



**FACULTAD DE CIENCIAS QUÍMICAS
UNIVERSIDAD AUTÓNOMA DE COAHUILA**

***SERVICIO DE ANÁLISIS DE DOS MUESTRAS:
ANÁLISIS QUÍMICOS, PRUEBAS DE ENSAYOS MECÁNICOS Y ANÁLISIS
METALOGRAFICO***

20 julio 2016

Atención,
M.C. Horacio Villarreal
Fundición de Aleaciones Especiales de México S.A. de C.V.

Presenta,
Dra. Ana Claudia Lara Cenicerros
Facultad de Ciencias Químicas



1. ANTECEDENTES

Se recibió por parte de la empresa **FUNDICIÓN DE ALEACIONES ESPECIALES DE MÉXICO S.A. DE C.V.** el día 29 de junio de 2016, dos muestras metálicas identificadas como: Pieza vaciada cuerpo y pieza vaciada bonete de válvula globo (ver fotografías 1 y 2 respectivamente). El cliente solicita se realice los análisis y ensayos que se mencionan en la tabla.

IDENTIFICACIÓN SOLICITANTE	ANÁLISIS Y/O ENSAYO	REGISTRO LABORATORIO FACULTAD
Pieza vaciada cuerpo	<ul style="list-style-type: none">- Análisis químico.- Análisis metalográfico- Ensayo de pruebas mecánicas.	16ME287
Pieza vaciada bonete	<ul style="list-style-type: none">- Análisis químico.- Análisis metalográfico- Ensayo de pruebas mecánicas.	16ME288



FOTOGRAFÍA 1. CUERPO DE VÁLVULA GLOBO



FOTOGRAFÍA 2. BONETE DE VÁLVULA GLOBO



2. RESULTADOS

- ANÁLISIS QUÍMICO

El análisis se realiza mediante la siguiente técnica: % de Carbono (C) y % de Azufre (S), por combustión y detección infrarroja, ASTM E1019/2008. El resto de los elementos por Espectrometría de Plasma (ICP).

ELEMENTO	16ME287
C	0,028
S	0,007
Fe	BAL.
Mn	1,45
P	0,013
Si	1,36
Cr	19,14
Ni	11,50
Mo	2,07
Cu	0,10
V	0,032
Ti	0,024
Nb	0,006
Al	0,008
W	<0,005
Co	0,119
Pb	<0,005
Sb	<0,005

ELEMENTO	16ME288
C	0,025
S	0,004
Fe	BAL.
Mn	1,48
P	0,015
Si	1,42
Cr	21,00
Ni	12,00
Mo	2,09
Cu	0,12
V	0,016
Ti	<0,005
Nb	<0,005
Al	0,006
W	0,009
Co	0,094
Pb	<0,005
Sb	<0,005

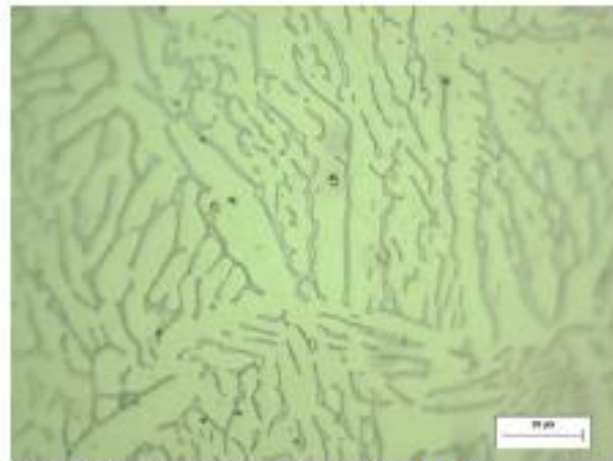
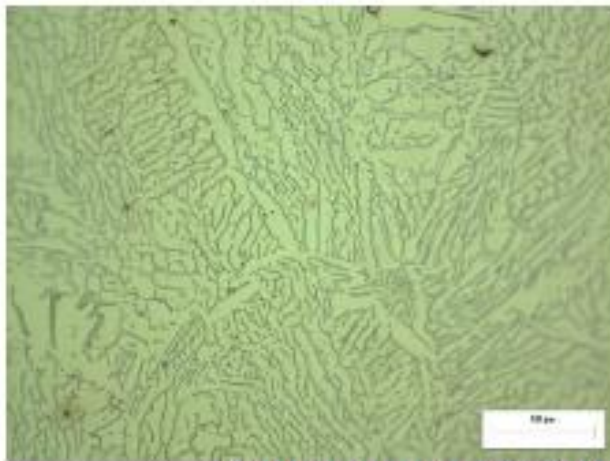
*(<) Indica que el valor obtenido es menor al límite de cuantificación de la curva de calibración



