What is claimed is:

1. A method for manufacturing a glass blank for magnetic disk, the method comprising a forming process of press-forming a lump of molten glass using a pair of dies to obtain a sheet glass material, wherein in the forming process, a difference in temperature in a press forming surface of the die is controlled so that the surface waviness of the sheet glass material is equal to 30 nm or less.

2. The method for manufacturing a glass blank for magnetic disk according to claim 1, wherein thermally equalizing means reduces the difference in temperature in the press forming surface by heat-exhausting from the press forming surface and/or heating the press forming surface.

3. The method for manufacturing a glass blank for magnetic disk according to claim 1 or 2, wherein the thermally equalizing means is a heat sink.

4. The method for manufacturing a glass blank for magnetic disk according to claim 3, wherein the heat sink is provided on at least a part of the surface opposite to the press forming surface.

5. The method for manufacturing a glass blank for magnetic disk according to claim 4, wherein the heat sink is provided so that amount of heat exhausted from a central portion of the molten glass is larger than that from the circumferential edge portion of the molten glass during the press forming.

6. The method for manufacturing a glass blank for magnetic disk according to any one of claims 1 to 5, wherein in the forming process, the falling lump of molten glass is press-formed using the pair of dies from a direction orthogonal to the falling direction.

7. The method for manufacturing a glass blank for magnetic disk according to any one of claims 1 to 6, wherein in the forming process, press forming is performed so that the temperature of the press forming surface of the pair of dies is substantially the same.

8. The method for manufacturing a glass blank for magnetic disk according to any one of

claims 1 to 7, wherein the thermal expansion coefficient at 100°C to 300°C of a glass blank obtained after press forming is in a range of 30 to 100 × $10^{-7}(K^{-1})$.

9. The method for manufacturing a glass blank for magnetic disk according to any one of claims 1 to 8, surface roughness of the press forming surface of the die is substantially uniform throughout the surface.

10. A method for manufacturing a glass substrate for magnetic disk, wherein a glass blank for magnetic disk is subjected to polishing processing having machining allowance of 50 μm or less to manufacture a glass substrate for magnetic disk, the glass blank being manufactured with the method for manufacturing a glass blank for magnetic disk according to any one of claims 1 to 9.

11. A method for manufacturing a glass substrate for magnetic disk, wherein a glass substrate for magnetic disk is manufactured using a glass blank for magnetic disk, the glass blank being obtained with the method for manufacturing a glass blank for magnetic disk according to any one of claims 1 to 9.

12. A method for manufacturing a glass blank for magnetic disk, the method comprising a forming process of press-forming a lump of molten glass using a pair of dies to obtain a sheet glass material, wherein in the forming process, press forming is performed while temperature of the molten glass is controlled so that cooling rate of the molten glass is -10 °C/second or less in the period during the period of time in which the molten glass is cooled from a glass transition point (Tg) to a strain point.

13. A method for manufacturing a glass blank for magnetic disk, the method comprising a forming process of press-forming a lump of molten glass using a pair of dies to obtain a sheet glass material, wherein in the forming process, press forming is performed while cooling rate of the molten glass is controlled during the period of time in which the molten glass is cooled from a glass transition point to a strain point so as to reduce in-plane strain generated when the molten glass lump is solidified into a sheet glass blank.

14. A method for manufacturing a glass blank for magnetic disk, which includes a forming

process of press-forming a lump of molten glass using a pair of dies to obtain sheet glass blank, wherein in the forming process, press forming is performed while cooling rate of the molten glass is controlled so that a difference in temperature on a surface of the molten glass during pressing of the molten glass is reduced.

15. The method for manufacturing a glass blank for magnetic disk according to any one of claims 12 to 14, wherein press forming is performed while the cooling rate of the molten glass is controlled so that a difference in temperature on a surface of the molten glass is reduced during the period of time in which the pair of dies close and separate .

16. The method for manufacturing a glass blank for magnetic disk according to any one of claims 12 to 15, wherein in the forming process, press forming is performed while the cooling rate of the molten glass is controlled so that a difference in temperature on a surface of the molten glass is reduced during the period of time in which the temperature of the molten glass moves from a glass transition point (Tg) to a strain point while pressing of the molten glass.

17. The method for manufacturing a glass blank for magnetic disk according to any one of claims 12 to 16, wherein in the forming process, the falling lump of molten glass is press-formed using the pair of dies from a direction orthogonal to the falling direction.

18. The method for manufacturing a glass blank for magnetic disk according to any one of claims 12 to 17, wherein in the forming process, press forming is performed while temperature of a press forming surface of the die during pressing of the molten glass is kept substantially uniform.

