During braking, a heat flow is generated by friction and heated the brake components, the heating causes thermal expansion in the disc and the pads and these expansions alternate the contact. This paper proposes a transient thermomechanical simulation of friction by the finite element method of disc/pads of a sport cars brake using ABAQUS. In this comparative study, three different ceramic composite materials (A359/SiC p20, Al6061/SiC, C/C-SiC) are used for the disc which is in friction with organic (C/C) lining bonded to steel back plates of the brake pads. This will allow us to emphasize the importance of the distribution and the variation of the temperature on the contact pressure and the stress field and the braking torque.