

CRAZING:

Crazing consists of hairline cracks in one surface of a moulding. Normally only a few small local cracks are evident but in severe cases cracks can be numerous and quite long, exceeding ten millimetres in length.

Crazing may be overlooked in a casual inspection of a clear moulding but if viewed at the correct angle the cracks will glisten as light is reflected from their sides.

Crazing occurs when the surface of a moulding is stretched beyond its limit, due to localised surface stresses being too high at some time during moulding, finishing, or use.

Crazing may result from: -

1. Incorrect moulding conditions.
2. Unsatisfactory gate design.
3. Poor part design
4. Moisture imbalance
5. Finishing operations
6. Presence of solvents
7. Service stresses

MOULDING CONDITIONS:

Surfaces stresses due to incorrect moulding conditions can be reduced by using high melt temperatures, hot well-vented moulds and fast injection at low pressures. Injection forward time should be adjusted to minimise over-packing and to prevent material discharge from the cavity when over pressured at the end of the injection time.

GATING:

Crazing stresses can be reduced by the use of runner restrictions and small gates particularly tab gates.

PART DESIGN:

The provision of adequate draft and the elimination of sharp inside corners, undercuts and significant changes in thickness are important contributions towards the reduction of surface stresses. The use of metal inserts causes relatively high stresses in the surrounding polymer due to the shrinkage of polymer being greater than that of the metal when cooling. To prevent crazing inserts should be free of sharp corners and grease or cutting solvents, and the thickness of polymer surrounding the insert must be at least equal to the radius of the insert. (Pre-heating of inserts will also assist as this decreases the temperature difference between the two materials and brings their shrinkage rates more in line with one another).

MOISTURE IMBALANCE:

Moisture will enter or leave the surface of a moulding much quicker than moisture changes take place at the centre. Surface stresses, which could cause crazing, are at a minimum when the moisture content is as near uniform as possible throughout the moulding, that is just after moulding or annealing.

FINISHING OPERATIONS:

To reduce crazing, all finishing operations are best carried out shortly after annealing, when mouldings have a favourable moisture balance.

To avoid excessive heat development, which would cause localised expansion and drying, creating crazing when shrinking and cooling, properly sharpened tools should be used, operated at recommended speeds and feed rates.

Cementing, hot stamping and other decorating operations may create stresses due to solvent action, applied pressures, and temperature and moisture differences.

PRESENCE OF SOLVENTS:

Crazing will occur at relatively low surface stress levels in the presence of solvents used in paints and cements. Mouldings should be annealed before and after using these materials.

Mouldings, which have been stored for over a week after moulding or annealing, will exhibit moisture imbalance and must either be dried or re-annealed just prior to painting or cementing.

SERVICE STRESSES:

Crazing stresses develop in service if mouldings are not able to expand and contract freely. In addition to using annealed mouldings clearance must be allowed between mating parts and around fixing holes. Fixing methods should be devised which will prevent over tightening.