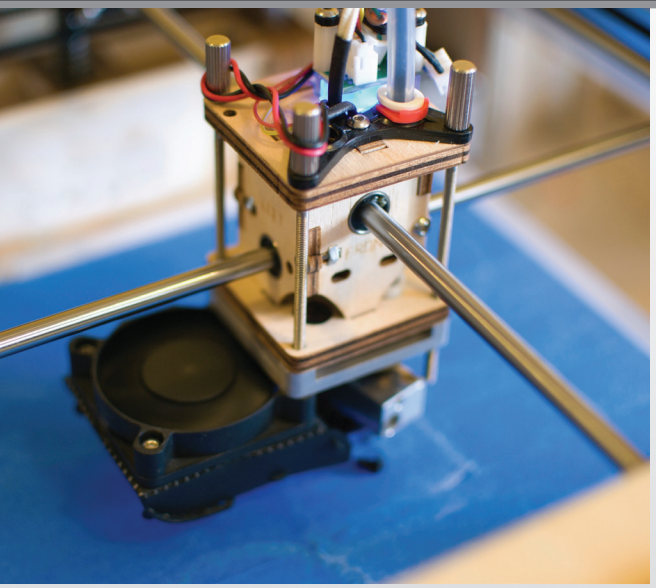
PROTO MANUFACTURING

ADDITIVE MANUFACTURING AND RESIDUAL STRESS



3D PRINTED COMPONENTS & THEIR RESIDUAL STRESS DISTRIBUTION

3D printing is being increasingly used as an alternative route to manufacturing components. In particular replacement parts that were manufactured via traditional methods such as casting, are now being made using additive manufacturing processes. While a printer can produce a dimensionally identical part, the process may not produce the same residual stress distribution in the part. The repeated cycles of heating and cooling that are required to deposit the layers of metal causes localized expansion and contraction, which in turn can create residual stress.

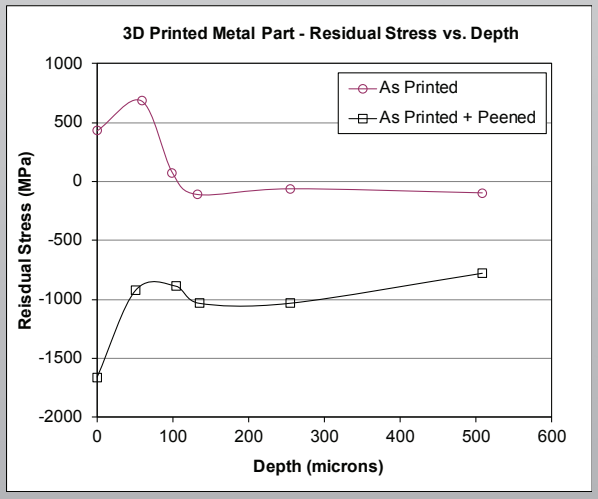
PARTS ARE NOT THE SAME UNLESS THEIR RESIDUAL STRESS DISTRIBUTION IS THE SAME

Finished components may be similar dimensionally, chemically, and microstructurally. However, they may have significantly different resistances to fatigue, stress corrosion cracking, and other life limiting influences, due to differences in residual stress.

PART A : GOOD

PART B : FAILS

Can you tell the difference? We can.



HOW WE CAN HELP CHARACTERIZE YOUR 3D PRINTED COMPONENT

X-ray diffraction can be used to quantify the difference in residual stress in 3D printed parts vs. traditionally manufactured parts. Additionally, we can determine other material differences such as grain size, percent crystallinity, texture, and dislocation density. This information can then be used for post-printing stress management processing such as heat treatment, stress relief, and surface enhancement.

ISO17025 and ITAR registered

WWW.PROTOXRD.COM

USA
PROTO Manufacturing Inc.
Tel 1-734-946-0974
info@protoxrd.com

CANADA
PROTO Manufacturing Ltd.
Tel 1-519-737-6330
protocanada@protoxrd.com

JAPAN
PROTO Manufacturing K.K.
Tel +81 587-81-6531
info@protoxrd.jp