Resistance spot welding is an inexpensive and efficient way of joining metals. It has extensive applications in household appliances and in automotive industries. The traditional approach in relation to spot welding machines is to use 50 Hz welding transformers. The drawback associated with these transformers is that they are both heavy and bulky. Moreover, the fusing requirements become larger due to increased welding power.

With the development of high power semiconductor switches and DC-DC converter topologies, it is now possible to develop inverter drive resistance spot welding equipment (RSE) which can be operated at frequencies higher than the 50Hz frequency. The advantage of using high frequencies is the reduction in the size of the transformer. Moreover, the fusing requirements are relaxed, as the power is shared between three phases.

In many industrial applications long welding arms are required between the transformer and the weld spot, which increases the inductance. The parasitic inductance in welding arms limits the maximum rate of change of the current. In order achieve a higher power the current has to be rectified. To rectify a current of the order of tenth of kA is challenging task and is one of the major sources of loss.

The full bridge converter topology is used for the inverter drive RSE. The power switches used in the converter are IGBT. In RSE, the DC link capacitors are used to store high energy. In the case of circuit failure, the stored energy can cause the IGBT device to rupture and in order to avoid this, a protection scheme is discussed in this work.

A controller circuit, using a DSPIC33FJ16GS502 controller, is developed in order to drive a high frequency full bridge converter, which can also be used to drive the IGBTs in the RSE.

The secondary side welding current is of the order of kilo amperes. A requirement for the welding control is that the current must be sensed precisely and in order to fulfill this, a Hall sensor system has been developed. This developed circuit is used in the feed-back control of the RSE. The presence of metallic objects and tools in the vicinity of the Hall sensor system can affect its precision. We have estimated the exclusion distance for the metal objects from the sensor by means of a model developed in COMSOL Multiphysics software.