

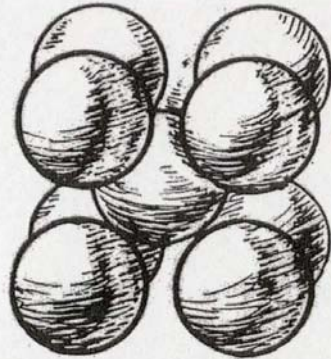
Notes About Steel Properties and Phases Relating to PWHT

by
Paul Kovach
Stress Engineering Services

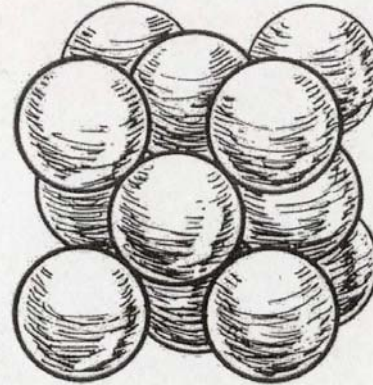
for
ASME
North West Houston Sub Section

March 28, 2002

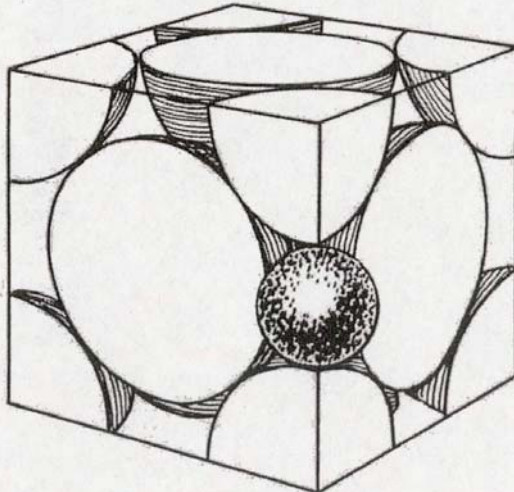
Lattices of Iron and Carbon



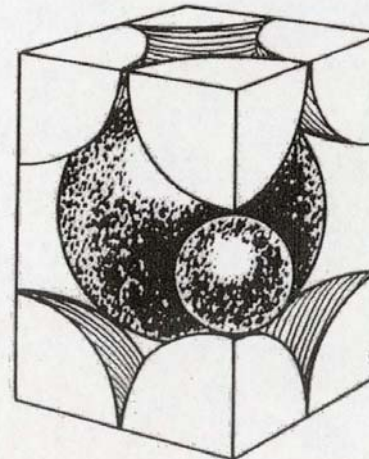
(a)



(b)



