CLAIMS:

1. An outer blade cutting wheel comprising a base in the form of an annular thin disc of cemented carbide having a Young's modulus of 450 to 700 GPa, having an outer diameter of 80 to 200 mm defining an outer periphery, an inner diameter of 30 to 80 mm, and a thickness of 0.1 to 1.0 mm, and a blade section disposed on the outer periphery of the base and having a greater thickness than the base, said blade section comprising abrasive grains and a metal or alloy bond, the metal or alloy bond being deposited on the outer periphery of the base by electroplating or electroless plating for bonding abrasive grains together and to the base, wherein

said abrasive grains are diamond and/or cBN abrasive grains having an average grain size of 45 to 310 μm and a toughness index TI of at least 150,

said blade section includes overlay portions which each protrude outward beyond the thickness of said base, the thickness of the overlay portion of said blade section has a tolerance [$(T3_{max}-T3_{min})$ mm] in the range (1):

$$0.001 \leq T3_{max}-T3_{min} \leq 0.1\times T2_{max} \qquad (1)$$

wherein $T3_{max}$ and $T3_{min}$ are maximum and minimum values of the thickness of the overlay portion throughout the circumference of the blade section, $T2_{max}$ is a maximum value of the thickness of the blade section throughout the circumference of the blade section, and

said blade section has a roundness [$(OD_{max}/2-OD_{min}/2)$ mm] in the range (2):

$$0.001 \leq OD_{max}/2-OD_{min}/2 \leq 0.01\times OD_{max} \qquad (2)$$

wherein OD_{max} and OD_{min} are maximum and minimum values of the outer diameter of the blade section, and wherein

said blade section further comprises a metal or alloy binder having a melting point of up to 350°C and

after the metal or alloy bond is deposited on the outer periphery of the base by plating for bonding abrasive grains together and to the base, the metal or alloy binder is infiltrated between abrasive grains and between abrasive grains and the base.

2. An outer blade cutting wheel comprising a base in the form of an annular thin disc of cemented carbide having a Young's modulus of 450 to 700 GPa, having an outer diameter of 80 to 200 mm defining an outer periphery, an inner diameter of 30 to 80 mm, and a thickness of 0.1 to 1.0 mm, and a blade section disposed on the outer periphery of the base and having a greater thickness than the base, said blade section comprising abrasive grains and a metal or alloy bond, the metal or alloy bond being deposited on the outer periphery of the base by electroplating or electroless plating for bonding abrasive grains together and to the base, wherein

said abrasive grains are diamond and/or cBN abrasive grains having an average grain size of 45 to 310 μm and a toughness index TI of at least 150,

said blade section includes overlay portions which each protrude outward beyond the thickness of said base, the thickness of the overlay portion of said blade section has a tolerance [$(T3_{max}-T3_{min})$ mm] in the range (1):

$$0.001 \leq T3_{max}-T3_{min} \leq 0.1\times T2_{max} \quad (1)$$

wherein $T3_{max}$ and $T3_{min}$ are maximum and minimum values of the thickness of the overlay portion throughout the circumference of the blade section, $T2_{max}$ is a maximum value of the thickness of the blade section throughout the circumference of the blade section, and

said blade section has a roundness [$(OD_{max}/2-OD_{min}/2)$ mm] in the range (2):

$$0.001 \leq OD_{max}/2-OD_{min}/2 \leq 0.01\times OD_{max} \quad (2)$$

wherein OD_{max} and OD_{min} are maximum and minimum values of the outer diameter of the blade section, and wherein said blade section further comprises a thermoplastic resin having a melting point of up to 350°C or a thermosetting resin having a curing temperature of up to 350°C and

after the metal or alloy bond is deposited on the outer periphery of the base by plating for bonding abrasive grains

together and to the base, the thermoplastic resin is infiltrated between abrasive grains and between abrasive grains and the base, or a liquid thermosetting resin composition is infiltrated and cured between abrasive grains and between abrasive grains and the base. ~~The cutting wheel of claim 1 wherein said blade section further comprises a metal or alloy binder having a melting point of up to 350°C and~~

~~after the metal or alloy bond is deposited on the outer periphery of the base by plating for bonding abrasive grains together and to the base, the metal or alloy binder is infiltrated between abrasive grains and between abrasive grains and the base.~~

