In this second part of the article I want to describe the dies available to the advanced hand loader that will fully utilize the care taken to prepare the cases.
I will also cover some priming, accurate powder charging, neck tension, COAL and any tips that will help gain the last bit of accuracy out of your finished round.
I would first like to describe my method of obtaining Cartridge Overall Length.
In my opinion the devices that use a modified cartridge inserted into the chamber cannot give a true accurate dimension from the bolt face to rifling.
I use a home made device called a “Ranging Rod”, this consists of a length of brass rod (5mm for .223-243, 6mm for 270 and 7mm for 308) approx 30” long.
This is fitted with 2 locking collars which aid final measurement.
With the rifle cocked, the brass rod is passed down the muzzle until it touches the bolt face, both collars are slid along the rod until they butt up against the muzzle,
the first collar touching the muzzle and the second collar touching the first collar.

RANGING ROD WITH COLLARS BUTTED AGAINST THE MUZZLE

The second collar is then locked in place and the rod is partially removed.
With the bolt then removed drop a bullet of choice into the neck of the chamber/rifling lead and have an assistant hold it gently in place with a length of suitable dowel.
Push the ranging rod back down the barrel until it touches the bullet tip, slide the first collar up against the muzzle and lock it in place.
The distance between the inside of the 2 collars will be the exact cartridge overall length with the bullet just engaging the rifling.

With the very bullet used for calculating the COAL create a dummy round to the exact dimension recorded for the COAL.
We all know that bullets are not all the same length, it is imperative that you take a bullet comparator reading from your dummy round and use this as a datum dimension to which all your other rounds will be compared.
This tool attaches to your vernier and has a bored collar corresponding with the bore of the rifle for a given calibre, the bullet of the completed round is inserted in the collar and a dimension is taken from the base of the case to the radius or ogive of the bullet where it locates in the collar.

BULLET SEATING DEPTH COMPARATOR

This gives a true reading of the distance of the bullet to the lands of the rifling.
A bullet comparator is an important piece of equipment in the quest for accurate measurement of overall length to the ogive and bullet seating depth
Now we have established the COAL with what is IMO the most accurate way lets have a look at the dies that are available for us to load are super accurate rounds with.
I am not going to tell you haw to set up and use these dies, you will already know this but I will give a brief description of how they work and the merits of each type.
Standard 2 die rifle sets have loaded millions of rounds and for most shooters are quite satisfactory but the accuracy minded shooter wants something a bit more specialised.
He will be looking for dies that are manufactured to much tighter tolerances and concentricity, to maximise his neck tension he will want interchangeable neck bushings and to exactly determine his bullet seating depth he will most likely choose micrometer adjustment.
Redding are the leaders in these types of dies, although competition dies are also made by RCBS, Forster and some custom makers, however only Redding and custom makers offer interchangeable bushing dies for standard 7/8-14 presses.
Savvy shooters almost always choose Redding Competition Bushing Dies or if they are looking for the utmost in alignment they will go for Hand Dies manufactured by the likes as L.E. Wilson and Neil Jones.

REDDING COMPETITION DIES WITH BUSHINGS AND BODY DIE

Hand dies cannot be used with a standard press and are usually used in conjunction with an Arbour press, although in the old days many shooters carried out their reloading operations by striking these dies with a mallet!
Hand dies are a chamber type dies cut for maximum alignment that also utilise interchangeable bushings.
Both the hand dies and the press dies are designed to size only the neck of the case and nothing else,

because of this separate dies are available which bump back the case shoulder when chambering and bolt closing becomes tight.
These are called body dies and will set back the shoulder without altering the case body.
Full-length re-sizing will accomplish the same thing but will also size the whole case robbing it of its accuracy enhancing chamber fit.
If requested many Rifle smiths will obtain die blanks and cut dies using the same reamers used for chambering the customers rifle.
To many this is thought to be the ultimate in hand loading dies but I think it has its limitations, the main one being they are only suited to one gun and when your barrel is worn out and you want a new one, you will also need new dies.
There are however some shooters who have purchased their own reamers to be used by the rifle smith exclusively on their rifles.
Not only will that eliminate the need for new dies it will also do away with having to prepare new brass for a new chamber.

SINCLAIR ARBOUR PRESS AND LE WILSON HAND DIES

Redding Competition dies are also chamber type dies but they differ by having the chamber in a sleeve which slides within the main body of the die.
On the sizing die the micrometer head unscrews to enable insertion of the appropriate sizing bush. This will be .002” to .003” smaller then the loaded round diameter which was worked out during case prep.
Experimentation with neck tension is the key here, so find out what works best in your rifle.
I start with neck tension just tight enough to stop the bullet rotating under normal finger and thumb turning pressure, and take it from there, which is usually .0015”.
The micrometer adjustable head will determine how much of the case neck you would like to size, there is no point sizing the whole neck when only one third will be holding the bullet at your desired COAL.
Thankfully the de-capping stem and pin are also fully adjustable and will need to be re-set when only sizing a portion of the neck.
The hand sizing die works by actually pushing the case into the die with the arbour press to size and then reversing the die and pushing on the de-capping stem.

