Let S be a minimal complex surface of general type and of maximal Albanese dimension; by the Severi inequality one has $K_S^2 \geq 4\chi(O\_S)$. I will describe a joint work with M.A. Barja and R. Pardini in which we completely classify the surfaces satisfying the equality $K_S^2 = 4\chi(O\_S)$. These are the surfaces with irregularity 2 whose canonical model is a double cover of the Albanese surface branched on an ample divisor with at most negligible singularities. This result provides an affirmative answer to a widely believed conjecture, whose complete proof till now seemed out of reach. Our argument combines classical results, such as the Castelnuovo bound for the genus of curves in projective spaces, with more modern techniques: the covering trick used by Pardini for her proof of the Severi inequality, and the Severi-Clifford inequalities for nef line bundles on irregular surfaces obtained recently by Barja.