3. A method for manufacturing an outer blade cutting wheel comprising the steps of:

providing a base in the form of an annular thin disc of cemented carbide having a Young's modulus of 450 to 700 GPa, having an outer diameter of 80 to 200 mm defining an outer periphery, an inner diameter of 30 to 80 mm, and a thickness of 0.1 to 1.0 mm,

providing abrasive grains, and

electroplating or electroless plating a metal or alloy on the base outer periphery for bonding the abrasive grains together and to the base to fixedly secure the abrasive grains to the base outer periphery to form a blade section having a greater thickness than the base,

said method further comprising the steps of:

using diamond and/or cBN abrasive grains having an average grain size of 45 to 310 μm and a toughness index TI of at least 150 as said abrasive grains, and

shaping said blade section such that said blade section includes overlay portions which each protrude outward beyond the thickness of said base, the thickness of the overlay portion of said blade section has a tolerance [$(T3_{max}-T3_{min})$ mm] in the range (1):

$$0.001 \leq T3_{max}-T3_{min} \leq 0.1\times T2_{max} \quad (1)$$

wherein $T3_{max}$ and $T3_{min}$ are maximum and minimum values of the thickness of the overlay portion throughout the circumference of the blade section, $T2_{max}$ is a maximum value of the thickness of the blade section throughout the circumference of the blade section, and said blade section has a roundness [$(OD_{max}/2-OD_{min}/2)$ mm] in the range (2):

$$0.001 \leq OD_{max}/2-OD_{min}/2 \leq 0.01 \times OD_{max} \quad (2)$$

wherein OD_{max} and OD_{min} are maximum and minimum values of the outer diameter of the blade section, and wherein

the method further comprising, after the step of plating a metal or alloy on the outer periphery of the base for bonding abrasive grains together and to the base, the step of letting a metal or alloy binder having a melting point of up to 350°C infiltrate into any voids between abrasive grains and between abrasive grains and the base to form the blade section. ~~The cutting wheel of claim 1 wherein said blade section further comprises a thermoplastic resin having a melting point of up to 350°C or a thermosetting resin having a curing temperature of up to 350°C and~~

~~after the metal or alloy bond is deposited on the outer periphery of the base by plating for bonding abrasive grains together and to the base, the thermoplastic resin is infiltrated between abrasive grains and between abrasive grains and the base, or a liquid thermosetting resin composition is infiltrated and cured between abrasive grains and between abrasive grains and the base.~~

4. A method for manufacturing an outer blade cutting wheel comprising the steps of:

providing a base in the form of an annular thin disc of cemented carbide having a Young's modulus of 450 to 700 GPa, having an outer diameter of 80 to 200 mm defining an outer periphery, an inner diameter of 30 to 80 mm, and a thickness of 0.1 to 1.0 mm,

providing abrasive grains, and

electroplating or electroless plating a metal or alloy on the base outer periphery for bonding the abrasive grains together and to the base to fixedly secure the abrasive grains to the base outer periphery to form a blade section having a greater thickness than the base,

said method further comprising the steps of:

using diamond and/or cBN abrasive grains having an average grain size of 45 to 310 μm and a toughness index TI of at least 150 as said abrasive grains, and

shaping said blade section such that said blade section includes overlay portions which each protrude outward beyond the thickness of said base, the thickness of the overlay portion of said blade section has a tolerance [$(T3_{max}-T3_{min})$ mm] in the range (1):

$$0.001 \leq T3_{max}-T3_{min} \leq 0.1\times T2_{max} \quad (1)$$

wherein $T3_{max}$ and $T3_{min}$ are maximum and minimum values of the thickness of the overlay portion throughout the circumference of the blade section, $T2_{max}$ is a maximum value of the thickness of the blade section throughout the circumference of the blade section, and said blade section has a roundness [$(OD_{max}/2-OD_{min}/2)$ mm] in the range (2):

$$0.001 \leq OD_{max}/2-OD_{min}/2 \leq 0.01\times OD_{max} \quad (2)$$

wherein OD_{max} and OD_{min} are maximum and minimum values of the outer diameter of the blade section, and wherein

the method further comprising, after the step of plating a metal or alloy on the outer periphery of the base for bonding abrasive grains together and to the base, the step of letting a thermoplastic resin having a melting point of up to 350°C infiltrate into any voids between abrasive grains and between abrasive grains and the base to form the blade section, or a liquid thermosetting resin composition having a curing temperature of up to 350°C infiltrate and cure into any voids between abrasive grains and between abrasive grains and the base to form the blade section.

~~5. The method of claim 4, further comprising, after the step of plating a metal or alloy on the outer periphery of the base for bonding abrasive grains together and to the base, the step of letting a metal or alloy binder having a melting point of up to~~

~~350°C infiltrate into any voids between abrasive grains and between abrasive grains and the base to form the blade section.~~

~~6. The method of claim 4, further comprising, after the step of plating a metal or alloy on the outer periphery of the base for bonding abrasive grains together and to the base, the step of letting a thermoplastic resin having a melting point of up to 350°C infiltrate into any voids between abrasive grains and between abrasive grains and the base to~~

~~form the blade section, or a liquid thermosetting resin composition having a curing temperature of up to 350°C infiltrate and cure into any voids between abrasive grains and between abrasive grains and the base to form the blade section.~~