Original Article

Quality control indigenous flying clothing : Field experience

Wg Cdr VS Sachdev* Gp Capt RR Kapur#

Quality control for flying clothing is of paramount importance, more so for fighter flying. Flying clothing has to be of high standard so that there are minimum chances of its failure in air. In recent years there has been a thrust towards indigensation of flying clothing which is a desirable step. However doubts are being raised at various levels regarding quality control of indigenous flying clothing. To alleviate this fear and to get feed back from the users which in turn may lead to improvement of the quality of the flying clothing, Air HQs had issued a policy letter to examine all flying clothing received at station logistics sections. As per that policy a team consisting of an aviation medicine specialist, a pilot and a technical officer is examining all flying clothing before its being issued to the users. Defect or observation report if required, is being raised based on the observations, by this team. It has been observed that besides the indigenous flying clothing, some used flying clothing items are being retrieved, repaired and are sent back for issue. The details of the repairs carried out is not being mentioned. Similarly it is not known if these repaired items are being tested and certified by any competent authority/agency. This trend is not desirable. This paper highlights the experience on the subject for last one year at one of the air force stations. Suitable recommendations are also made.

Keywords: Life support system, anti G suit, flying boots, visors.

Flying imposes considerable physiological demand and aircrew are provided with specialised clothing and equipment to protect them against aviation stresses. The minimum protective outfit worn by aircrew include an overall, anti G suit, aircrew helmet, oxygen mask, gloves and boots. The quality of this specialised clothing is critical for flight safety and the chances of failure should be minimum.

Flying clothing items specific to the type of aircraft were earlier being procured from abroad. In recent years there has been a thrust towards indigenisation of flying clothing which is a desirable step to reduce our dependence and also to save foreign exchange. Further to that it has also been decided to carry out indigenous repairs of retrieved Russian Crash helmets of ZSH type so as to use them to the maximum possible extent. However doubts are being raised at various levels regarding quality control of indigenous flying clothing. To alleviate this fear and to get feed

* *Classifed Specialist (Aviation Medicine) 30 Sqn AF. C/o 99 APO*

Senior Advisor Aviation Medicine, SMO No. 11, Wing AF. C/o 99 APO

back from the users which in turn may lead to improvement of the quality. Air HQs had issued a policy letter to examine and functionally assess all flying clothing items received at station logistic section. A team consisting of an aviation medicine specialist, a pilot on type and a technical officer are to examine all flying clothing to ascertain the serviceability and fitness prior to its issue to the users. A defect or observation report is required to be raised based on the observation by this team and comments of aviation medicine specialist are endorsed on this report. The basic aim of this pre-issue inspection of the aircrew flying clothing is to ensure that aircrew are issued with fully functional standardised flying clothing. The observation/defect report are raised to give a feed back to higher authorities so that manufacturing/quality control agencies may be appraised of these observations/defects to ensure future quality control of aircrew flying clothing.

In this paper the experience gained on the subject at an Air Force Station is presented and suitable recommendations are suggested for improvement.

Material and methods

During last one year 100% inspection of all items of flying clothing specially those manufactured indigenously was carried out by the team before being issued to aircrew or kept in storage at station logistic section. Detailed visual inspection of all items like flying overalls, flying boots and gloves was carried out and certified for their functional aspects. Other critical items like ZSH-3M outer helmets, inner leather helmets, oxygen masks and anti G suit were also visually examined in details. Few functional assessment test like impedance check for inner helmet, G loaded visors check for outer helmet, zipper testing for anti G suit were also carried. The anomalies noticed which were of minor nature and did not render the equipment unserviceable were forwarded as observation report only and defect report was not raised. However defect report was raised for the items which were considered unfit for issue on visual inspection and local functional tests to the extent feasible.

Results and discussion

A summary of results of flying clothing examined at logistic section at Air Force Station Tezpur is given in table below.

