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# Strain hardening behaviour and the Taylor factor of pure magnesium

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## Abstract

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## Notes

### Notes

1. Kelley and Hosford [13](#) showed that the yield surface of textured polycrystals of pure Mg is highly non-equiaxed due to the stress asymmetry of twinning; however, it takes a nearly equiaxed shape after the first 6–8% strain, once twinning is over.
2. Preserving the yield surface's initial shape requires strain hardening proportional to the current flow stress, an assumption which is not easy to justify by dislocation theory [3](#).
3. The scales in [Figures 1](#) through [4](#) are related by the Taylor factors  $M_{\sigma} = M_{\epsilon} = 4.5$ . A higher or lower  $M$  value, respectively, decreases or increases the relative slope of the polycrystal curves.
4. It is noted that Graff et al.'s modelling [17](#) ignored possible contributions from twinning modes other than  $\{10\bar{1}1\}$ . More complex modes of twinning are known to become active at high pressures. This is noted in their experimental work, which is simplistic at very large strains.
5.  $\langle c + a \rangle$  twinning is also known to occur in hexagonal close packed crystal [47](#), and contributes to the overall deformation.



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Source: Springer Science and Business Media LLC

Effect of deformation temperature on Hall-Petch relationship registered for polycrystalline magnesium

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Pair interaction of pyramidal dislocations and its contribution to flow stresses in Mg crystals during slip in system  $\{11\bar{2}2\}$

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Application of texture simulation to understanding mechanical behavior of Mg and solid solution alloys containing Li or Y

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Texture Evolution and Ultrafine Grain Formation in Cross-Cryo-Rolled Zircaloy-2

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Microscopic observations of glide in non close-packed planes in aluminium, and comparison with magnesium

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The Influence of Temperature and Strain Rate on the Flow Stress of Magnesium Single Crystals

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The deformation of magnesium single crystals

Source: Informa UK Limited

Electron-microscopic Investigation of Low Temperature Work Hardening of Mg Single Crystals

Source: Elsevier

The relation between polycrystal deformation and single-crystal deformation

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Polyslip in polycrystals

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Solid solution strengthening of magnesium alloys: a review of the effect of temperature on the yield strength

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Deformation modes in  $\gamma$ -TiAl as derived from the single crystal yield surface

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The plastic deformation of polycrystalline aggregates

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The crystallography and deformation modes of hexagonal close-packed metals

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The yield surface of h.c.p. crystals

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Self-consistent modelling of the plastic deformation of F.C.C. polycrystals and its implications for diffraction measurements of internal stresses

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Polyslip in single crystals

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Effect of „Forest” Dislocations in the  $\{1122\}$   $\square 1123$  system on hardening in Mg single crystals under basal slip

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Validating a polycrystal model for the elastoplastic response of magnesium alloy AZ31 using in situ neutron diffraction

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The activity of non-basal slip systems and dynamic recovery at room temperature in fine-grained AZ31B magnesium alloys

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