19. The method for manufacturing a glass blank for magnetic disk according to any one of claims 12 to 18, wherein in the forming process, press forming is performed so that temperature of a press forming surface of the die is substantially identical between the pair of dies.

20. The method for manufacturing a glass blank for magnetic disk according to any one of claims 12 to 19, wherein the temperature of the pair of dies is kept lower than the glass transition point (Tg) of the molten glass during the period of time in which the glass blank starts to contact and is separated from the die.

21. The method for manufacturing a glass blank for magnetic disk according to any one of claims 12 to 20, wherein the forming process is performed using a molten glass having a glass transition point (Tg) of 600°C or higher.

22. A method for manufacturing a glass blank for magnetic disk, the method comprising a forming process of press-forming a lump of molten glass using a pair of dies to obtain a sheet glass material, wherein in the forming process, press forming is performed while temperature of the molten glass is controlled so that surface waviness of the sheet glass material is 30 nm or less and the cooling rate is -10 °C/second or less during the period of time in which the temperature of the molten glass is cooled from a glass transition point to a strain point

23. A method for manufacturing a glass substrate for magnetic disk, wherein a glass substrate for magnetic disk is manufactured without performing annealing treatment using a glass blank for magnetic disk, the glass blank being obtained with the method for manufacturing a glass blank for magnetic disk according to any one of claims 12 to 22.

24. A glass substrate for magnetic disk, which is obtained with the method for manufacturing a glass substrate for magnetic disk according to claim 23, wherein the glass transition point (Tg) is 600°C or higher.

25. A magnetic disk which is manufactured using the glass substrate for magnetic disk which is obtained with the method for manufacturing a glass substrate for magnetic disk according to claim 23.

What is claimed is:

1. A method for manufacturing a glass blank for magnetic disk, the method comprising a forming process of press-forming a lump of molten glass using a pair of dies to obtain a sheet glass blank , wherein the forming process includes controlling a difference in temperature in a press forming surface of the die so that amount of heat exhausted from a central portion of the press forming surface of the die is larger than that from the circumferential edge portion of the press forming surface, and forming the sheet glass blank having surface waviness equal to 30 nm or less.

2. The method for manufacturing a glass blank for magnetic disk according to claim 1, wherein the forming process includes reducing the difference in temperature in the press forming surface by heat-exhausting from the press forming surface and/or heating the press forming surface.

3. The method for manufacturing a glass blank for magnetic disk according to claim 1 or 2, wherein the forming process includes controlling the difference in temperature in the press forming surface by using a heat sink.

4. The method for manufacturing a glass blank for magnetic disk according to claim 3, wherein the heat sink is provided on at least a part of the surface opposite to the press forming surface.

5. The method for manufacturing a glass blank for magnetic disk according to any one of claims 1 to 4, wherein in the forming process, the falling lump of molten glass is press-formed using the pair of dies from a direction orthogonal to the falling direction.

6. The method for manufacturing a glass blank for magnetic disk according to any one of claims 1 to 5, wherein in the forming process, press forming is performed so that the temperature of the press forming surface of the pair of dies is substantially the same.

7. The method for manufacturing a glass blank for magnetic disk according to any one of claims 1 to 6, wherein the thermal expansion coefficient at 100°C to 300°C of a glass blank obtained after press forming is in a range of 30 to 100 $\times 10^{-7}(K^{-1})$.

8. The method for manufacturing a glass blank for magnetic disk according to any one of claims 1 to 7, surface roughness of the press forming surface of the die is substantially uniform throughout the surface.

9. A method for manufacturing a glass substrate for magnetic disk, wherein a glass blank for magnetic disk is subjected to polishing processing having machining allowance of 50 μm or less to manufacture a glass substrate for magnetic disk, the glass blank being manufactured with the method for manufacturing a glass blank for magnetic disk according to any one of claims 1 to 8.

10. A method for manufacturing a glass substrate for magnetic disk, wherein a glass substrate for magnetic disk is manufactured using a glass blank for magnetic disk, the glass blank being obtained with the method for manufacturing a glass blank for magnetic disk according to any one of claims 1 to 8.

11. A method for manufacturing a glass blank for magnetic disk, the method comprising a forming process of press-forming a lump of molten glass using a pair of dies to obtain a sheet glass blank , wherein in the forming process, press forming is performed to form the sheet glass blank while temperature of the molten glass is controlled so that cooling rate of the molten glass is -10 °C/second or less in the period during the period of time in which the molten glass is cooled from a glass transition point (Tg) to a strain point, wherein the sheet glass is to be scribed into two-concentric-circle shape having outside concentric circle and inside concentric circle, and the sheet glass blank is to be partially heated so that a portion outside the outside concentric circle and a portion inside the inside concentric circle are removed by a difference in thermal expansion of the sheet glass blank.

