Claims

1. A fixed abrasive sawing wire comprising a metallic wire and abrasive particles, said abrasive particles being fixed on said metallic wire with an organic binder layer characterised in that said abrasive particles are also partly embedded in said metallic wire.
2. The fixed abrasive sawing wire of claim 1 wherein said metallic wire further comprises a core and a metallic sheath surrounding said core, said sheath having a lower hardness than said core.
3. The fixed abrasive sawing wire of claim 2 wherein said core is a plain carbon steel wire and said metallic sheath is one out of the group comprising steel, iron, copper, tin, zinc, aluminium, nickel, brass, bronze, zinc-aluminium, copper-nickel, beryllium-copper or any other alloy thereof.
4. The fixed abrasive sawing wire of claim 3 wherein said metallic core and said metallic sheath is made of plain carbon steel wherein the carbon content of said core is higher than the carbon content of said sheath.
5. The fixed abrasive sawing wire of claim 4 wherein the carbon content of said metallic wire gradually decreases in an outward radial direction.
6. The fixed abrasive sawing wire according to claim 3 wherein the interface of the metals of core and sheath do not alloy and have a rough interface so that said core and sheath mechanically interlock.
7. The fixed abrasive sawing wire according to any one of the claims 1 to 6 wherein said organic binder layer is a thermosetting polymer out of the group comprising phenolic resin, phenol formaldehyde, melamine phenol formaldehyde or acrylic based resin or amino based resin like melamine formaldehyde, urea formaldehyde, benzoguanamine formaldehyde, glycoluril formaldehyde or epoxy resin or epoxy amine or polyester resin or epoxy polyester, vinyl ester, alkyd based resins.
8. The fixed abrasive sawing wire according to any one of the claims 1 to 6 wherein said organic binder is a thermoplast selected out of the group comprising acrylic, polyurethane, polyurethane acrylate, polyamide, polyimide epoxy, vinyl ester, alkyd resins, silicon based resins, polycarbonates, poly ethylene terephtalate, poly butylene terephtalate, poly ether ether ketone, vinyl chloride polymers.

9. The fixed abrasive sawing wire according to any one of claim 7 or 8 wherein said organic binder layer further comprises a filler selected out of the group comprising aluminium oxides, silicon carbides, silica, chromium oxides, boron nitride, mica, talc, calcium carbonate, kaolin, clay, titanium oxide, barium sulphate, zinc oxide, magnesium hydroxide, potassium titanate, magnesium sulphate, diamond grains, metal powders or mixtures thereof.
10. The fixed abrasive sawing wire according to any one of claims 7 to 9 wherein said metallic wire further comprises an inorganic primer coating selected from the group comprising silicates, phosphates or chromates.
11. The fixed abrasive sawing wire according to any one of claims 7 or 10 wherein said metallic wire further comprises a primer coat selected out of the group comprising organo functional silanes, organo functional titanates or organo functional zirconates or mixtures thereof for improved adhesion of said organic binder layer to said metallic wire.
12. The fixed abrasive sawing wire according to any one of claims 1 to 11 wherein said abrasive particles are selected out of the group comprising diamond, cubic boron nitride, silicon carbide, aluminium oxide, silicon nitride, tungsten carbide or mixtures thereof.
13. The fixed abrasive sawing wire according to claim 12 wherein said abrasive particles are coated with a coating out of the group comprising titanium, silicon, zirconium, tungsten, chromium, iron, copper or nickel.
14. The fixed abrasive sawing wire according to claim 13 wherein said abrasive particles further comprise a primer coat selected out of the group comprising organo functional silanes, organo functional titanates or organo functional zirconates or mixtures thereof for improved adhesion of said organic binder layer to said abrasive particles.
15. The fixed abrasive sawing wire according to any one of claims 1 to 14wherein said particles have a median particle size and are embedded into said metallic wire up to about one third of said median particle size and said organic binder is thicker than one third of said median particle size.
16. The fixed abrasive sawing wire according to any one of claims 1 to 14 wherein said particles have a median particle size and are embedded into said metallic wire down to about two thirds of said median particle size.

Claims

I. A fixed abrasive sawing wire comprising a metallic wire and abrasive particles, said abrasive particles being fixed on said metallic wire with an organic binder layer,
wherein said metallic wire further comprises a core and a metallic sheath surrounding said core, said sheath having a lower hardness than said core, said abrasive particles being partly embedded in said sheath of said metallic wire.

