

Frame Repair

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I usually send bent or tweaked frames out to Vern Fueston, GT Enterprises in Montague, California. See October 1, 2004 issue of the VMCA News.

As BMW engineering design progressed from the R32, the integrity and strength of the frames improved.

The series of tubular frames before the introduction of the pressed steel frame were brass welded together. Brass "work hardens"™ with age. It does not need to be pounded, twisted or bent for this to happen. All a brass part need do is sit on a shelf, and the differential forces inside created when cooling will be enough to cause "work hardening"™. The metal becomes crystallized and will fracture under stress.

For those of us who are interested in old firearms have seen hundred year old brass cartridges that have never been fired, cracked at the neck where the bullet was seated. Cartridge makers have since learned that new cartridges need to be annealed.

The same thing happened to the brass joints on those early frames. But of course, annealing the brass on them would have made the joints weaker, and they would have "work hardened"™ during use and crystallized sooner.

Enter the pressed steel frame, or what some people call the "Star Frame"™. Actually, the German word Starr means "rigid" and the term "Star Frame,"™ more commonly used to describe the pressed steel frames, would actually apply to any rigid frame, whether brazed tubular steel, pressed steel, or welded tubular steel such as found on the R5.

When BMW bought the Austin automotive works in Eisenach (where BMW later made the Dixi) in the late nineteen twenties, they acquired the tools and technology to manufacture the pressed steel frames that were introduced with the R11 and R2, soon followed by the R16 and R4.

Of course, BMW motorcycles were made so that owners could mount sidecars to them. Being a primary means of transportation, many sidecars were sold, mounted on BMWs and ridden nearly everywhere throughout Europe.

Adding a sidecar to a bike adds sideways stresses to the vertical stresses that already occur when riding down a pot holed street. Frames bent with increased use, flexing steel in some cases fractured, and those bikes were taken to local repair shops to be welded back up.

BMW intended to build bikes meant to last a lifetime. The engineers first strengthened the pressed frames with additional riveted on steel brackets seen on the last R12s. They also returned to the tubular frame design, only this time, the frame members were welded.

Well, most of them were welded: The R5 and R6 had bolt on brackets joining the tubes at the rear of the frames. The R20 and R23 (later R24 was the same) had tubes that were bolted to a cast steel steering head in addition to being bolted to brackets at the rear of the frames.

The Plunger Series, the R51, R61, R66, and R71 had completely welded oval cross section, double loop steel tube frames.

Electric arc welding was used in Germany at this time, but I could not say for sure that these frames were electric stick welded. I've taken several pre-war frames to experienced welders for their examination. Their opinion is that the welds were made with an acetylene torch.

This makes sense. Welders tell me that electric welding tends to leave the weld seams under greater stress and the metal at the weld seams more brittle than with gas welds. BMW certainly did not want their frames to break.

Let us save the story on post war development for another time. I told you this much to bring you to the R24 frame I worked on recently.

Like the pre-war R20 and R23, the R24 frames were among the weakest of the weak. Excepting the main longitudinal member that is bolted into the steering head, all the remaining steel tubing is 26 mm outside diameter with 3 mm wall thickness. Each end of the two side rails have solid steel inserts for support where they are bolted to their corresponding brackets.

This particular frame must have gotten whacked from the front. Someone attempted to straighten the side rails, then gave up

Let's get to the question forming in our minds: "Why bother with these rails, when there were a lot of R24s made. Certainly these rails turn up from time to time, don't they?"

Yes, they do turn up. Choosing a different set of side rails is accompanied by a new set of problems. The serial number, corresponding with the serial number on the crankcase, is stamped on top of the right side rail engine mount block. These rails were also hand made in pairs. Even though they were formed together and the tabs welded in place while the rails were in a jig, no two pair are exactly alike.

These rails match the engine case, making them unique to this bike.

The owner of this R24 got lucky: I had a spare set of rails that had been badly clobbered at the ends, however very usable in the two sections I needed. Some previous owner was good enough to remove the serial numbers from the spare frame, so now I have to go into convulsions while fretting over destroying a good frame.

(I checked with Metric and Multi Standard Corp. for 26 mm hydraulic steel seamless tubing. Nada! They haven't got it).