

## ABSTRAK

*Seat* merupakan salah satu komponen filter oli yang berfungsi sebagai pelat dasar (*base plate*). Di dalam *seat* terdapat lubang *inlet* atau jalur masuk, dan ulir untuk memasang filter oli pada mesin sekaligus sebagai lubang *outlet* atau jalur keluarnya oli pada sistem filter oli. Komponen *seat* umumnya terbuat dari material *steel plate hot rolled coiled (SPHD)*. Pembuatan komponen *seat* menggunakan *simple tool* membutuhkan waktu dan biaya operasional yang relatif besar dikarenakan bentuknya yang kompleks. Dalam penelitian ini, *tool* pembentuk komponen *seat* di desain menjadi *progressive dies* guna melakukan penghematan biaya operasional produksi. Perhitungan gaya-gaya yang bekerja pada proses pemotongan dan pembedakan komponen berdasarkan spesifikasi material produk KSE006-0408B yaitu *Steel Plate Hot Rolled Coiled* dengan *tensile strength* 337 Mpa. *Software* CAD digunakan untuk sketsa desain *dies* dalam bentuk 2D. Kemudian disimulasikan dalam bentuk 3D menggunakan *software Solid Edge*. Dari hasil rancangan diperoleh hasil jarak sisi tepi material 3,617 mm, jarak antar potongan 2,3 mm, dan lebar material 96 mm. Gaya *embossing 1* 33.749,8 N, gaya *pierching* 112.986,3 N, gaya *forming* 122.726,44 N, gaya *embossing 2* 24.446,6 N, gaya *blanking* 171.228 N, gaya *stripper* 44.513,7 N, dan kapasitas mesin yang diizinkan 734.476,26 N. Dari perhitungan gaya *stripper* dapat ditentukan dimensi pegas yaitu SSWH 35 x 60. Tegangan yang diterima oleh komponen *dies* sebagai berikut:  $\sigma_{punch\ emboss} = 109,6$  MPa,  $\sigma_{dies\ emboss} = 70,79$  MPa,  $\tau_{punch\ pierching\ diameter\ 6\ mm} = 269,6$  MPa,  $\tau_{punch\ pierching\ diameter\ 10\ mm} = 269,6$  MPa,  $\tau_{die\ pierching} = 269,6$  MPa,  $\sigma_{punch\ forming} = 20,05$  MPa,  $\sigma_{die\ forming} = 19,12$  MPa,  $\sigma_{punch\ emboss\ 2} = 235,9$  MPa,  $\sigma_{die\ emboss\ 2} = 235,9$  MPa,  $\tau_{punch\ blank} = 271,14$  MPa,  $\tau_{dies\ blank} = 269,9$  MPa. Panjang *punch* maksimal yang diizinkan adalah 59,9 mm. *Clearance embossing* dan *forming* 2,53 mm. *Clearance pierching* dan *blanking* 0,2 mm. *Radius emboss 2* 2,4 mm, *radius forming* 2,6 mm.

**Kata kunci :** *Progressive Dies, Pierching, Forming, Blanking, Steel Plate Hot Rolled Coiled*

**PROGRESSIVE DIES WORK ANALYSIS FOR SEAT PRODUCTS  
KSE006-0408B WITH EMBOSsing, PIERCHING, FORMING,  
AND BLANKING PROCESS USING TEST SPECIMENS  
STEEL PLATE HOT ROLLED COILED**

**ABSTRACT**

*Seat is one of the components of the oil filter that functions as a base plate. Inside the seat there is an inlet hole or inlet lane, and a thread to install an oil filter on the engine as well as an outlet hole or oil escape path in the oil filter system. Seat components are generally made of hot rolled coiled (SPHD) steel plate material. Making seat components using simple tools requires relatively large time and operational costs due to its complex shape. In this study, the seat component forming tool was designed to be progressive dies in order to save production operational costs. Calculation of the forces acting on the process of cutting and forming components based on the material specifications of the KSE006-0408B product, namely Steel Plate Hot Rolled Coiled with a tensile strength of 337 Mpa. CAD software is used to sketch dies designs in 2D form. Then simulated in 3D form using Solid Edge software. From the design results, the material edge distance is 3,617 mm, the mesh between pieces is 2.3 mm, and the material width is 96 mm. Embossing force 1 33,749.8 N, pierching force 112,986.3 N, forming force 122,726.44 N, embossing force 24,446.6 N, blanking style 171,228 N, stripper force 44,513.7 N, and permissible machine capacity 734,476.26 N. From the calculation of stripper force, the dimensions of the spring can be determined, namely SSWH 35 x 60. The shear stress and normal stress received by the components of the dies is as follows:  $\sigma$  punch emboss = 109.6 MPa,  $\sigma$  dies emboss = 70.79 MPa,  $\tau$  punch pierching diameter 6 mm = 269.6 MPa,  $\tau$  punch pierching diameter 10 mm = 269.6 MPa,  $\tau$  die pierching = 269.6 MPa,  $\sigma$  punch forming = 20.05 MPa,  $\sigma$  die forming = 19.12 MPa,  $\sigma$  punch emboss 2 = 235.9 MPa,  $\sigma$  die embbos 2 = 235.9 MPa,  $\tau$  punch blank = 271.14 MPa,  $\tau$  dies blank = 269.9 MPa. The maximum permissible punch length is 59.9 mm. Embossing and forming clearance 2.53 mm. Clearance pierching and blanking 0.2 mm. Embossing radius 2.4 mm, forming radius 2.6 mm.*

**Keywords :** *Progressive Dies, Embossing, Pierching, Forming, Blanking, Steel Plate Hot Rolled Coiled*