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Steel Cross Wedge Rollings - Technological Design Principle

钢质楔横轧件 工艺编制原则

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Foreword

This Standard is drafted in accordance with stipulations in GB/T 1.1-2009.

This Part is summarized by National Technical Committee 74 on Forging of Standardization Administration of China (SAC/TC 74).

This Standard is mainly drafted by the following organizations: Hebei Dong An Jing Gong Co., Ltd., University of Science and Technology Beijing, Beijing Ke Da Ji Xiang Science and Technology Co., Ltd., Beijing Research Institute of Mechanical & Electrical Technology, Hubei Tri-ring Forging Co., Ltd., Dongfeng Forging Co., Ltd.

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Steel Cross Wedge Rollings - Technological Design Principle

1 Scope

This Standard specifies technological design principle of steel cross wedge rollings (hereinafter referred to as “rollings”), including technological design, determination of technological parameters, equipment selection, mold design and quality control.

This Standard is applicable to steel hot rolled parts that are manufactured through the technology of cross wedge rolling.

2 Normative References

The following documents are indispensable to the application of this Standard. In terms of references with a specified date, only versions with a specified date are applicable to this Standard. The latest version (including all the modifications) of references without a specified date is also applicable to this Standard.

GB/T 8541 Terminology of Forging and Stamping

GB/T 32258 Steel Cross Wedge Rollings - General Specification

3 Terms and Definitions

Terms and definitions that are defined in GB/T 8541 are applicable to this document.

4 Technological Design Principle

4.1 Technological Design

4.1.1 The manufacturing procedure of steel cross wedge rollings mainly includes: cutting - heating - rolling - hot alignment - thermal treatment - surface cleaning - cold straightening - sawing of finished product - inspection. The arrangement of the procedure shall consider the convenience of material flow throughout the whole manufacturing process; the control of manufacturing cost, the quality requirements from clients and the condition of equipment, etc.

4.1.2 Casual inspection shall be conducted in each procedure in accordance with product's characteristics.

4.1.3 When it is impossible to implement hot alignment, pay attention to temperature

In accordance with product requirements, select corresponding thermal treatment equipment.

4.3.6 Surface cleaning

Suitable surface cleaning equipment can be selected in accordance with product dimension, texture, shape, surface quality and processing precision requirement, etc.

4.3.7 Cold straightening

Select suitable equipment to conduct cold straightening on rolled parts with extremely low straightness accuracy. In addition, eliminate residual stress in accordance with clients' requirements.

4.3.8 Sawing of finished product

Toothless saw and band sawing machine can be adopted. When toothless saw is used, prevent over-burned tissue around the sawed area.

4.4 Mold Design

4.4.1 In the selection of mold parameters, including the forming angle (α) and widening angle (β), several factors shall be comprehensively considered, such as the percentage reduction of area (ψ) of rolled parts, length of roll face and avoidance of product defects, etc. The forming angle shall be selected within the range of $18^\circ \sim 34^\circ$; the widening angle shall be selected within the range of $4^\circ \sim 12^\circ$.

4.4.2 Try to make sure cavities on both sides of the mold are the same. In terms of relatively short axial asymmetrical workpieces, combine 2 or more workpieces to make them symmetrical, then, start rolling.

4.4.3 Place the side that is not involved in rolling, or the side that manifests slight deformation, on the end of the rolled parts, so that the loss of head materials can be reduced.

4.4.4 When the percentage reduction of area is greater than 80%, the design method of secondary wedge or reduced forming angle can be adopted.

4.4.5 In terms of parts that will easily lead to defects like loosening and hollowness, increase the forming angle.

4.4.6 In order to decrease spiral mark, a transition fillet R can be designed between the forming surface and the top surface.

4.4.7 In order to guarantee the rotation of rolled parts, anti-slip mark can be added on the bevel of the forming angle.

4.4.8 An unloading segment shall be designed on the mold, so that distortion of

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