment is carried out. It may not always be feasible to obtain Letters of Intent (LoIs) particularly for projects which are taken up by HAL for technology development.

In some cases, if project is not successful, the cost may not be recoverable though efforts are made to utilize the expenditure incurred by incorporating learning in other projects.

HAL prepares Performance measure documents, lesson learnt report and project closure report for completed projects. Project related documents, flight trial reports and defect investigation reports effectively capture lessons learnt. It is clarified that, for the project 3 (UAV), closure report was prepared by HAL covering the lessons learnt co-ordinated by IIT Kanpur. However, the new R&D Manual which would be prepared after a benchmarking exercise by the consultant, would cover lessons learnt in a more structured manner."

[Ministry of Defence, Department of Defence Production]
(O.M No. 48040/08/2023-D(HAL-III)-Vol II dated 21.04.2025)

INDIGENOUS DEVELOPMENT OF AIRCRAFT 1 AND ADDITIONAL MODIFICATIONS

Recommendation (No.8)

6. The Committee observe that HAL's attempt to upgrade Aircraft 2 (Avionics Modernization Program) faced significant delays and financial overruns due to evolving user requirements and unplanned modifications. Initially sanctioned for ₹84.61 crore in 2015, the upgrade aimed to reduce dependency on foreign manufacturers by integrating indigenous Line Replaceable Units (LRUs) and advanced avionics. However, the project was still ongoing as of July 2022, exceeding the original timeline by over four years. HAL was forced to seek additional ₹69.37 crore in funding in 2018, raising the total cost to ₹153.98 crore, without securing firm commitments from the Indian Air Force (IAF) for future orders. The Committee also note that HAL failed to obtain formal permission from the Original Equipment Manufacturer (OEM) before proceeding with modifications, which could pose legal and contractual risks. Additionally, the IAF introduced new requirements mid-way, such as the integration of a Counter Measure Dispensing System (CMDS), which further delayed certification and testing.

The Committee would suggest HAL to establish a structured pre-design consultation mechanism with the IAF and other stakeholders to finalize system requirements before initiating avionics upgrades to ensure that mid-course modifications do not disrupt project timelines and financial planning. Additionally, the Ministry of Defence should develop a long-term roadmap for avionics modernization, ensuring that R&D initiatives are synchronized with future defense requirements to prevent redundancy and cost escalation. HAL should also implement a contractual risk mitigation strategy, securing OEM approvals in advance to prevent potential licensing disputes and ensure smooth project execution.

Reply of the Government

"In this project, HAL tried to anticipate the needs of the user and initiated the design with self-funding to ensure that the company is continuously innovating to meet the future needs of the customer. There is a certain amount of risk involved to this, however, it is required to stay competitive. In view of this, though efforts are made to finalize system requirements with stakeholders, it may not be possible always.

As per existing R&D Manual, HAL studies preliminary staff Qualitative requirements (PSQR) during pre-design stage and engages with customers before finalising the requirements.Periodic joint project management reviews are being held with customers to align the customer requirements in the design. HAL is committed to contractual risk mitigation and will ensure that risk analysis is conducted as part of project planning. HAL will also proactively secure necessary OEM approvals in advance to prevent licensing disputes and ensure smooth project execution. Headquarters Integrated Defence Staff (HQ IDS) under MoD prepares a 10-year Integrated Capability Development Plan (ICDP) in consultation with the SHQ, comprising of two five-year plans. Along with ICDP, a 10 year Technology Perspective and Capability Roadmap (TPCR) is also prepared to give signal to the defence industry for its need of equipment & technologies in next 8-10 years."

[Ministry of Defence, Department of Defence Production]
(O.M No. 48040/08/2023-D(HAL-III)-Vol II dated 21.04.2025)

CONCLUSION

Recommendation (No.9)

