RCBS 'X' Dies – A Test

By Larry M. Gibson

Surprisingly, there was little fanfare with the introduction of the 'X' dies by RCBS. All I saw were small blurbs in the trade magazines and mention of them in Rick Jamison's Shooting Times column. Advertised to reduce or eliminate case stretch – the question is, do they? My real interest was: Will they reduce case stretch, i.e., increase case life, of 7.62 NATO (that's .308 WIN to you non-military types) cases fired in M14/M1As?

The number of reloadings per case for M14/M1As is probably the worst of any rifle/cartridge combination short of the .303 Lee Enfield family. Incipient head separation is the reason for case loss. My experience with rack grade M14/M1As is 5 good firings per case with the 6th being a 'throwaway', and this only if the brass was fired in a bolt gun or M14/M1A to begin with. A match M14/M1A with a tight 'match' chamber may get 1-2 more firings, but more often not. If surplus once fired brass is used, the 1st firing was more than likely done in a machine gun and only 1-2 reloadings/firings are possible before head separation.

Most head separations can be identified as a speckled crack forming around the case just ahead of the web at the expansion ring. This crack is sometimes quite obvious. Then on some cases the head will separate from the case on ejection. Many times both parts of the separated case are ejected. But sometimes only the head is ejected leaving the front half of the case in the chamber. The rifle picks up the next round attempting to chamber it and things get jammed up. Not good! The other question here; is there gas cutting damage to the chamber?

What causes this incipient head separation to happen? Simply put, on firing, the case expands to grip the chamber walls sealing off the gas pressure. When the bullet leaves the barrel pressures are reduced and the case contracts (not to its original dimensions) releasing its grip on the chamber walls and allowing extraction. However, it appears that the M14/M1A begins extraction prior to the pressure dropping completely. The cases do not contract as much as they would if fired in a bolt action for instance. Compounding the problem is the mil-specs for military chambers are somewhat generous in their diameter dimension to allow for functional reliability during combat conditions. When full-length resizing (necessary for M14/M1A) case walls are squeezed in first. This pushes the shoulder forward.

The shoulder is then set back by the full-length die and the brass flows forward into and elongating the neck. This increases the case length on each resizing considerably. Also, since the brass at the expansion ring expanded and was squeezed in and forward during resizing, the case gets progressively thinner in that specific area. The result is, eventually, a head separation at that thinning location. Most mil-spec (US) chambers allow for a maximum case length of about 2.045". I, like most M14/M1A users, have found trimming unnecessary. Incipient case head separation will occur, and cases discarded, before maximum case length is reached and trimming is necessary.

Are these RCBS 'X' Dies a cure for this? I decided to use my rack grade M1A to put them to the test. The issue GI barrel has quite a generous mil-spec chamber with headspace being within tolerance. This usually results in the 5th firing being the 'throwaway' for brass in this rifle. It has untold thousands of rounds through it, many rapid fire. Accuracy capability is 2-1/2 to 3 MOA with M118 Special Ball or equivalent reload. This would be the best 'worst case' test rifle. All rounds would be fired with the rifle loading from the magazine in normal semi-auto function. Slow fire single-loading technique would not be used.

For ammunition I selected 10-rounds of LC 92 M118 Special Ball. A check for concentricity revealed a runout of .011" for one round with the others being .004-.007".

My M118 equivalent load is:

BRASS: The 10 LC 92 cases from the selected M118 Special Ball
PRIMER: Winchester WLR
POWDER: H4895 41 grns
BULLET: M118 174 grn
CARTRIDGE OAL: 2.8"

Other than deburring the flash hole, chamfering the case mouth and removing the primer pocket crimp, there was no special case preparation done. Cases were measured after each resizing with the minimum to maximum case lengths recorded. Concentricity was checked after each loading. Two cases (marked and tracked) consistently had .004-.005" runout with all others being .0005-.003" throughout the test. Neck thickness (outside diameter) was measured after each loading to check for brass flow into the neck area.

The test would be concluded based on any one of these criteria:

-Any sign of incipient head separation
-Case buckled or dimensionally damaged/deformed during resizing
-Split neck or body
-Case length exceeding 2.045"
-Loose primer pockets
-Neck thickening to cause excessive runout (.010")
-Drastic deterioration of accuracy*
-Malfunctions caused by damaged (dinged up) cases

***Note** – The 6th, 12th and 18th groups will be fired in a Fulton Armory Match M1A to verify accuracy. All test firing was conducted at Tacoma Rifle and Revolver range.

