Objective of the invention

It is an objective of the present invention, to provide a hot metal sheet forming tool with a coating that improves satisfactorily die lifetime and performance of the tool. The coating should provide enough abrasive wear resistance, enough adhesive wear resistance and enough temperature stability. Principally, the coating should improve the protection against galling observed in AlSi-coated steel sheets after hot metal sheet forming operations in comparison to the coating that are currently used.

In one aspect, there is provided a hot metal sheet forming tool having a CrSiN hard coating as the only coating.

In another aspect, there is provided a hot sheet metal forming process for manipulating a workpiece, where a hot metal sheet forming tool as disclosed herein is used.

In a further aspect, there is provided a use of a CrSiN coating as the only coating on a hot sheet forming tool.

Description of the invention

According to the present invention, hot forming tools are coated with CrSiN coatings. The inventors observed that CrSiN coatings improve considerably service lifetime and performance of hot metal sheet forming tools used by hot sheet metal forming processes.

CrSiN coatings are up to now known to be used as protection coating for dry machining tools (JP2005186184), where the operational demands and stress collective are completely different as the corresponding for hot metal sheet forming tools, where one of the big problems is for example the galling phenomenon that

occurs when AlSi-coated steel sheets are used as workpiece as was mentioned before.

The CrSiN coatings applied according to the invention exhibited very good abrasive wear, excellent temperature stability and an outstanding good reduction of AlSi-adhesion on the surface of the hot metal sheet forming tools and thus a very good solution to the galling problem that is normally observed in the surface of

Claims

1. Hot metal sheet forming tool having a CrSiN hard coating as the only coating.

2. A hot metal sheet forming tool according to claim 1 , wherein said CrSiN hard coating is characterized by a Si content in a film being > 0 up to 15 at%.

3. A hot metal sheet forming tool according to claim 2, wherein said CrSiN hard coating is characterized by a Si content in a film being, ~~preferably~~ 2 - 10 at%.

4. A hot metal sheet forming tool according to claim 2, wherein said CrSiN hard coating is characterized by a Si content in a film being, ~~more preferably~~ 3 -8 at%.

~~3~~5. A hot metal sheet forming tool according to claims 1 ~~and~~ or 2, wherein the tools substrate is a hot thermal conductivity steel or nitrided steel or a carbonitrided steel or any other previous surface treated steel.

~~4~~6. A hot metal sheet forming tool according to claims 1 ~~and~~ or 2, wherein the tools substrate is a non-nitrided steel.

~~5~~7. A hot metal sheet forming tool according to claims 1 or 2~~to 4~~, wherein said CrSiN hard coating is formed by arc ion plating.

~~6~~8. Hot sheet metal forming process for manipulating a workpiece, where a hot metal sheet forming tool according to any one of claims 1 - ~~5~~ 7 is used.

~~7~~9. A hot sheet metal forming process according to claim ~~6~~8, wherein the workpiece is an AlSi-coated metal sheet.

~~8~~10. A hot sheet metal forming process according to any one of claims ~~6~~ 8 - ~~7~~ 9 wherein the workpiece is a metal sheet having tensile strength of ~~around~~ 1 ,500 MPa or more.

~~9~~11. Use of a CrSiN coating as the only coating on a hot sheet forming tool.