

FF MAGNA CORE

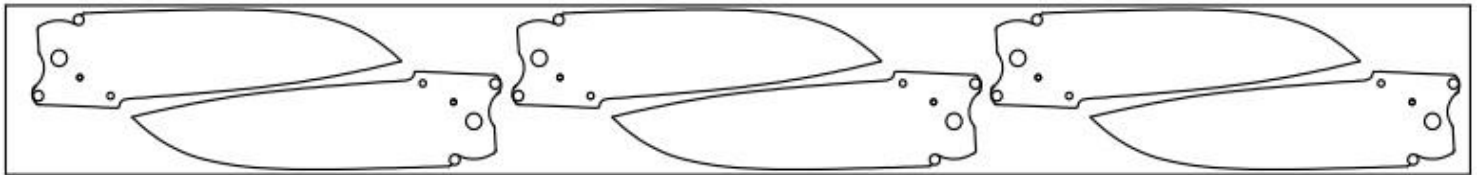
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FF Magna Core is a san-mai layered stainless damascus made of a CPM MagnaCut central core and UHB AEB-L + AISI 304 jacket. MagnaCut is a groundbreaking American-made powder metallurgy stainless steel for knives. An excellent combination of toughness, corrosion, and wear resistance makes it a great choice for small folders, choppers, or kitchen knives.

Steel	Color	C	Si	Mn	P	S	Cr	Mo	V	Ni	Nb	N
MagnaCut	Black-Grey	1,15					10,7	2	4		2	0,2
AEB-L	Black-Grey	0,65	0,4	0,65	<0,025	<0,015	12,8					
304L	Silver-shiny	<0,03	<0,75	<2	<0,045	<0,03	18-20			9		

MACHINING

Our products are soft annealed to provide the best possible machining, reaching hardness approx. 280HV. You can use all conventional types of machining. We don't recommend cutting (format) material on machine shears. We recommend bandsaw cutting, milling, laser, or waterjet cutting. **We recommend setting the knife edge's position outside of damascus flat.** The thickness of the core slightly expands from the center to the edges.



MILLING/DRILLING

- Milling – monolithic carbide mill --- Vc50-60 m/min
- For hard-milling (sizing) with monolithic carbide, mill feed up to Vc100 m/min
- Milling with VBD mill --- Vc55-80 m/min
- Milling with HSS-Co mill --- Vc14-16 m/min
- Drilling - HSS-Co drill --- Vc10-12 m/min
- Drilling – PVD coated carbide drill ---Vc60-80 m/min.

GRINDING

You can grind our steel on all conventional types of grinders. We recommend belt-grinders or Berger grinding machines. For belt grinders, we recommend sanding belts with ceramic grains, like 3M Cubitron II; however, all ranges of conventional abrasives are usable (for example, SAIT, Klingspor, Norton, VSM, etc.). Watch out for not overheating (tempering) the steel by grinding. When it's heat-treated, it may lose the required properties.

HEAT TREATMENT

SOFT ANNEALING

- Our materials are soft annealed. You have to apply this process only after forging.
- Heat the material in a furnace to 900 °C / 1652°F
- Hold at the temperature for 2 hours at least
- Slow cooling in a furnace to 595°C (15°C/h) / 1100°F (25°F/h)
- Remove material from a furnace and keep slow cooling on the air.

HARDENING

Hardening is necessary to reach full corrosion resistance and the final hardness of the steel. We recommend hardening the steel by heat treatment professionals using vacuum technology like Bodycote. Recommended hardening process:

- Preheating temperature 845-870°C / 1550-1600°F
- Austenitizing temperature 1100°C / 2012°F. We do not recommend 1205°C, due to the Damascus composition.
- Hold at the temperature for 20 minutes
- Cooling by nitrogen gas (overpressure 2-3 bars) or by air up to the temperature 50°C / 122°F
- Prefer oil-bath hardening to increase the final hardness; salt-bath hardening is also possible.
- Immediate deep freeze -150/-196 °C / -302/-384°F and hold for 1-3 hours. Hardness will increase by +1 HRC).

TEMPERING

After hardening, it's necessary to begin the tempering process as soon as possible.

- For knife blades, we recommend tempering process 2x2h 180°C / 356°F
- To keep blade flexibility, we recommend a minimal tempering temperature 150°C / 300°F
- Tempering over 400°C / 750°F causes lower corrosion resistance.

Austenitizing - Plate/Oil Quench to Room Temperature						
Min Aust time	30 min	25 min	20 min	15 min	10 min	5 min
Temper	1950°F (1065°C)	2000°F (1095°C)	2050°F (1120°C)	2100°F (1150°C)	2150°F (1175°C)	2200°F (1205°C)
300°F (150°C)	60.5	62	62.5	63	63.5	63
350°F (175°C)	59.5	60.5	61.5	61.5	62	61.5
400°F (205°C)	58.5	59.5	60	60.5	60.5	60.5
500°F (260°C)	57.5	58.5	58.5	59	60	59.5
1000°F (538°C)	57	58.5	59.5	60.5	61.5	62

Source: Crucible Industries LLC

Vacuum Furnace – 2 Bar Quench						
Temper	No Cryo			With Cryo		
	1950°F (1065°C)	2050°F (1120°C)	2150°F (1175°C)	1950°F (1065°C)	2050°F (1120°C)	2150°F (1175°C)
300°F (150°C)	59.5	62	62.5	61	62.5	64
350°F (175°C)	58.5	60.5	61.5	59	61.5	63
400°F (205°C)	58	59.5	60	58.5	61	62
500°F (260°C)	56.5	58	58.5			
960°F (515°C)	58.5	61	62			

Results may vary with hardening method and section size.

ETCHING

To properly contrast the damascus steel layers, it's necessary to etch the material (blade). You can experiment with various etching techniques depending on your skill; however, following the below-mentioned steps, you'll get nice results.

Etchant	Solution	Concentration	Time	AEB-L	MagnaCut	304L
Ferric Chloride Fe3Cl	Fe3Cl + Distilled water	20-25%	10-25 minutes	Black-Grey	Black-Grey	Silver - shiny

- Ensure that the blade's surface is smooth, clean, and free of scratches (since etching won't hide them), finished up to 1000+ grit or polished.
- Properly degrease the blade; cleaning it in the soap-water works well.
- Before etching, we recommend testing the solution on a sample piece of heat-treated material.
- You can reuse etching solution several times. Before you get the blade into the solution, check if there's no dirt on the solution's surface.
- After etching, you have to neutralize the blade using Na₂CO₃ (Sodium carbonate) or NaHCO₃ (Baking soda). You can also use soap water and properly clean the etching residues from a blade.
- Dry the etched blade. We recommend spraying it with WD-40 (or similar) and drying it again to remove any possible residues.
- You can slightly polish the etched blade on a buffing wheel for enhanced contrast. We recommend testing it on a sample piece.
- If you want to make your etching solution more reactive, increase the temperature, concentration of Fe₃Cl, or add vinegar.

MARKING