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We study the formation of vortex structures as the result of the interference of different Bose-Einstein condensates clouds that are initially separated by an appropriately crafted laser sheet. After the removal of the laser sheet the fragments collide and generate a rich structure of vortex pairs (in 2D), vortex lines and vortex rings (in 3D). We perform a detailed numerical study of the effects of the relative phases of the different fragments on the formation of vortices. We also study the effects of the ramping down rate of the laser sheet as well as damping effects due to coupling with the thermal cloud. (Received September 21, 2007)