12. A method for manufacturing a glass blank for magnetic disk, the method comprising a forming process of press-forming a lump of molten glass using a pair of dies to obtain a sheet glass blank , wherein in the forming process, press forming is performed to form the sheet glass blank while cooling rate of the molten glass is controlled during the period of time in which the molten glass is cooled from a glass transition point to a strain point so as to reduce in-plane strain generated when the molten glass lump is solidified into a sheet glass blank, wherein the sheet glass blank is to be scribed into two-concentric-circle shape having outside concentric circle and inside concentric circle, and the sheet glass blank is to be partially heated so that a portion outside the outside concentric circle and a portion inside the inside concentric circle are removed by a difference in thermal expansion of the sheet glass blank.

13. A method for manufacturing a glass blank for magnetic disk, which includes a forming process of press-forming a lump of molten glass using a pair of dies to obtain a sheet glass blank, wherein in the forming process, press forming is performed to form the sheet glass blank while cooling rate of the molten glass is controlled so that a difference in temperature on a surface of the molten glass during pressing of the molten glass is reduced, wherein the sheet glass blank is to be scribed into two-concentric-circle shape having outside concentric circle and inside concentric circle, and the sheet glass blank is to be partially heated so that a portion outside the outside concentric circle and a potion inside the inside concentric circle are removed by a difference in thermal expansion of the sheet glass blank.

14. The method for manufacturing a glass blank for magnetic disk according to any one of claims 11 to 13, wherein press forming is performed while the cooling rate of the molten glass is controlled

so that a difference in temperature on a surface of the molten glass is reduced during the period of time in which the pair of dies close and separate.

15. The method for manufacturing a glass blank for magnetic disk according to any one of claims 11 to 14, wherein in the forming process, press forming is performed while the cooling rate of the molten glass is controlled so that a difference in temperature on a surface of the molten glass is reduced during the period of time in which the temperature of the molten glass moves from a glass transition point (Tg) to a strain point while pressing of the molten glass.

16. The method for manufacturing a glass blank for magnetic disk according to any one of claims 11 to 15, wherein in the forming process, the falling lump of molten glass is press-formed using the pair of dies from a direction orthogonal to the falling direction.

17. The method for manufacturing a glass blank for magnetic disk according to any one of claims 11 to 16, wherein in the forming process, press forming is performed while temperature of a press forming surface of the die during pressing of the molten glass is kept substantially uniform.

18. The method for manufacturing a glass blank for magnetic disk according to any one of claims 11 to 17, wherein in the forming process, press forming is performed so that temperature of a press forming surface of the die is substantially identical between the pair of dies.

19. The method for manufacturing a glass blank for magnetic disk according to any one of claims 11 to 18, wherein the temperature of the pair of dies is kept lower than the glass transition point (Tg) of the molten glass during the period of time in which the glass blank starts to contact and is separated from the die.

20. The method for manufacturing a glass blank for magnetic disk according to any one of claims 11 to 19, wherein the forming process is performed using a molten glass having a glass transition point (Tg) of 600°C or higher.

21. A method for manufacturing a glass blank for magnetic disk, the method comprising a forming process of press-forming a lump of molten glass using a pair of dies to obtain a sheet glass blank , wherein in the forming process, press forming is performed to form the sheet glass blank while temperature of the molten glass is controlled so that surface waviness of the sheet glass blank is 30 nm or less and the cooling rate is -10 °C/second or less during the period of time in which the temperature of the molten glass is cooled from a glass transition point to a strain point, wherein the sheet glass blank is to be scribed into two-concentric-circle shape having outside concentric circle and inside concentric circle, and the sheet glass blank is to be partially heated so that a portion outside the outside concentric circle and a portion inside the inside concentric circle are removed by a difference in thermal expansion of the sheet glass blank.

22. A method for manufacturing a glass substrate for magnetic disk, wherein a glass substrate for magnetic disk is manufactured without performing annealing treatment using a glass blank for magnetic disk, the glass blank being obtained with the method for manufacturing a glass blank for magnetic disk according to any one of claims 11 to 21.

23. A glass substrate for magnetic disk, which is obtained with the method for manufacturing a glass substrate for magnetic disk according to claim 22, wherein the glass transition point (Tg) is 600°C or higher.

24. A magnetic disk which is manufactured using the glass substrate for magnetic disk which is obtained with the method for manufacturing a glass substrate for magnetic disk according to claim 22.