

### 论文摘要

中国有色金属学报

**ZHONGGUO YOUSEJINSHUXUEBAO XUEBAO**

第19卷 第8期 (总第125期) 2009年8月

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文章编号: 1004-0609(2009)08-1437-06

## 主动式模具温控方法在凝固成形中的应用

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**摘 要:** 提出一种主动式模具温控方法, 并开发测控系统将其应用于凝固成形中, 通过主动的外加可控温度场来控制零件成形过程, 实现零件按自下而上的顺序凝固。主动的外加可控温度场通过均匀分布在模具中独立的加热与冷却单元实现, 并开发了基于工控组态软件的应用系统实现流程控制。进行了成形过程的数值模拟与成形实验, 使测控系统及控制策略的设计得到检验和改进。数值模拟结果表明: 成形过程中, 工件等温面基本保持平面, 固液界面沿z轴方向向上移动, 符合主动式温控的预期目标。成形实验结果表明: 采用主动温控方案2进行零件成形时, 零件成形质量较好, 内部没有缩孔缩松等缺陷。

**关键字:** 模具; 温控; 凝固成形; 组态软件

## Application of active mold temperature control method in solidification

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**Abstract:** An active mold temperature control method was presented and applied in solidification by developing a measure and control system. The forming process was controlled by the active outer controllable temperature field, which was brought by the individual heating and cooling units distributed in the proportional spacing towards the solidification direction in the mold. Thus, the product solidifies from the bottom to top. The flow control was implemented by developing the application based on the configuration software. The system and control strategy were verified and improved by simulation and experiment research of forming process. The simulation results show that the isothermal surfaces of workpiece are near-planar, and the solid-liquid interface moves up along the  $z$  direction during solidification progresses. The experimental results indicate that, by the active temperature control method case 2, no shrinkage defects exist in the product and the forming quality is promoted.

**Key words:** mold; temperature control; solidification; configuration software

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