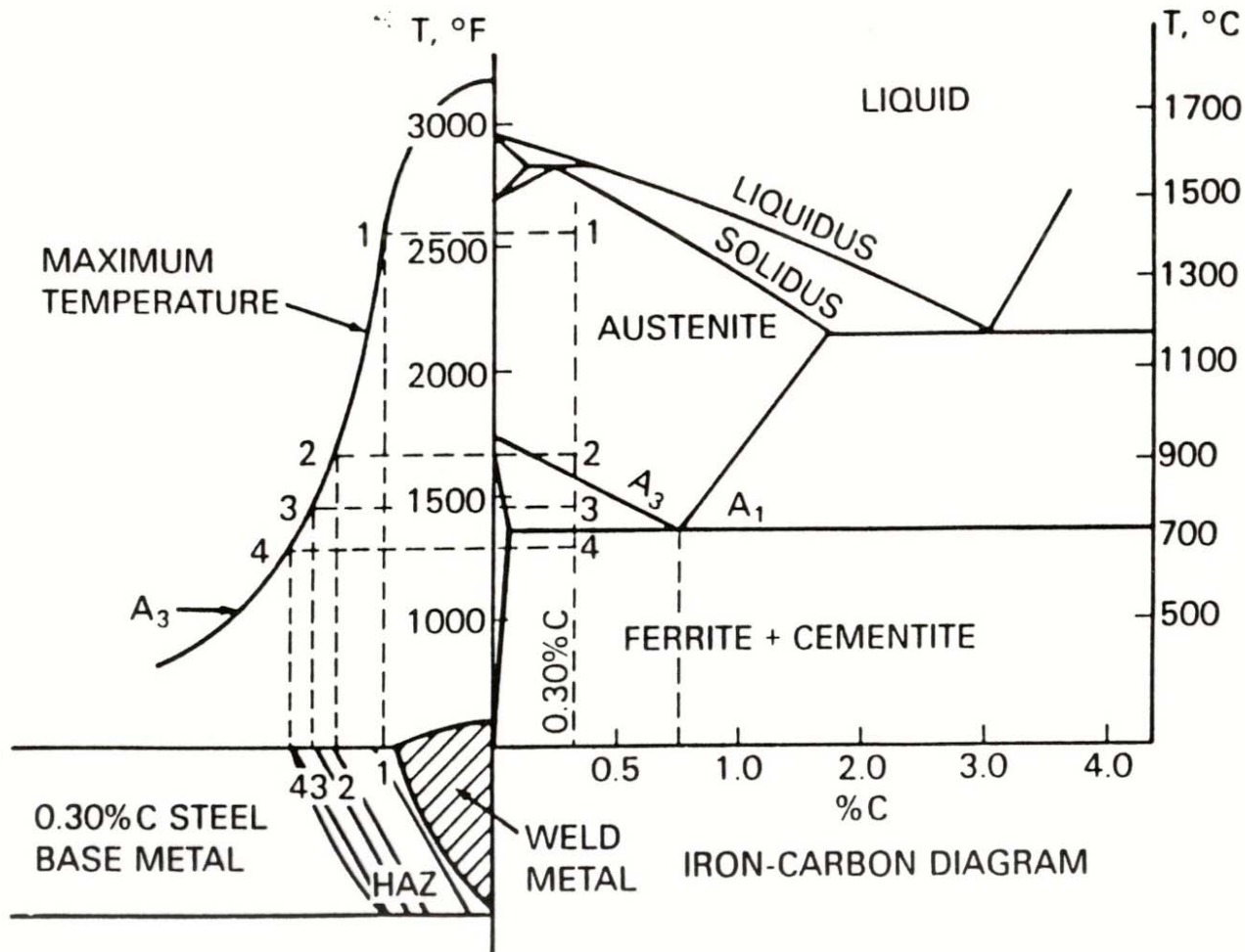
(c)



(d)

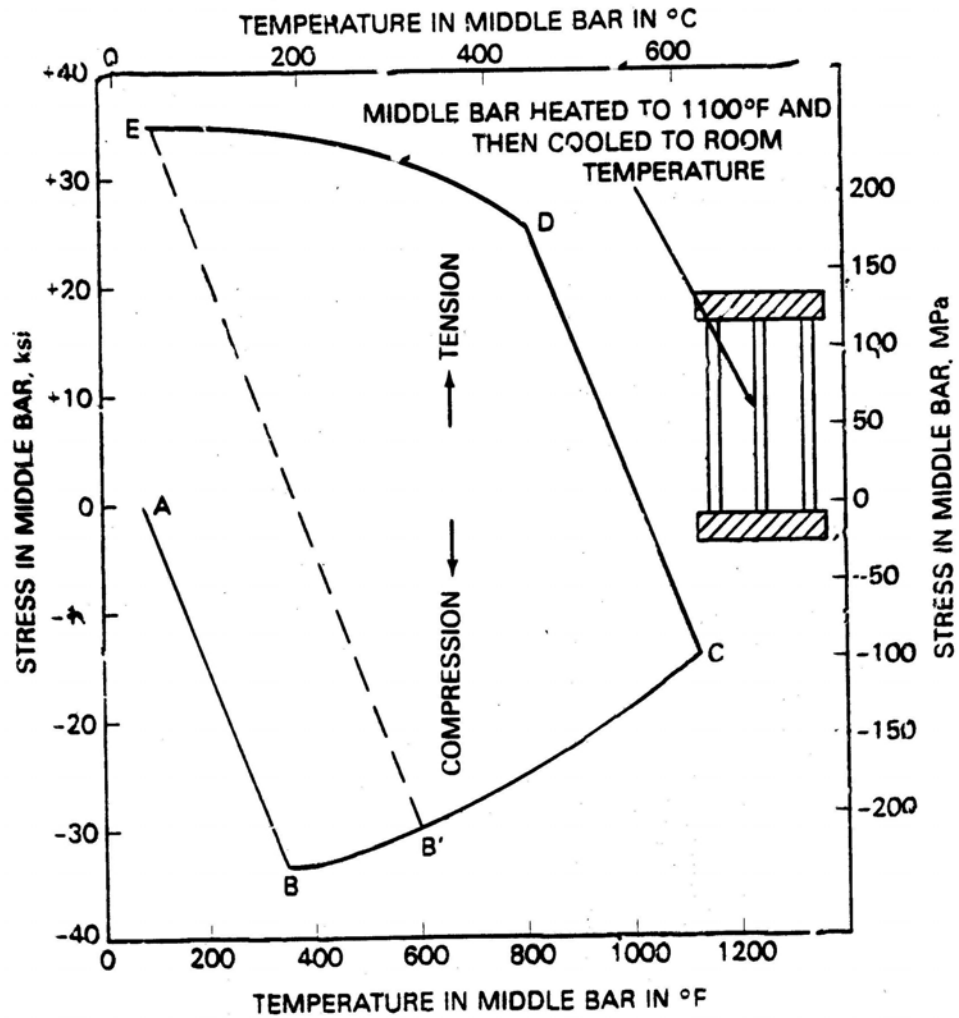
Figure 3. (a) Body-centered cubic (bcc) lattice of iron. (b) Face-centered cubic (fcc) lattice of iron. (c) Face-centered cubic (fcc) lattice with carbon. (d) Body-centered tetragonal (bct) lattice with carbon.

