Available online at www.sciencedirect.com

ScienceDirect

Procedia Manufacturing 22 (2018) 93–98

Procedia MANUFACTURING

www.elsevier.com/locate/procedia

11th International Conference Interdisciplinarity in Engineering, INTER-ENG 2017, 5-6 October 2017, Tirgu-Mures, Romania

A new technical version of wiping of the steel wire surface after "Hot Dip" zinc coating

Tintelecan Marius[a,]*, Sas-Boca Ioana Monica[a], Pop Mariana[a], Iluțiu-Varvara Dana-Adriana[a]

[a] *Technical University of Cluj-Napoca, 28 Memorandumului Street, 400114, Cluj-Napoca, Romania*

Abstract

The fight against corrosion process is a goal of nowadays.
For wires the fight against corrosion process means to cover their surface with certain versions of coatings of the surface.
The making an anti-corrosive coatings, effective on the surface of steel wire, is a goal clearly attainable by special processes of zinc coating, belonging implicitly advanced manufacturing technologies.
This paper proposes a new version of coating for steel wires and compares it technologically with the old version of getting a galvanized steel wire the manner of deposition of zinc was the classical one ("Hot Dip") and assumes the immersion in a bath of molten zinc; bath located at a certain temperature. The wiping of superficial zinc layer (process subsequent to its deposition), in this case, is important and is applicable for an intermediate steel wire diameter from where steel wires go through a final drawing process.
The other one has just a different technological step of wiping and which implies a mechanical device.
Generally the wiping process (after the "Hot Dip" zinc coating, therefore valid in both versions) is strongly influenced by at least two parameters: the manner itself of the wiping of the steel wire surface and the cooling duration of the steel wire from the temperature of the galvanizing bath at ambient temperature.
In the authors' view, the comparison is more easily achievable by analyzing the concrete way of obtaining a galvanized steel wire (for example, galvanized steel wire Ø 2.0 mm, made of steel with 0.3% C) in each of the two technical variants .The analysis will be detailed only starting with the diameter (technologically speaking) at which the drawing process starts (Ø 6.0 mm), this being the diameter up to which the steel wires are obtained by hot rolling.

Peer-review under responsibility of the scientific committee of the 11th International Conference Interdisciplinarity in Engineering.

Keywords: Zinc coating process; anti-corrosive layers; sudden removal; fast cooling; wiping device; layer structure.

* Corresponding author. Tel.: +40-721-594-419.
E-mail address: marius.tintelecan@ipm.utcluj.ro

2351-9789
Peer-review under responsibility of the scientific committee of the 11th International Conference Interdisciplinarity in Engineering.
10.1016/j.promfg.2018.03.015

1. Old version (actual version)

The evaluation of the current version implies its detailing, specifying:

1.1. The actual technological flow

The technological flow (practically the technological stages) of obtaining a zinc wire with Ø 2.0 mm, made of steel with 0.3% C, considering the raw material: Ø 6.0 mm wire is specified below:

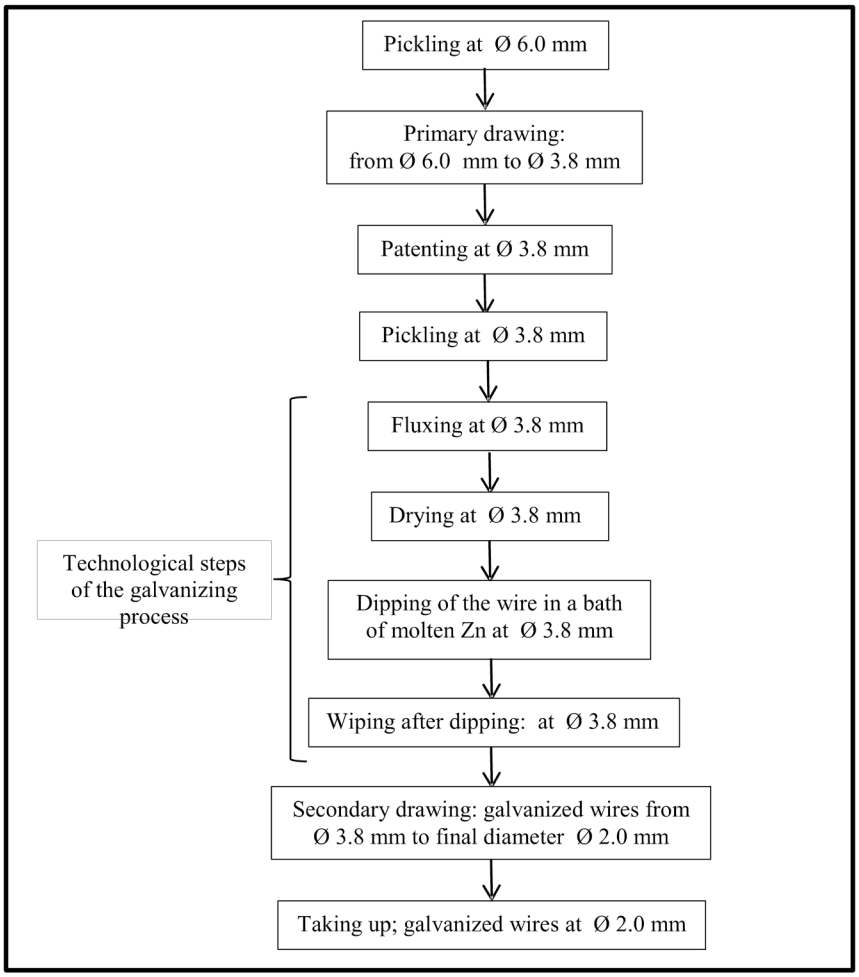

Fig. 1. The technological flow of the galvanized wire in the actual version.

Technically detailing each technological stage, we note:

- Pickling – was made in the chemical variant, in a bath with hydrochloric acid solution,
  - its purpose is to remove oxides from the surface of the steel wire,
- Primary drawing – was made in 4 passes, in dry form, using as a lubricant: Ca-based soap powder
  - the drawing series was as follows: Ø 6.0 mm → Ø 5.35 mm → → Ø 4.75 mm → Ø 4.23 mm → Ø 3.8 mm
- Patenting – was made for the possibility of plastic deformation, canceling the hardening and texturizing of the cold deformed steel,
  - an isothermal quenching was made, in order to create the most sorbitical structure,