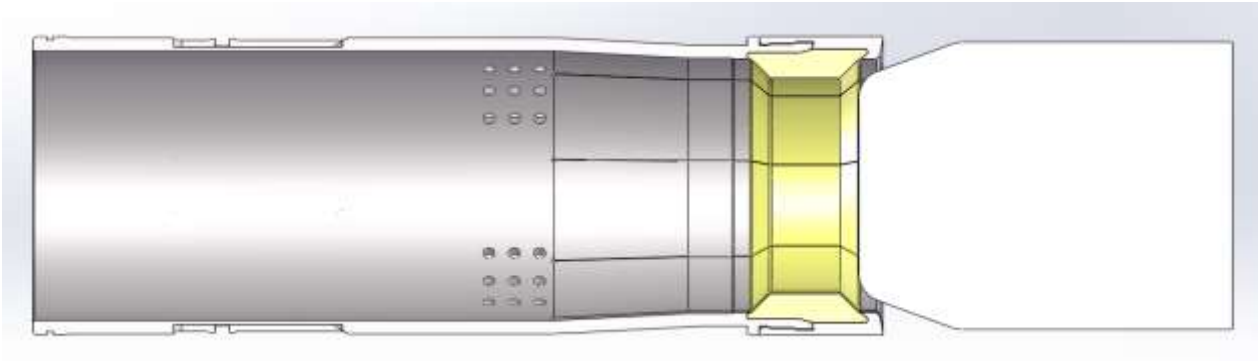


## Flaring procedure



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## 1 Flaring

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This procedure gives a detailed explanation of how to flare seat and expand seat fingers. There are several critical steps in this procedure that need special attention.

- The flaring area shall have a minimum width
- The temperature increase should happen evenly and slowly over whole flaring area.
- The flaring temperature during flaring process SHOULD NOT be greater than the material tempering temperature.
- The seat cannot be exposed to a temperature that will cause a transformation to austenite.
- The cooling of the seat after finger expansion shall be done in a controlled manner.
- The QPQ treatment shall be performed after flaring.

### 1.1 Equipment

The following equipment is needed to flare the hybrid flex seats:

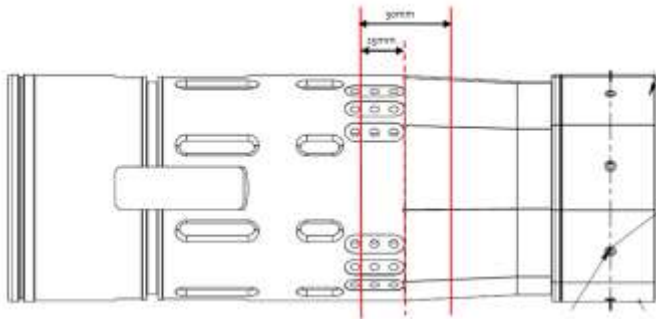
1. Induction heater or similar
2. Mandrel. The mandrel needs to have an outer diameter according to table 2.1

### 1.2 Procedure

- 1.2.1 Install the flex seat in the heater. If this heater is an induction heater, make sure that the seat is centered in the coil. Measure the seat OD to coil distance at three points around the seat OD and note the measurement in the table 2-1 in the flex seat flaring certificate
- 1.2.2 Line up the mandrel so it is ready to be pushed into the hybrid seat. Use Calculation 1 to find the correct mandrel size.



- 1.2.3 Heat the hybrid seat at the end of the assembly grooves (beginning of "seat fingers"). The heated area shall be a minimum for 30mm wide, 15 mm above and 15 mm below assembly grooves.



- 1.2.4 Increase temperature to the flaring area slowly. Use minimum of 10 minutes to increase the temperature from ambient to the material specified tempering temperature plus zero minus 100F (38C) (find tempering temperature in the material certificate)
- 1.2.5 While keeping the temperature at the specified value in 1.2.4, press the correct sized mandrel into the hybrid seat. This will push the fingers out. The fingers should lay against the flat surface on the mandrel.

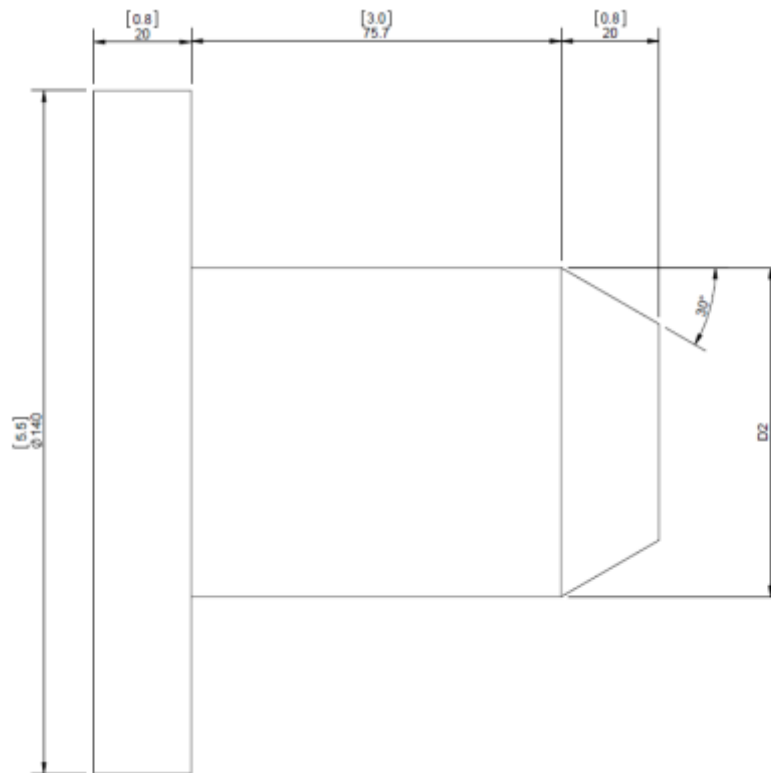


- 1.2.6 Turn off the heat source and let the temperature drop to ambient temperature without active cooling.
- 1.2.7 Let the hybrid seat cool down to ambient temperature with the mandrel inserted.
- 1.2.8 Remove the mandrel and measure the expansion of the ID and OD. This must be in accordance with table 2.1. List the dimension of expansion mandrel used in table 4-1 in the flex seat flaring certificate

#### Calculation 1

$$D_2 = 2.885 + .334 \text{ in } + .039/-0'' = \text{Mandrel OD (3.219 to 3.258 OD)}$$

Figure 1 Steel mandrel drawing



### 3 Quench Polish Quench (QPQ)

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Heat treat per C-001 (QPQ) shall be performed after flaring.

### 4 Non Destructive Testing (NDT)

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Wet magnetic particle inspection of heat affected area on the OD and ID shall be performed after flaring and QPQ. Any indication found is subject to rejection of the part. Contact engineering for disposition.

## 5 Supplier Qualification tests

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A minimum of one complete seat shall be sent to a materials laboratory to check for micro cracks, microstructure and conduct hardness and tensile tests at the center of a finger on the heated area to qualify the process and the supplier.