CPM S110V Real World

I am going to try to give some perspective here at the risk of adding further fuel to the fire. I don't want this to be about my knives but I want to offer my experience with CPM S110V and a little history and background. I do have some experience with it. I may be the first to make a knife with this grade, RJ Martin and I picked it up at about the same time as I recall. Crucible sent me a bar with enough material to make a couple of knives. I was looking for an alternative to CPM S125 since I had has some workability problems with it at that time. I used some CPM 125V recently and had better results with it but that is a whole nother story. I am fortunate to have some help with the metallurgist at Crucible who developed this grade and got some early guidance on heat treating. There was no data sheet available when this one first came out so I used the same basic procedure as for CPM S90V and got some ok results. The first heat on this grade was limited and they had some trouble rolling it so in the beginning it was in very short supply. It was supplied annealed but still pretty hard. The first heat was like one hole one drill. Subsequent heats have been much better and work ability is much improved now. My first attempts were not tempered enough and I got some chippy blades with the same hardness and geometry as with CPM S90v. The heat treat was improved over time with the help of Crucible and I will just say that a deep subzero and multiple tempers are very beneficial. I have passed on what I learned to Spyderco and together with their own experience I think they have it down now on this grade.

I do my own testing and have posted several times on the way I am doing it now. My testing has evolved over the years the same as knife designs, heat treating and techniques for grinding and finishing. These high hardness and higher carbide steels do not have much plastic deformation before failure. Normally on a softer heat treat you would see some elastic deformation (springy bending) and a little plastic movement (bending) and then with further bending a final breakage. (chipping) At hardness at about about RC 58 with most of the knife blade steels that plastic range is pretty small and under stress you can get chipping without much deformation before hand. All materials, including blade steels have a stress limit. Stress is the force divided by the amount of material resisting the force. If you have a very small area, fine grind and very fine sharpened edge then the stress is very high. The stress limit is exceed and you will get bending (rolling) and then breakage. This is not just with CPM S110V but with most of the higher hardness blades out there. We are now pushing the envelope on carbide volume, hardness and very fine edge sharpening. There are a whole range of steels available now for knife blades and they all have a personality. If you want wear resistance then you have to have a balance of hardness and carbides to resist wear. Hardness equals strength so you have to have enough strength (hardness) to resist deformation and hold those carbides there so they can wear. It is a balancing act and there is no free lunch. I have experimented with some of the lower alloy (carbide) grades out there. Some 420 variants with carbon percentage from .3 to .5 %. Final hardness of 56 to 58 and 14 to 16 percent chrome. They make very nice kitchen knives, sharpen easily and respond ok to a plain steel for restoring the edge. Edge holding is just ok but is not a big deal since turn around and open a drawer and pull out the stone or steel and a few strokes and you are back in business. Ductility here is important since no one wants metal chip in the food. If you are in the field under some less than ideal conditions then sharpening is not as convenient. My preference is for high hardness, high carbide like a D2 variant or CPM S30v, CPM S90V, CPM S110V or similair grades in the same category in a stain resistant steel or one of the A11's /CPM M4 HSS. My shop testing and field testing confirms this, at least for me. Other makers and uses will have different opinion on this I am sure. I took a hunting trip to Africa for Plains Game in 2012 and had a chance to see Native Skinners in action. They were using some inexpensive knives (came in a box with a blue molded plastic handle) and they made like 8 or 10 skinning cuts and then to the stone to sharpen. My guess, only a guess, that these were like .3 or 4 carbon. I gave the skinner one of mine, was M 390 at RC 61 and he finished skinning the whole Bull Kudu with out touching it to a stone. He had a pretty big grin on his face when he was done.

Another time I was Elk hunting and we had a Bull down in a gully, 5:00 PM and dark and snowing and we had ATV's down there. A elk quarter is a big load for an ATV and rider so we had to skin and quarter on the ground there. The guide was a pre-dentist student and had a scalpel with replaceable blades. Again my guess is .3 to .4 carbon and 15% chrome. He made 5 or 6 cuts and then threw the blade away and replaced it. After about 4 cycle of this I gave him my knife (CPM S90V) and he finished the whole job with that knife and no sharpening. Again not about my knives but to illustrate that sometimes it takes the right tool for the job and that is why we keep experimenting and pushing the envelope on new steels.

Back to CPM S110V RC 61/61.5-- I now test for edge chipping on .007 behind the edge by whittling seasoned fir. I push with at least 40 lbs and twist the blade out of the cut. I makes a scrunching sound and the blade vibrates in the hand. No chipping and I consider this a harsh enough test to prove the performance of the knife in any reasonable situation in the field. To make sure I am not dreaming in the daytime I have asked Jim Ankerson to do the same test and he also sees the same behavior. Can I make it chip? Yes do the same thing with the same geometry on a very hard wood like Becote and it will roll a bit and then finally see some fine chips. We have exceeded the stress limit on that hardness and geometry.
Yes a bit of anedoteal information here and I am sure that it will be discounted by some but is my honest take on the subject. For whatever it is worth.

No I do not think CPM S110v is chippy with the right heat treat and processing , at least for any reasonable application.