Corrosion resistant plastic mould steel with best machinability

Bratislava, October 2016
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1 INTRODUCTION PLASTIC MOULD STEEL
2 CORROPLAST FM: THE NEW ALTERNATIVE
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4 SUMMARY
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4 SUMMARY
Plastic consumption in industrialized countries

Source: PlasticsEurope Market Research Group
Classification of Plastic mould Steels

- Plastic mould Steels
  - Corrosion resistant Steel grades
    - Sulfurized Steel grades
    - Non sulfurized Steel grades
  - Non corrosion Resistant Steel grades
    - Sulfurized Steel grades
    - Non sulfurized Steel grades
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Corrosion resistant plastic mould steels

<table>
<thead>
<tr>
<th>Steel Grade</th>
<th>% C</th>
<th>% Mn</th>
<th>% Cr</th>
<th>% Mo</th>
<th>% S</th>
<th>% Ni</th>
<th>Hardness</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.2316</td>
<td>0.33</td>
<td>&lt; 1.50</td>
<td>16.00</td>
<td>1.20</td>
<td>0.50</td>
<td>0.50</td>
<td>265-310 HB</td>
</tr>
<tr>
<td>1.2085</td>
<td>0.33</td>
<td>&lt; 1.40</td>
<td>16.00</td>
<td>0.50</td>
<td>0.050</td>
<td>0.50</td>
<td>280-325 HB</td>
</tr>
<tr>
<td>Corroplast FM</td>
<td>0.22</td>
<td>1.60</td>
<td>12.80</td>
<td>0.090</td>
<td></td>
<td></td>
<td>270-315 HB</td>
</tr>
</tbody>
</table>
Optimisation of the analysis I

Phase components during solidification of 1.2085
(chemical composition according to SEL)
Optimisation of the analysis II

Phase components during solidification of Corroplast FM

Carbon content

Area of hot forming

Austenit + …

M$_7$C$_3$ + …

M$_{23}$C$_6$ + …

Sigma + …
INTRODUCTION PLASTIC MOULD STEEL

CORROPLAST FM: THE NEW ALTERNATIVE

PROPERTY COMPARISON

SUMMARY
Machinability in laboratory experiment

- Milling experiment on universal milling machine
- Equivalent machining parameter
- Cutting inserts: Seco HM (coated)
Property comparison
Microstructure I: δ – Ferrite

Position of the sample: core; M = 100:1

Corroplast FM:
Less δ – Ferrite in the matrix than in 1.2085
Property comparison
Microstructure II: coarse carbides

Position of the sample: core; M = 500:1

Corroplast FM:
No coarse carbides compared to 1.2085 → homogeneous structure
Property comparison
Manganese- sulphides

Position of the sample: core; M = 100:1

Corroplast FM:
Small Mn- sulphides globular distributed in the matrix
Summary

In comparison to steel 1.2085 Corroplast FM offers:

» Homogeneous microstructure, less segregations
   → optimized analysis and metallurgy, suitable heat treatment

» Less coarse carbides, fine microstructure
   → optimized analysis, suitable heat treatment

» Reduction of δ – ferrite
   → reduction of ferrite-forming elements

» Improvement of machinability
   → addition of sulphur, optimized treatment during casting and secondary metallurgy
Vielen Dank für Ihre Aufmerksamkeit
Thank you for your attention