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Thin position for knots has provided a crucial tool in solving long-standing problem in the field, most notably property R and the knot complement problem. In previous work, we extended the notion of thin position in a natural way to handle decompositions of 3-manifolds. This complexity for 3-manifolds enjoyed some properties not shared by the standard thin position for knots in the 3-sphere. Here we introduce the idea of relative handles, and accomplish the amalgamation of the concepts for knots and for 3-manifolds. The level surfaces dictated by the new minimal complexity for knots have all of the pleasant properties from 3-manifolds (in particular, the thin surfaces are incompressible), while retaining the useful properties from thin position for knots. (Received February 18, 2005)