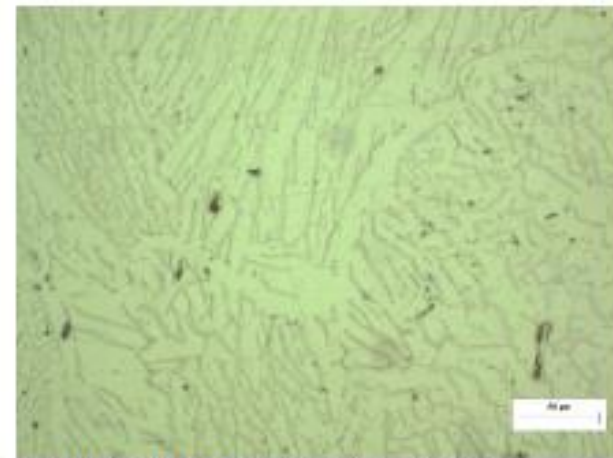
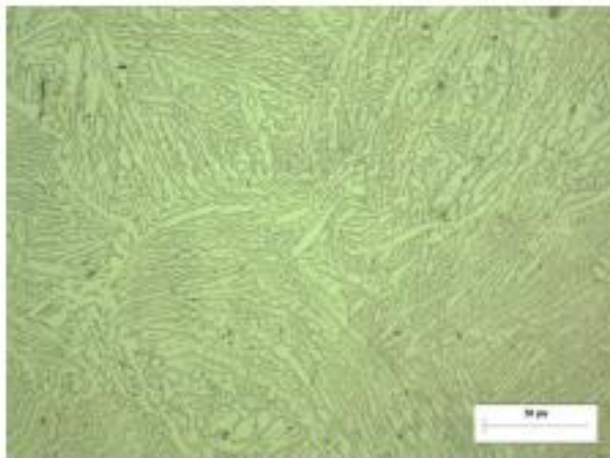
- ANÁLISIS METALOGRAFICO

PIEZA VACIADA CUERPO (16ME287)

La microestructura que presentan tres zonas distintas, consiste en una red interdendrítica con algunos precipitados de carburos en el límite de grano en una matriz de austenita. Ver fotomicrografías 1 – 4.



Fotomicrografías 1 -2. Zona 1: 200 y 500X, respectivamente

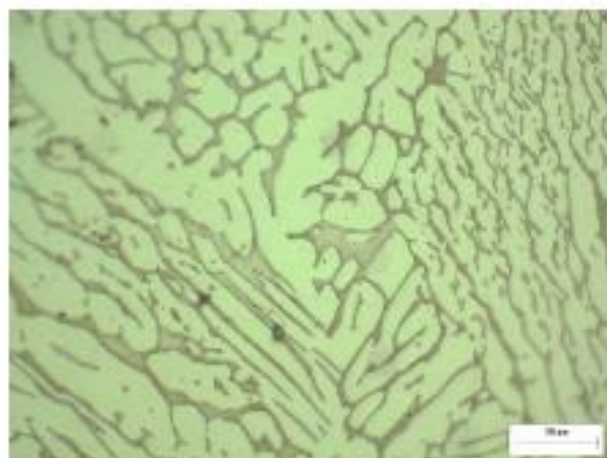
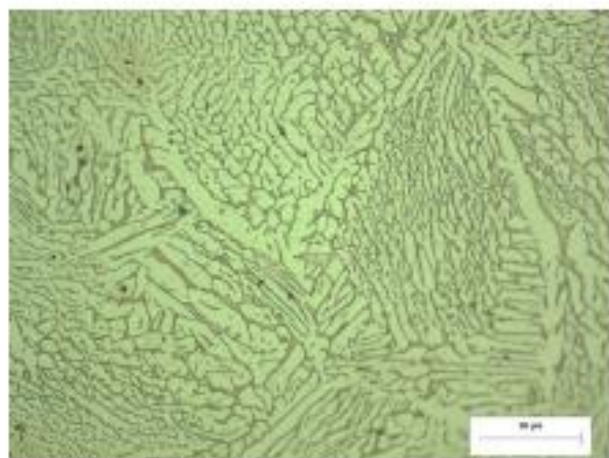


