
Title: Development of Auto Ejection Melt Spinning (AEMS) and its application in fabrication of cobalt-based ribbons

Authors: A.A. Shirzadi, T. Kozieł, G. Cios, P. Bała

PII: S0924-0136(18)30425-4
DOI: https://doi.org/10.1016/j.jmatprotec.2018.09.028
Reference: PROTEC 15942

To appear in: *Journal of Materials Processing Technology*

Received date: 20-6-2018
Revised date: 19-9-2018
Accepted date: 21-9-2018

Please cite this article as: Shirzadi AA, Kozieł T, Cios G, Bała P, Development of Auto Ejection Melt Spinning (AEMS) and its application in fabrication of cobalt-based ribbons, *Journal of Materials Processing Tech.* (2018), https://doi.org/10.1016/j.jmatprotec.2018.09.028

# Development of Auto Ejection Melt Spinning (AEMS) and its application in fabrication of cobalt-based ribbons

A.A. Shirzadi[a,b*], T. Kozieł[c], G. Cios[d], P. Bała[c,d]

[a] The Open University, School of Engineering & Innovation, Milton Keynes, MK7 6AA, UK.

[b] Dongguan Centre of Excellence for Advanced Materials (CEAM), Dongguan 523808, China.

[c] AGH University of Science and Technology, Faculty of Metals Engineering and Industrial Computer Science, Al. Mickiewicza 30, 30-059 Krakow, Poland.

[d] AGH University of Science and Technology, Academic Centre for Materials and Nanotechnology, Al. Mickiewicza 30, 30-059 Krakow, Poland.

* Corresponding author (A.A. Shirzadi), E-mail: a.shirzadi@open.ac.uk

**Abstract**

Auto Ejection Melt Spinning (AEMS) is a new variant of melt spinning processes in which spontaneous ejection of the alloy occurs as soon as it is fully melted. Unlike the conventional laboratory melt spinning processes, there is no need for a skilled operator to monitor the melt temperature and/or manually release the ejection gas at the right moment. This new process substantially reduces the uncertainties associated with temperature measurement and human errors. On the request of the authors, the capability of the new process was independently tested and verified by the design engineers of a renowned manufacture of laboratory melt spinners in Germany [Edmund Bühler GmbH]. The application of the new process for fabrication of high melting point cobalt-based ribbons is also described and the key findings are outlined.

**Keywords:** Melt Spinning, Cobalt Ribbon, Rapid Solidification, Planar Flow Casting

## 1. Introduction

Melt spinning is a method used for rapid solidification of certain alloys mainly to obtain completely non-crystalline ribbons, *i.e.* amorphous or so-called “metallic glasses”, that cannot be fabricated using conventional continuous casting processes. Depending on the spinning conditions extremely high cooling rates, sufficient to obtain amorphous structures, can be achieved (*e.g.* tens of thousands of centigrade per second). In this