7. The Committee recognize HAL's pivotal role in advancing India's defense and aerospace capabilities, contributing significantly to indigenous aircraft, helicopter, and engine development. However, the findings in C&AG Report No. 18 of 2023 highlight critical shortcomings in HAL's project planning, execution, and financial oversight. Issues such as non-compliance with pre-project documentation, procurement delays, cost overruns, and inadequate

market research have led to prolonged project timelines, impaired costs, and missed strategic opportunities. While HAL has made commendable progress in strengthening India's self-reliance in aerospace technologies, systemic inefficiencies continue to hinder its ability to meet operational demands effectively. The Committee firmly believe that rigorous adherence to pre-project processes, enhanced risk assessment mechanisms, and structured stakeholder engagement are essential for HAL to achieve global competitiveness in defense manufacturing. Strengthening financial oversight, establishing robust market research frameworks, and ensuring timely compliance with international certification standards will be crucial in positioning HAL as a leading aerospace powerhouse on the global stage. The Committee also emphasize the urgent need for HAL to transition from a reactive to a proactive R&D strategy, ensuring that technological advancements align seamlessly with national defense objectives and market requirements. In light of these observations, the Committee urge HAL and the Ministry of Defence to implement the recommendations in letter and spirit, ensuring that future projects are executed with greater efficiency, financial prudence, and strategic foresight. The success of India's defense modernization and indigenization efforts will depend not just on technological advancements but on the ability to integrate innovation with effective project management, accountability, and long-term vision. HAL's progress in these areas will not only strengthen national security but also cement India's position as a global leader in defense and aerospace manufacturing.

Reply of the Government

"Noted please. MoD & HAL would implement recommendation with due regards and sincerity."

[Ministry of Defence, Department of Defence Production]
(O.M No. 48040/08/2023-D(HAL-III)-Vol II dated 21.04.2025)

CHAPTER III

OBSERVATIONS/RECOMMENDATIONS WHICH THE COMMITTEE DO NOT DESIRE TO PURSUE IN VIEW OF THE GOVERNMENT'S REPLIES

- Nil -

CHAPTER IV

OBSERVATIONS/RECOMMENDATIONS IN RESPECT OF WHICH REPLIES OF THE GOVERNMENT HAVE NOT BEEN ACCEPTED BY THE COMMITTEE AND WHICH REQUIRE REITERATION

- Nil -

CHAPTER V

OBSERVATIONS/RECOMMENDATIONS TO WHICH THE GOVERNMENT HAS FURNISHED INTERIM REPLIES AND REPLIES ARE STILL AWAITED

DELAYS IN PROJECT 1 (GAS TURBINE ENGINE) DEVELOPMENT

Recommendation (No. 3)

1. The Committee note that the Gas Turbine Engine project, initially sanctioned for ₹441.41 crore, has been significantly delayed, causing an impaired expense of ₹159.23 crore. The project was divided into two stages: Stage I (Project Definition and Design) was originally scheduled for completion in September 2014 but was delayed to December 2015, and Stage II (Prototype Development, Testing, and Certification) has been ongoing since 2018 with no completion in sight. One of the primary reasons for the delay is the failure to secure critical components on time, due to procurement bottlenecks and delayed approvals for test-bed construction. Additionally, land clearance approvals were delayed due to bureaucratic inefficiencies, adding more than three years to the project timeline. The Committee also note that HAL did not anticipate the need for 3D technology and advanced material integration, leading to multiple redesign efforts and further pushing back project deadlines. The lack of indigenous expertise in medium thrust-class engine development forced HAL to rely on external consultants, increasing costs and extending the timeline. In this project the Committee note that the project, was handled in very casual approach wherein not even thorough research was done as HAL was not sure where to buy the critical component on time and it was delayed. Therefore, the Committee recommend conducting thorough research on the project and urges HAL to establish long-term strategic partnerships with both domestic and international vendors. This will ensure the timely availability of critical components and minimize procurement-related delays. Additionally, the Ministry of Defence should allocate dedicated funding for the early-stage development of test-bed infrastructure, ensuring that essential testing facilities are in place before project execution begins. The Committee would suggest that to accelerate technological readiness, HAL should invest in advanced material research and indigenous 3D technology capabilities to reduce dependency on foreign suppliers.

