

CoA/M/M+P-55



ST. NO.
UDC. R 29489
AUTH.

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December, 1964

THE COLLEGE OF AERONAUTICS

DEPARTMENT OF PRODUCTION AND INDUSTRIAL ADMINISTRATION

Test Report No. PLB0/15

Field tests of PERPRO tips grade RD107
copy turning steel B.S.4



S U M M A R Y

A batch of 232 Rammer Butt Stems were machined at P. and V. (Mining and Engineering) Ltd., with alternate tips of S1P and RD 107. The results showed that under the same cutting conditions the RD107 gave more pieces per edge than did the S1P. It is suggested that further field trials should be carried out to confirm this result.

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Test Conditions

Tests were carried out turning the body of Standard Stems for 7" diameter Rammer Butts, shown in figure 2. The material of these stems was B.S.4, a 1% C .4% Mn steel, in the annealed condition. The machine used was a copy lathe No. GF-KDM.11/70 at the machine shop of P. and V. (Mining and Engineering) Ltd., Dronfield.

The body was machined from a forging in two passes the first being at a depth of about $\frac{1}{8}$ " and the second $\frac{1}{32}$ ". The cutting speeds used were 325 fpm and 410 fpm; the feed being .014 in/rev. in each case.

Tips of Sanvik S1P and PERPRO RD107 were used alternately until the batch of 232 stems was completed.

Test results

During the tests six tips were used and at the end of the tests five of the tips were sent to Cranfield together with the machining study data sheets for analysis.

The wear of the five tips was measured, as shown in figure 1, and the results are given in table 1.

The machining of rammer butts is a fairly severe test of the toughness of tips in that as the tool reaches the apex of the tapered portions of the stem the swarf comes off as an annular ring which spins round the workpiece often causing the tip to fracture. It will be noticed that two of the S1P tips failed by breaking into two.

If it is considered that two edges have been used when a tip fails in such a way that it is not possible to use the second edge, then table 1 can be summarised as follows:-

<u>Grade</u>	<u>Edges used</u>	<u>Pieces machined</u>	<u>Pieces/edge</u>
RD 107	3	118	39
S1P	6	114	19

Photographs of the state of the tips at the end of the tests are given in figures 3 - 8.

Conclusions

Although it is not possible to give any exact quantitative comparison from the limited results obtained during these tests, the results did show that RD 107 gave a superior performance to S1P under the same conditions.

Further tests should be carried out under machine shop conditions with other workpieces and material specifications to confirm this result.

Acknowledgments

Thanks are due to P. and V. (Mining and Engineering) Ltd., for their co-operation with these field tests, and for their permission to reproduce figure 2.

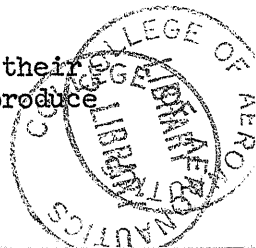
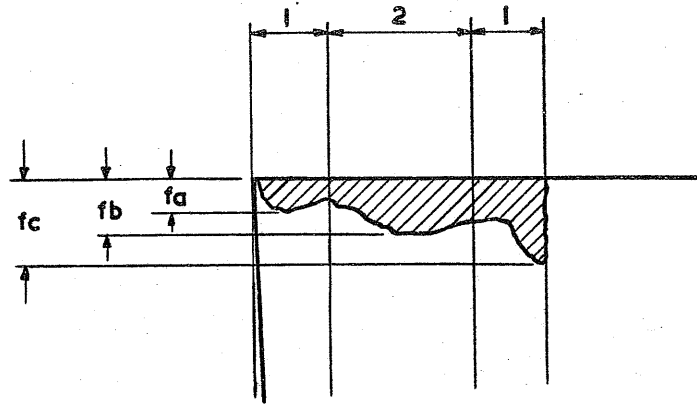


TABLE 1

Tip No.	Grade	Edge	Speed fpm	Life min.	Pieces machined	Fa	Fb 1/1000"	Fc	Deformation	Remarks
1	RD 107	1	325	141	83	50	45	25	7	Chipped on flank 2nd edge not used
2	SLP	1	325	5	4	-	-	-	-	Fractured into two, not possible to use second edge
3	SLP	1	325	8	6	20	5	5	10	Break through of crater on flank. 2nd edge not used.
4	RD 107	1	410	49	35	23	51	31	1	Chipped at depth of cut
		2	410			13	16	8	8	Chipping at junction of crater and flankwear
5	SLP	1	410	39	28	-	-	-	-	Fractured into two, not possible to use second edge
6	SLP	1	325	-	76	-	-	-	-	Not returned to Cranfield.