This Air Force Station is a flying base where pilots are first time inducted to MOFT (Mig Operational Flying Training) Conversion syllabus. Thus all pilots are equipped with protective clothing required for fighter flying. Due to shortage of flying clothing at times pilots have to resort to sharing of flying clothing. Majority of flying clothing examined at station logistic section were found satisfactory, meeting at least the minimum standards. However certain observations regarding the material used and workmanship were recurrent in nature and are listed below.

a) Metal used in various clips and hooks of inner leather helmet were found rusted even before its issue.

b) Two different types of soles are being used for flying boots by manufacturers, and stitching is not of standard pattern. There are complaints of poor finish and eyelets of shoe laces are of poor quality.

c) Zippers of overalls and anti G suits are of poor quality and get rusted fast.

Details of flying clothing inspected

Sl No.	Item	Make	Total No	Observation	Remarks
1.	Flying overall	Mk 11	450	Nil	Fit for issue
2.	Flying Boots	Mk-111	82	Sole & stitching not of standard pattern, eyelets of shoe laces are of poor quality	Fit for issue
3.	Flying gloves	Mk 11	153	Nil	Fit for issue
4.	Oxygen masks	Russian	78	Nil	Fit for issue
5.	Outer helmet (ZSH-3M)	a) Russian	02	Nil	Fit for issue
		b) Retrieved & repaired	17	anchorage hook for chin strap moving & rotating freely. Workman ship poor quality visor violet in colour	Not for issue
		Cat 'B'	15	Visor violet in colour	Fit for issue
6.	Inner helmet leather	a) Russian	41	Inner helmet impedance low for two	Fit for issue except two
		b) Indigenous	58	Poor workmanship R1 lead is not matching with aircraft leads	Fit for issue except five
7.	Anti G suits	a) Indigenous	77	Nil	Fit for issue
		b) Indigenous (repaired)	03	Cloth material and zips are of inferior quality Zip replaced	Fit for issue

d) Three anti G suits MK-11 (Cut away type) size 2 manufactured by Arnar Indian were stamped (Repaired). Details of the repairs carried were not mentioned. On close inspection cloth material and zips of these suits visually appeared to be of inferior quality. However, zip opening of anti G suits was satisfactory. They were considered fit for issue and observation report was raised for future improvement of the quality.

Certain major observations of aircrew flying clothing which could have compromised flight safety are listed below. They are reflected as defect report.

a) A stock of seventeen ZSH-3M crash helmets received were retrieved and repaired helmets. Details of the initial damage as well as repairs carried were not available hence the crash protection properties were unpredictable. In this regard the certificate supplied by the manufacturer along with original Russian helmet is relevant which cautions against the use of helmet even after a single ejection. Inspection of the anchorage hooks for the chain strap also revealed it to be freely rotating and not fixed firmly as available in original Russian helmet. The visor in these helmets was violet in colour and it was not known whether it meets with the minimum required standards for aircrew visors. Hence the stock was considered unfit for issue to aircrew and it was recommended to evaluate some of these helmets (random sample) in totality by a suitable testing agency. The next lot of retrieved and repaired helmets received were categorised as cat 'B' and the quality of repairs carried out was satisfactory. Hence these helmets were cleared for issue with the

recommendation for providing the details of initial damage sustained and testing for crash attenuation property of random samples.

b) Seven inner helmets were found unfit for issue due to poor impedance matching, poor quality and serviceability.

Recommendations

a) Development of indigenous flying clothing is a step in right direction and must be encouraged.

b) There is a need to incorporate an experienced aviation medicine specialist with the agency responsible for the quality control of these items. This will minimise the number of defect/observation reports from the units. At the same time it will also help in reducing unnecessary holding up of flying clothing items pending quality testing decisions.

c) Basic policy issue of retrieving and repairing outer helmets need to be supported with results of random testing of these helmets by some agency such as IAM/DEBEL. Similarly visors used for these helmets should meet the minimum standard of aircrew visors.

d) Since anti G suits cannot be functionally tested at peripheral units, it is recommended that a random batch testing be carried out by a suitable agency.

Conclusion

Suitable flying clothing is the basic aircrew requirement to ensure flight safety. To this end the new policy regarding pre-issue inspection of the flying clothing at station level by a team of different members is a step in the right direction. As facilities for special test are not available at peripheral units it is not possible to assess and certify all quality control aspect of these flying clothing. Hence there is a need to incorporate an experienced aviation medicine specialist with the agency responsible for the quality control of flying clothing. This will result in minimum hold ups of flying clothing.