Reply of the Government

"HAL took up R&D of two engines pro-actively to become self-reliant in the engine technology and is developing Gas Turbine Engine which is very complex and highly iterative process where the progress is made stage wise incorporating lessons from earlier stage of design, testing. The engines taken up for R&D are 25 kilo newton engine able to power fixed

wing aircraft of the class of Intermediate jet trainer and another class of Turbo shaft engine which will be powering Helicopters. The critical components for such engine are being designed and developed for the first time in the country and there has been delay from the estimated time in redesigning them. It is pertinent to bring out that very few countries in the world have matured gas turbine engine manufacturing technology and they do not transfer the complete technology. HAL is actively working towards establishing long-term strategic partnerships with global aerospace and defence companies to overcome the technology gap. HAL has long time relationship with Engine manufacturing companies like Rolls Royce & Safran for manufacturing of Aero Engines designed and developed by them. Further, HAL has formed a JV company named as SAFHAL with Safran Helicopter Engines, France to jointly develop engine for IMRH / DBMRH Project. However, even in these cases, none of foreign companies/ countries are ready to transfer 100% ToT. The core competence of HAL is in Research and Development of aircraft, helicopters, engines and accessories. The material research which is a critical factor for engine development is being taken up by DMRL (DRDO) and MIDHANI & private sector. HAL is working with these organizations for advanced materials required for aero-engine development. HAL has placed orders on MIDHANI for Rs 757.82 Crs towards indigenization of raw material.As suggested, a gap analysis of ground facilities for testing of airborne systems is being carried out by the Ministry."

[Ministry of Defence, Department of Defence Production]
(O.M No. 48040/08/2023-D(HAL-III)-Vol II dated 21.04.2025)

Comments of the Committee

(Please see para 10 of Chapter I of the Report)

DELAYS IN EASA CERTIFICATION FOR HELICOPTER 1 AND EXPORT CHALLENGES

Recommendation (No. 6)

2. The Committee observed that HAL's attempt to secure certification for Helicopter 1 from the European Aviation Safety Agency (EASA) was delayed by over a decade, leading to ₹108.24 crore in impaired costs and significantly affecting its export potential. Initially, HAL anticipated that its extensive military certification experience would facilitate the EASA approval process. The lack of prior engagement with international civil aviation regulators resulted in prolonged testing and documentation delays. Consequently, HAL was unable to market and export Helicopter 1 in a timely manner. The Committee further note that the extended certification timeline not only impacted HAL's financial standing but also reduced its credibility in the international aviation industry. Given the stringent regulatory landscape of civil aviation, the Committee strongly emphasize the need for HAL to integrate international certification requirements from the earliest stages of aircraft design. The Committee recommend that HAL establish a dedicated Civil Certification Task Force to ensure efficient coordination of all compliance-related activities and facilitate faster regulatory approvals. Additionally, the Committee urge the Ministry of Defence to strengthen bilateral agreements with key international certification

bodies, including EASA, to fast-track approval processes for future aircraft and helicopter projects.

Reply of the Government

"The majority of HAL's projects are for Indian Defence Services. The products which has a potential to be marketed as civil products would be taken up for Civil and International certification. The current R&D manual encompasses the requirements of both military and Civil certification (DGCA). Based on the requirement of the project undertaken, HAL will integrate international certification requirements at the design stage. At HAL, Civil Certification group already exists with the name of Airworthiness Group (AWG) and they are co-ordinating with DGCA and EASA. MoD will examine the feasibility of strengthening bilateral agreements with key international certification bodies, including EASA, to fast-track approval processes for future aircraft and helicopter projects through Ministry of Civil Aviation and DGCA."

[Ministry of Defence, Department of Defence Production]
(O.M No. 48040/08/2023-D(HAL-III)-Vol II dated 21.04.2025)

Comments of the Committee
(Please see para 13 of Chapter I of the Report)

New Delhi;
08 December, 2025
17 Agrahayana, 1947(S)

Baijayant Panda
Chairperson
Committee on Public Undertakings

APPENDIX- I

COMMITTEE ON PUBLIC UNDERTAKINGS
(2025-26)

MINUTES OF THE FIFTEENTH SITTING OF THE COMMITTEE

The Committee sat on Friday, the 5th December, 2025 from 1000 hrs. to 1045 hrs. in Committee Room No. '2', Ground Floor, Extension to Parliament House Annexe, New Delhi.