The range has solid cement benches, which were used with sandbag rests front and rear. A 100-yard reduced 'A' bull target was used. All targets were at 100-yards. I set up the Oehler 35P to chronograph all rounds fired for each 10-shot string. But as the test went on, and on, and on, I quit after the 10th string. Chronograph results were consistent and showed no variation other than that normally expected. The LC 92 M118 averaged 2600 FPS and the M118 equivalent reload averaged 2575 FPS for the subsequent 9 ten shot strings chronographed.

The RCBS X-Die was installed in my Pacific single-stage press and adjusted as per the instructions. It's really quite easy. These dies differ from other full-length dies in the dimension and design of the decapping rod. The diameter of the rod is larger and appears to act as a mandrill of sorts. There is a shoulder on it, which controls the length as the case. Apparently the case is prevented from stretching by the case mouth butting against this shoulder. Thus the decapping rod must be carefully adjusted as per the instructions. This shoulder is the key to the success of the die.

I found on the 2nd resizing that the expander was really getting hard to pull through the necks. Also, the lengths of the cases were varying more than I thought they should. Case lubing technique was changed to standing the cases in a tray. They were then sprayed lightly with Dillon case lube. With this method the necks (lube gets sprayed lightly into the case mouth) pulled over the expander quite easily and the uniformity of case length dramatically improved. Cases are cleaned again to remove the lube and remove the lube from the inside of the case neck.

Throughout the test, case length never exceeded 2.027" and actually remained quite consistent. After the 12th resizing the necks had begun to thicken by about .001" at the shoulder to taper forward about 1/3 of the way to the case mouth. However, this did not adversely affect concentricity or accuracy.

The case rims got a little beat up, but there were no malfunctions of any kind. This included the 2 firings in the tight match chambered M1A. Primer pockets remained tight throughout the test. I thought the case mouths would require rechamfering, but they did not. Accuracy remained consistent with the rack grade M1A. The LC 92 M118 ten shot group was 2.8". The last (15th) ten-shot group with the M118 equivalent load was 2.4". The average of groups 2-15 being 2.7". Groups 6 and 12 were fired with the match M1A to verify the accuracy and both were 1.6".

The test was concluded after the 15th firing based on incipient head separation. One case developed that slight 'speckled circle' at the expansion ring. There was no clear-cut crack and probably no gas cutting happened. I may or may not continue the test with the rest of the cases.

Tabulated below are the measurements after each resizing:

	MINIMUM CASE LENGTH	MAXIMUM CASE LENGTH	INCREASE IN CASE LENGTH
1	2.013	2.019	
2	2.021	2.025	.006
3	2.025	2.027	.002
4	2.025	2.027	.000
5	2.022	2.027	.000
6	2.023	2.025	-.002
7	2.023	2.025	.000
8	2.024	2.026	.001
9	2.024	2.027	.001
10	2.025	2.027	.000
11	2.025	2.027	.000
12	2.024	2.026	-.001
13	2.025	2.026	.000
14	2.024	2.027	.001

Case length evened out at the 3rd resizing and remained fairly consistent. Interestingly, numbers 6 & 12 that were fired in the match M1A show a decrease in length! At #12 is where I detected a thickening (.001") of the case necks in the shoulder area which tapered forward. Again this did not affect concentricity or accuracy.

Questions not addressed in this test:

1. Case life when used in match chambers or bolt guns?
2. Case life of cases already fired several times?
3. Case life of surplus once-fired (in machine guns) cases?
4. Case life of civilian manufactured (Rem, Win, Fed, PMC, et al) cases?

The answers to these questions will probably have results as positive, if not more so, than this test.

My technique for loading M14/M1A ammo now will probably be as follows:

1. Clean cases.
2. Stand cases in loading trays and spray lightly with Dillon case lube.
3. Size with RCBS X-Die using Pacific single stage press.
4. Clean cases. Clean primer pockets. (On 1st resizing prep cases by remove primer crimp, deburr flash hole, turn necks, trim to uniform length and chamfer case mouth). Conduct visual inspection for defects (split necks, head separation, etc.).
5. Load on Dillon 550B. Use a Bonanza neck size die or a Redding bushing die at station 1. This may or may not be necessary. The idea here is to iron out any dents the 2nd cleaning may have caused in the case mouth and perhaps uniform neck tension on the bullet.

This limited test revealed that; using the RCBS 'X'dies, when reloading for the M14/M1A, one may expect 3 times or more firings per case as when using standard dies. I have been using Bonanza Benchrest full-length dies prior to this. I've never found the need for small base dies, as some recommend, for they really shorten case life.

This increase of case life is, in my opinion, truly astounding. Also, it appears case trimming is unnecessary. I would hope RCBS would make them in a wider array of calibers than currently available. I will buy more of them. When I think of the thousands of 5-6 times fired brass that I have thrown out ... oh well!