This de-primes and also pushes the case out of the die.
Before I go on to the next stage I will take this point to mention the Lee Colette die, to me this is not a precision piece of equipment to be used for the construction of bench rest quality ammo but many experienced hand loaders are using them to load some very accurate ammunition.
The principle of the die is excellent but it is let down by poor manufacturing.
I have a 243 Colette die which I obtained to do a side by side accuracy test against Redding comp dies.
Ten groups of five shots were fired with ammo loaded in each die and I can honestly say there was no overall winner, both dies producing very accurate ammunition.
However, some fettling of the Lee die was needed in order for it to work to its best.
The dies work by using a split collet within the die to squeeze the case neck down against an internal mandrel, my problem was that the mandrel was to big and did not give enough neck tension and the burrs on the slots in the collet were engraving lines into the case neck.

LEE COLLET DIE

LEE COLLET DIE IN COMPONENT FORM

Polishing down of the mandrel cured the neck tension problem and de-burring of the slots fixed the lines on the neck.
If you are loading fired cases it is advisable to clean out your primer pocket with the appropriate tool, do not be tempted to use your primer pocket uniformer, the hard residue will quickly blunt your cutter and if you have a carbide one, may lead to chipped cutting edge.
Priming tools are a personnel choice and the shooter will have his favourite, I will however stress that if your looking for a priming tool, choose one that has lots of feel.
This will enable you to sense when the primer is pushing onto the bottom of the primer pocket and reduce the pressure, it is imperative that primer is seated below the level of the base of the case to ensure correct positioning of the primer anvil against the back of the primer pocket.
Tools which do not have enough feel can result in proud or crushed primers both resulting in erratic ignition.
Powder charging, an accurate powder measure is desirable but not necessary, it will however, speed up the loading process considerably.
If you choose to use a powder measure it must be able to drop a charge with at least a 1/10 of a grain consistency.
This will give you accurate ammunition out to at least 300m, some shooters will say 500.
Develop a technique of how you throw your charge and consciously stick to it, I hit the stop hard at the top and the bottom of the rotation of the powder measure handle.
When the measure comes with a drop tube, use it. It will help compact the powder charge and if it is transparent you will be able to see if you have a full or partial charge dropping into the case.
My choice is a measure made by Harrell's, their range of measures were designed to offer the bench rest shooter a quick and accurate way to dispense powder within the allotted 7 minute relay time of a bench rest match, just in case you did not know bench rest shooters fire and re-load the same batch of prepped cases throughout the match, this must be done between relays.
They are not cheap and although they all share the same metering chamber, superior models feature such things as roller bearings for extra smooth operation.

HARRELS POWDER MEASURE

I set up my measure and throw 10 charges at my set weight to make sure of consistency before any powder is dropped into a case, when I am satisfied I charge the brass and check every 10th charge as I go along. My charges are checked on a Pact digital scale.
One of my friends trickled his charges into the pan of a beam scale which is an equally, if not more accurate way of determining your powder charge but oh so time consuming.
He is now using a Redding 3BR measure and spends more time shooting now then throwing charges.
When Ranges increase past 500m a powder measure will not do, at 1000yds a 50fps discrepancy in velocity can mean a 5 inch drop on the target.
The trickling onto a scale is the only way to go, but the standard beam scales offered by the loading equipment makers are again limited to 1/10 of a grain accuracy and quite cut the mustard.
Beam scales made by Ohaus or the new range of digital scales which can measure 1/100 of a grain are a must here if serious long range accuracy is to be achieved.
Competitive 1000yd shooters in the US are using these digital scales to weigh to the last kernel of powder, with a kernel of Varget weighing approx 2/100ths of a grain the accuracy of these scales cannot be exceeded.
The Competition bullet seating dies by Redding and Forster again feature the sliding sleeve but have a fully floating bullet seating stem which locates on the bullets ogive instead of the bullet tip.
The floating seater ensures that bullet is seated exactly straight into the case with minimal miss-alignment.

FORSTER ULTRA SEATER AND NECK DIE

I set up my seater die using my dummy round, with the die mounted in the press I back off the seater stem, raise the case into the die and wind the stem back down until it contacts the bullet.
I then back the seater off 10 divisions or .010" on the micrometer and proceed to load a proper round.
In an ideal world the die when set to dummy round would produce seated bullets to the exact COAL but this seldom happens.
You will probably find that the round that you have just loaded will be something like .007" to .010" longer then your dummy round comparator reading.
Adjust your seating depth in increments until the exact same comparator reading is achieved.
When this operation is performed steadily with precise movements of the press handle, comparator readings will be within .001" of each other, make sure you check every round as you go along, that way you will pick up any discrepancies as they appear.

BULLET DEOTH COMPARATOR WITH 6MM BR CARTRIDGE

With this dimension achieved you can zero of your die micrometer head and then decide how much clearance or “bullet jump” you want your bullet to have with the rifling or how much engagement or contact you want with the rifling, for instance lets say plus/minus .005” of your “zero” comparator reading
One last note, do not measure your loaded rounds over the bullet tip this will give you differing dimensions because of the different lengths of the bullets.
A quick polish with a duster of your finished round to remove any dust, dirt or grit , pop it into your ammo box and off to the range for load development.
You might be lucky and drop onto an accurate combination quickly, otherwise it will be playing around with bullet seating depths, powder charge weights, different powders, different primers and bullets etc, until your combination finds your rifles sweet spot and it becomes a “Hummer”
But remember this, only change one component of your cartridge at a time, failure to do so will result in uncontrolled results, without knowing which component changed the rounds behaviour for the better or the worse.

Ian.