PRESENT

Shri Baijayant Panda - Chairperson

MEMBERS

LOK SABHA

2. Shri Tariq Anwar
3. Shri Chandra Prakash Joshi
4. Shri Kaushalendra Kumar
5. Shri Shankar Lalwani
6. Shri B.Y. Raghavendra
7. Shri Mukesh Rajput
8. Shri Sukhjinder Singh Randhawa
9. Shri Prabhakar Reddy Vemireddy
10. Shri Lalji Verma

RAJYA SABHA

11. Dr. John Brittas
12. Shri Neeraj Dangi
13. Shri Milind Murli Deora
14. Dr. Bhagwat Karad
15. Shri Surendra Singh Nagar
16. Shri Debashish Samantaray
17. Shri Arun Singh

SECRETARIAT

1. Shri Anjani Kumar - Joint Secretary
2. Smt. Mriganka Achal - Director
3. Shri Tenzin Gyaltsen - Deputy Secretary

2. The Hon'ble Chairperson briefly apprised the Members on the Eleven draft Reports. The Committee then considered and adopted the following draft reports, without any changes/modifications: -

i. Sagarmala Finance Corporation Limited (SFCL) (Comprehensive Examination);

ii. Rural Electrification Corporation Limited (REC Limited) (Comprehensive Examination);
iii. Nuclear Power Corporation of India Limited (NPCIL) (Comprehensive Examination);
iv. Review of Performance of Petroleum & Natural Gas Sector CPSUs (Horizontal Examination);
v. "Para No. 2.4 of C&AG Report No. 14 of 2021 regarding 'Loss due to flaring of High-pressure gas' relating to Oil & Natural Gas Corporation (ONGC) Limited. (Audit Based Examination);
vi. Action Taken by the Government on the Observations/ Recommendations contained in the First Report (18th Lok Sabha) on "Procurement of hardware/software item to the tune of Rs. 890.34 Crores through strategic alliance" relating to National Informatics Centre Services Inc. (NICSI)" [Based on Audit Para No. 6.1 of C&AG Report No. 03 of 2021];
vii. Action Taken by the Government on the Observations/ Recommendations contained in the Third Report (18th Lok Sabha) on "Undue enrichment through recovery of turnover tax from consumer" relating to Indian Oil Corporation Limited (IOCL) [Based on Audit Para No. 2.1 of C&AG Report No. 14 of 2021];
viii. Action Taken by the Government on the Observations/ Recommendations contained in the Ninth Report (18th Lok Sabha) on "Industrial Finance Corporation of India Limited (IFCI ltd)";
ix. Action Taken by the Government on the Observations/ Recommendations contained in the Tenth Report (18th Lok Sabha) on "Design and Development (D&D) in Hindustan Aeronautics Limited (HAL)" [Based on Chapter-II of C&AG Report No. 18 of 2023];
x. Action Taken by the Government on the Observations/ Recommendations contained in the Eleventh Report (18th Lok Sabha) on "Reviewing timely submission of Action Taken Notes (ATNs) on C&AG Paras/Reports (Commercial) by the Ministries/Departments"; and
xi. Action Taken by the Government on the Observations/ Recommendations contained in the twelfth Report (18th Lok Sabha) on "IREL (India) Limited".

3. The Committee authorized the Chairperson to finalize the draft Reports on the basis of factual verification as suggested by the concerned CPSUs/Ministry/Department/C&AG and presentation of the same during the current session of Parliament.

The Committee, then, adjourned.

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APPENDIX-II

(Vide para 4 of the Introduction)

Analysis of the Action Taken by Government on the Observations/ Recommendations contained in the Tenth Report (18th LS) of the Committee on Public Undertakings (2025-26) on Chapter II of C&AG Report No. 18 of 2023 regarding 'Design and Development (D&D)' in Hindustan Aeronautics Limited (HAL)'.

I	Total number of recommendations	09
II	Observations/Recommendations that have been accepted by the Government [vide Recommendations [*vide* Recommendations at Sl. Nos. 1, 2, 4, 5, 7, 8 and 9]	Total - 07 Percentage-77.78 %
III	Observations/Recommendation which the Committee do not desire to pursue in view of Government's replies.- Nil	Total - 00 Percentage-0.00%
IV	Observations/Recommendations in respect of which replies of the Government have not been accepted by the Committee and need reiteration. - Nil	Total - 00 Percentage-0.00%
V	Observations/Recommendations to which the Government has furnished interim replies. Sl. Nos. 3 and 6.	Total - 02 Percentage-22.22%