FLANKWEAR MEASUREMENT

FIG. I

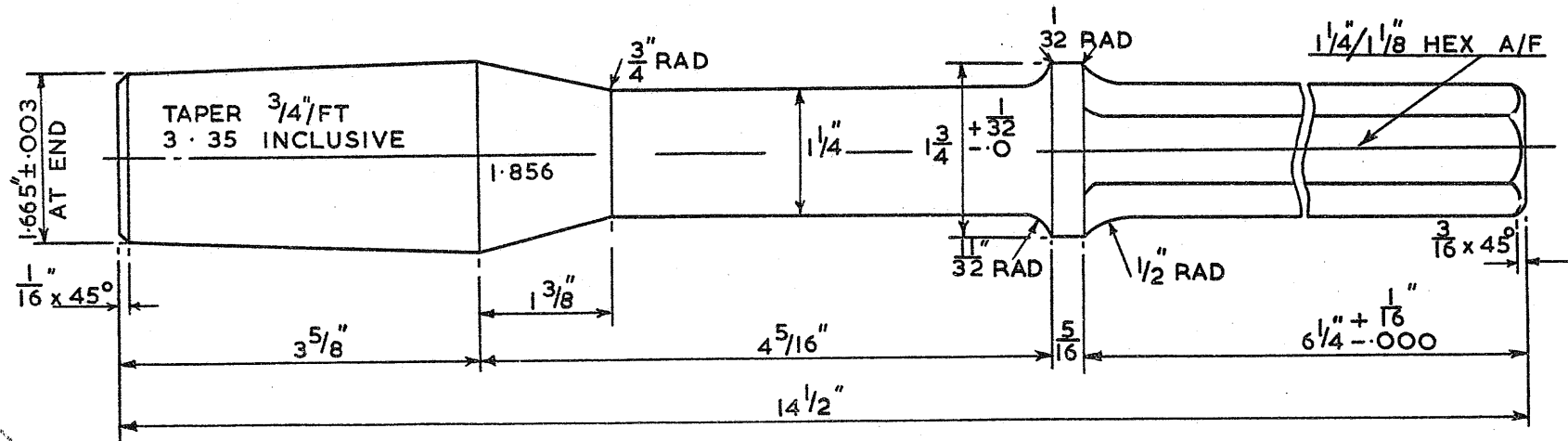
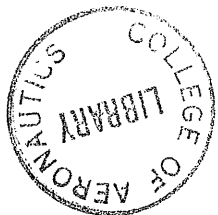


FIG.2. P & V STANDARD STEMS FOR 7" DIA RAMMER BUTTS.



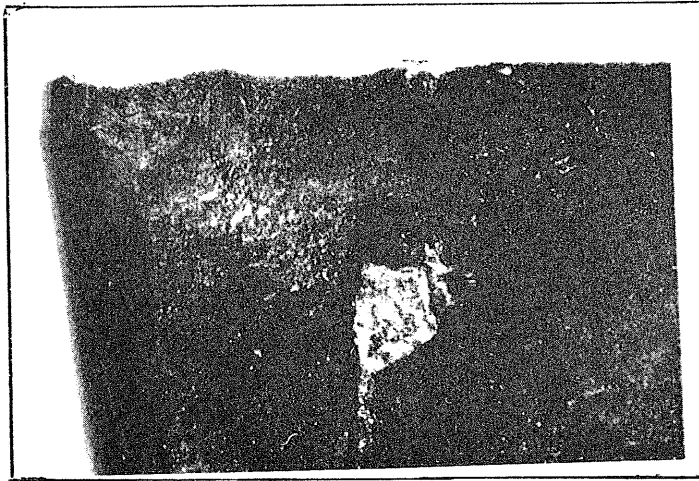


FIG. 3 FLANK AND CRATER WEAR RD107 TIP 1 .