2. The fixed abrasive sawing wire of claim 1 wherein said core is a plain carbon steel wire and said metallic sheath is one out of the group comprising steel, iron, copper, tin, zinc, aluminium, nickel, brass, bronze, zinc-aluminium, copper-nickel, beryllium-copper and any other alloy thereof.

3. The fixed abrasive sawing wire of claim 2 wherein said core and said sheath are made of plain carbon steel wherein a carbon content of said core is higher than a carbon content of said sheath.

4. The fixed abrasive sawing wire of claim 3 wherein a carbon content of said metallic wire gradually decreases in an outward radial direction.

5. The fixed abrasive sawing wire according to claim 3 wherein an interface of a metal of said core and a metal of said sheath do not alloy and have a rough interface so that said core and sheath mechanically interlock.

6. The fixed abrasive sawing wire according to claim 1 wherein said organic binder layer is a thermosetting polymer selected from the group comprising phenolic resin, phenol formaldehyde, melamine phenol formaldehyde or acrylic based resin or amino based resin like melamine formaldehyde, urea formaldehyde, benzoguanamine formaldehyde, glycoluril formaldehyde, epoxy, epoxy amine, polyester resin, epoxy polyester, vinyl ester, alkyd based resins.

7. The fixed abrasive sawing wire according to claim 1 wherein said organic binder is a thermoplast selected from the group comprising acrylic, polyurethane, polyurethane acrylate, polyamide, polyimide epoxy, vinyl ester, alkyd resins, silicon based resins, polycarbonates, polyethylene terephtalate, poly butylene terephtalate, poly ether ether ketone, and vinyl chloride polymers.

8. The fixed abrasive sawing wire according to claim 6 wherein said organic binder layer further comprises a filler selected from the group comprising aluminium oxides, silicon carbides, silica, chromium oxides, boron nitride, mica, talc, calcium carbonate, kaolin, clay, titanium oxide, barium sulphate, zinc oxide, magnesium hydroxide, potassium titanate, magnesium sulphate, diamond grains, metal powders and mixtures thereof.

9. The fixed abrasive sawing wire according to claim 6 wherein said metallic wire further comprises an inorganic primer coating selected from the group comprising silicates, phosphates and chromates.

10. The fixed abrasive sawing wire according to claim 6 wherein said metallic wire further comprises a primer coat selected from the group comprising organo functional silanes, organo functional titanates, organo functional zirconates or mixtures thereof for improved adhesion of said organic binder layer to said metallic wire.

11. The fixed abrasive sawing wire according to claim 1 wherein said abrasive particles are selected from the group comprising diamond, cubic boron nitride, silicon carbide, aluminium oxide, silicon nitride, tungsten carbide and mixtures thereof.

12. The fixed abrasive sawing wire according to claim 11 wherein said abrasive particles are coated with a coating selected from the group comprising titanium, silicon, zirconium, tungsten, chromium, iron, copper and nickel.

13. The fixed abrasive sawing wire according to claim 12 wherein said abrasive particles further comprise a primer coat selected from the group comprising organo functional silanes, organo functional titanates, organo functional zirconates and mixtures thereof for improved adhesion of said organic binder layer to said abrasive particles.

14. The fixed abrasive sawing wire according to claim 1 wherein said particles have a median particle size and are embedded into said metallic wire up to about one third of said median particle size and said organic binder is thicker than one third of said median particle size.

15. The fixed abrasive sawing wire according to claim 1 wherein said particles have a median particle size and are embedded into said metallic wire down to about two thirds of said median particle size.

16. The fixed abrasive sawing wire according to claim 7 wherein said organic binder layer further comprises a filler selected from the group comprising aluminium oxides, silicon carbides, silica, chromium oxides, boron nitride, mica, talc, calcium carbonate, kaolin, clay, titanium oxide, barium sulphate, zinc oxide, magnesium hydroxide, potassium titanate, magnesium sulphate, diamond grains, metal powders and mixtures thereof.

17. The fixed abrasive sawing wire according to claim 9 wherein said metallic wire further comprises a primer coat selected from the group comprising organo functional silanes, organo functional titanates or organo functional zirconates and mixtures thereof for improved adhesion of said organic binder layer to said metallic wire.