Transformations around a weld



-Approximate Relationships Among Peak Temperature, Distance from Weld Interface, and the Iron-Carbon Phase Diagram

Stress in a constrained bar (weld) when heated



Notes About Paul Kovach

PAUL J. KOVACH

Specialized Professional Competence

Failure analysis especially evaluation of fracture surfaces to determine modes of failure. Material behaviors under static, dynamic, creep, fatigue, and impact loading. Oxidation and corrosion in flue gases, seawater, and a wide variety of produced and process fluids. Weldability and welding procedure development. Materials selection and applications in industries such as petrochemical, power generation, oil and gas production, nuclear, pipeline, and transportation.

Research Activities

Mr. Kovach has been the principal investigator in research projects addressing issues such as high temperature coatings to provide corrosion resistance for low alloy steels in coal and oil ash as well as steam side exfoliation. He also lead the development of allowable stress curves for design of components operating in liquid sodium at temperatures up to 1200°F. Other projects in the nuclear power field include a multi-million dollar stress corrosion cracking investigation of alloy 600 nuclear steam generator tubing. Another significant project culminated in the ASME Code recognition of acoustic emission in lieu of x-ray on specific Section VIII pressure vessels.

Employment History

Principal, Stress Engineering Services, Inc., 1995 - Present
Senior Associate, Stress Engineering Services, Inc., 1993 - 1995
Staff Metallurgist, Stress Engineering Services, Inc., 1991 - 1993
Director, Materials Technology, Vetco Gray, Inc., 1983 - 1990
Manager, Materials and Processes, Hydril, 1981 - 1983
Manager, Nuclear Aftermarkets, Graver Energy Systems, Inc., 1975 - 1980
Manager, Materials Laboratory, Babcock and Wilcox, 1962 - 1975

Academic Background

M.S., Metallurgy, M.I.T., 1962
B.E., Cum Laude, Youngstown State, 1960

Notes About Paul Kovach

PAUL J. KOVACH

Registration

Registered Professional Engineer: Texas No. 72779

Professional Honors

Life Member – ASM International, 1997

Member ASM Handbook Committee, 1996 - Present

Honorary Faculty Member, Metals Engineering Institute, 1983

Henry Roemer Award for Outstanding Metallurgical Engineering Graduate from Youngstown State, 1960

Distinguished Military Student, Youngstown State, 1960

ASM Scholarship, Youngstown State, 1958

Professional Societies

ASM International

American Welding Society

National Association of Corrosion Engineers

Engineering Designs and Analyses

Mr. Kovach's early career activities were in the fossil fueled and nuclear power generation fields and included international experience in negotiating a construction code with the German TUV for fabrication of nuclear reactor vessels and steam generators acceptable in Germany. He later established a new department to conduct modifications and repairs on operating nuclear power plants.

Throughout most of his career he has had responsibility for development and approval of materials and welding specifications in compliance with client and international code requirements. This included development of a low dilution corrosion resistant weld overlay process that is now used in most corrosive oil and gas fields around the world.

In the areas of failure analysis, Mr. Kovach has investigated failures as diverse as heavy walled pressure vessels to medical instruments and gas turbines to cranes and offshore platforms. He has investigated domestic waterline corrosion failures, pipeline failures, and automobile accidents caused by component failures as well as automobile fires.