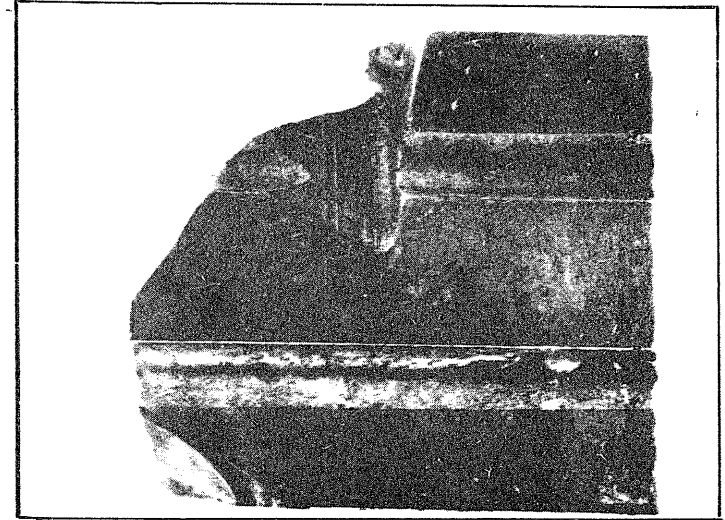
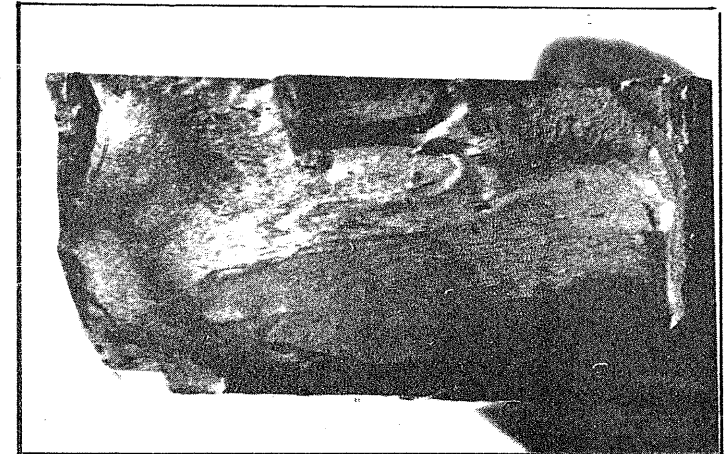
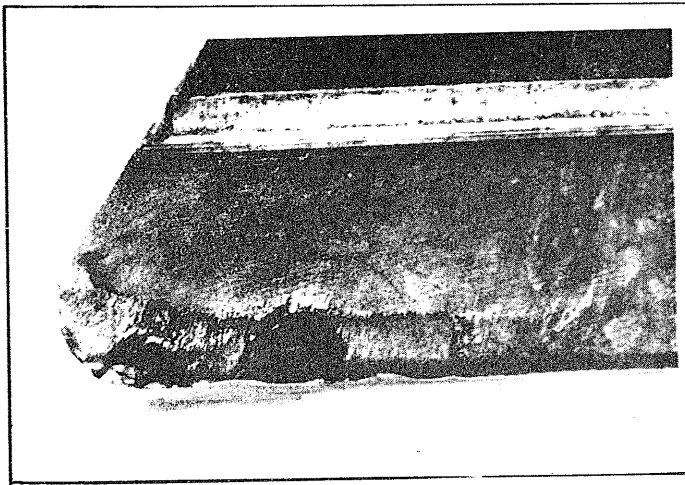


