ABSTRACT. We consider the L^2 gradient flow for the Willmore functional. In [KS] it was proved that the curvature concentrates if a singularity develops. Here we show that a suitable blowup converges to a nonumbilic (compact or noncompact) Willmore surface. Furthermore, an L^{∞} estimate is derived for the tracefree part of the curvature of a Willmore surface, assuming that its L^2 norm (the Willmore energy) is locally small. One consequence is that a properly immersed Willmore surface with restricted growth of the curvature at infinity and small total energy must be a plane or a sphere. Combining the results we obtain long time existence and convergence to a round sphere if the total energy is initially small.