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The results illustrate the usefulness of the model as a means of achieving optimal designs of composite structures where creep and creep rupture are life limiting. The creep deformation model follows earlier work and is based on a flow potential function that depends on invariants reflecting stress and the material symmetry. A creep and creep damage theory is presented for metallic composites with strong fibers. As the focus is on the interaction of creep and damage, primary creep is ignored. Experiments are outlined for characterizing a composite through creep rupture tests under transverse tension and longitudinal shear. Application is to reinforced structures in which the fiber orientation may vary throughout but a distinct fiber direction can be identified locally (local transverse isotropy). Application is made to a thin-walled pressure vessel with reinforcing fibers at an arbitrary helical angle.