FIG. 4 FRACTURE OF S1P TIP 2



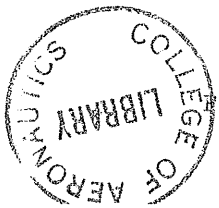
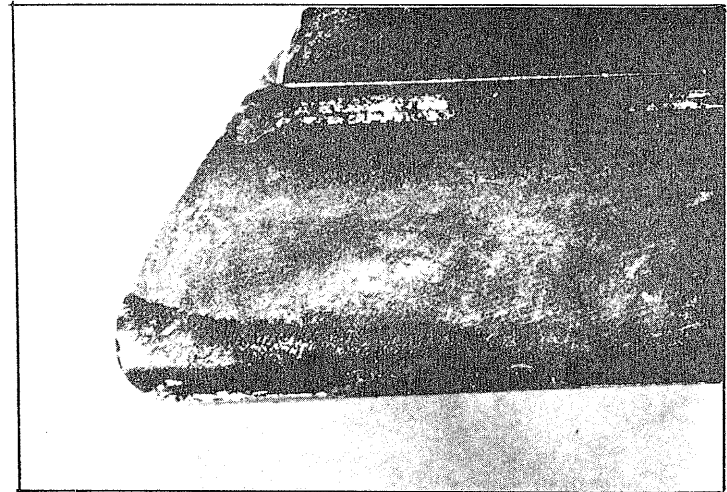
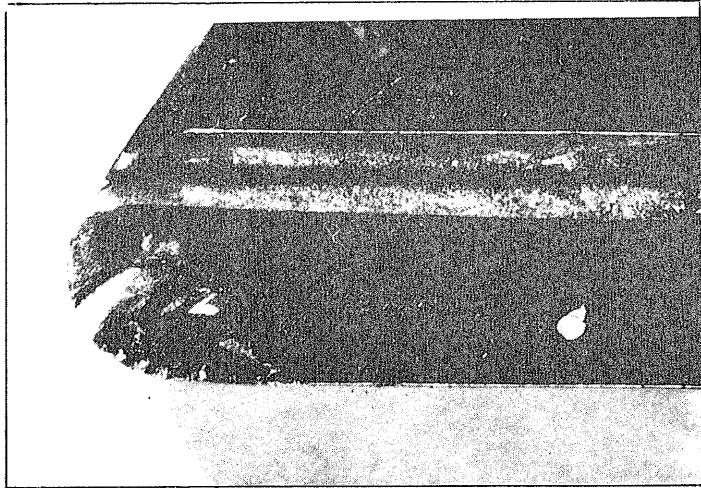
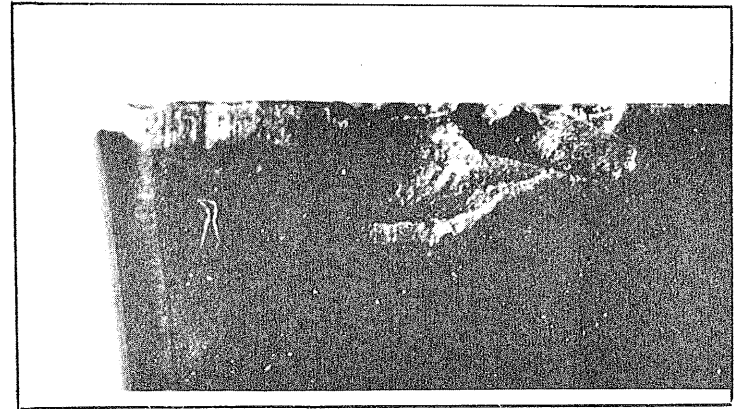
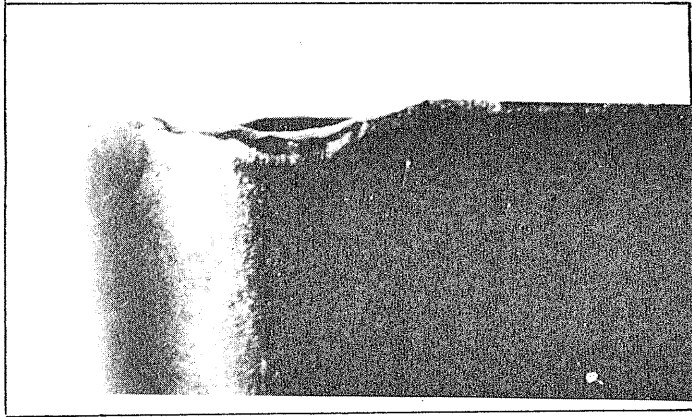


FIG. 5 FLANK AND CRATER WEAR S1P TIP 3.

FIG. 6 FLANK AND CRATER WEAR RD 107 TIP 4a.

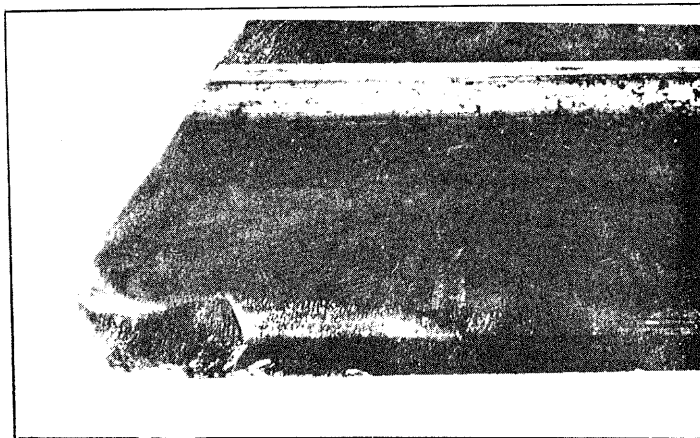
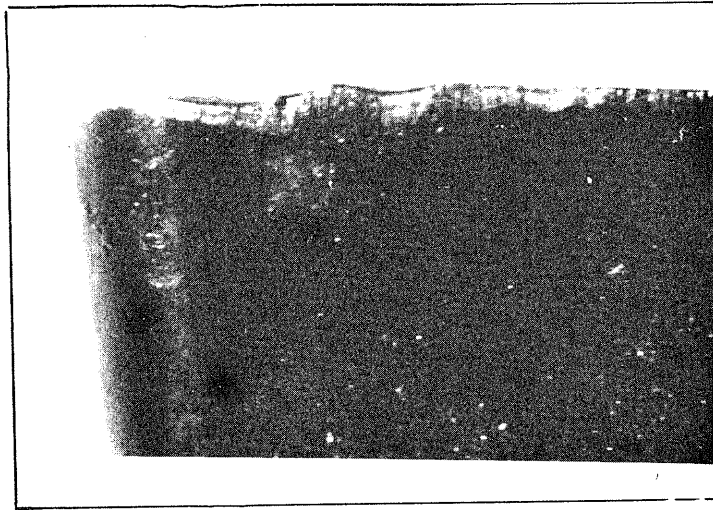


FIG. 7 FLANK AND CRATER WEAR RD 107 TIP 4b.

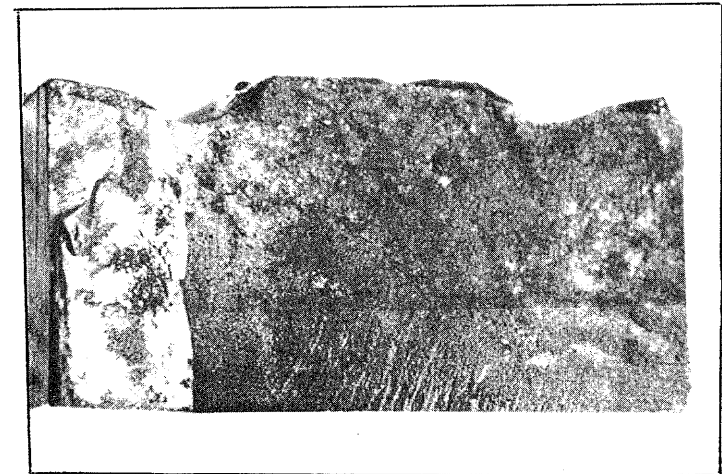
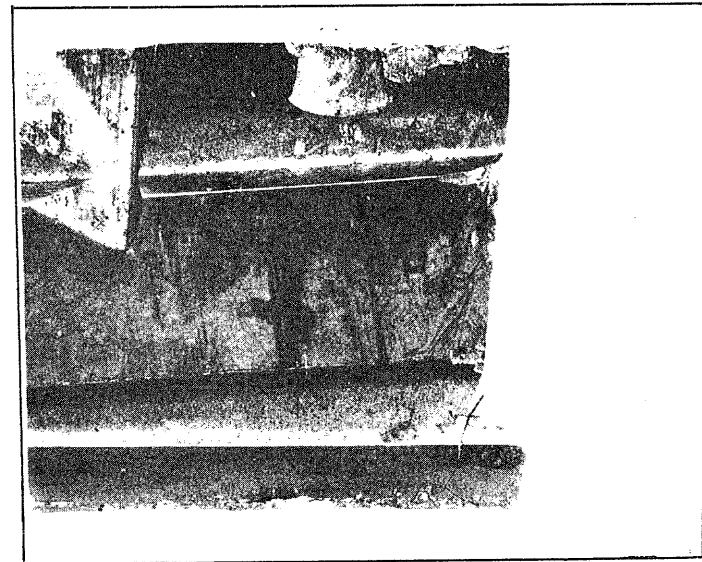


FIG. 8 FRACTURE OF S1P TIP 5.