Fotomicrografías 3 -4. Zona 1: 200 y 500X, respectivamente

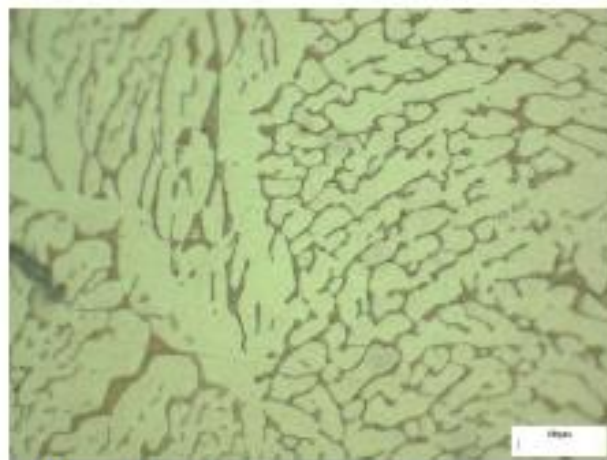
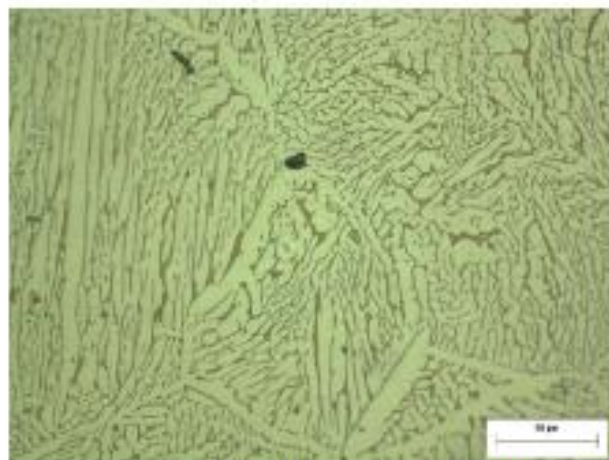


PIEZA VACIADA BONETE (16ME288)

Las fotomicrografías muestran una red interdendrítica con pequeños trazos de límite de grano en una matriz de austenita. Ver fotomicrografías 5 -8.



Fotomicrografías 5 -6. Zona 1: 200 y 500X, respectivamente



Fotomicrografías 7 -8. Zona 1: 200 y 500X, respectivamente



- ENSAYO DE PRUEBAS MECÁNICAS

ENSAYO DE DUREZA: ASTM E18/12

Se realizó un total seis indentaciones sobre el espesor de la muestra 16ME288, aplicando una carga de 100 kgf, con penetrador de 1,5875° de diámetro en escala Rockwell B. Los valores obtenidos se muestran en la siguiente tabla.

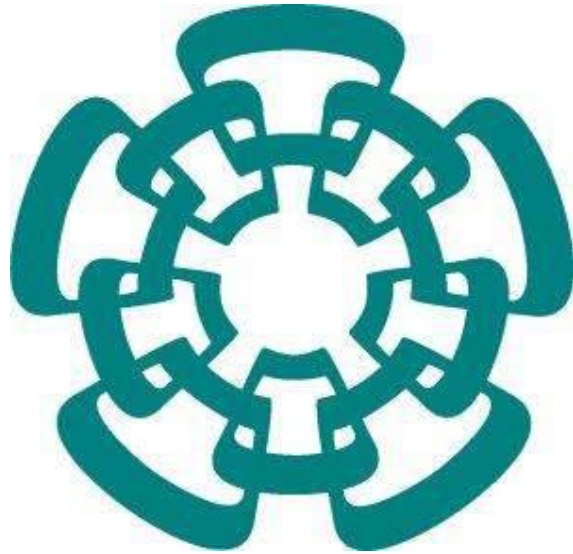
IDENTIFICACIÓN	LECTURAS HRB	PROMEDIO HRB
16ME288	71,64	71,08
	72,18	
	71,18	
	69,33	
	72,18	
	70,02	

ENSAYO DE TENSIÓN: ASTM E8/03

Se realizó ensayo de tensión para las dos muestras (16ME287, 16ME288). Los valores obtenidos se muestran en la siguiente tabla.

Identificación	Diámetro, mm	Longitud, mm	Área, mm ²	Carga Máxima, kg	Carga al 0.2% de def, kg	Esfuerzo Máx, Mpa	Esfuerzo de Cedencia, Mpa	% de Alargamiento
16ME287	6,20	25,4	31,00	1798	803,9	686	362	27
16ME288	6,21	25,4	31,20	1692	740,46	651	341	32

Nota: Los resultados emitidos en este informe solo corresponden a las muestras ensayadas proporcionados por el Cliente.



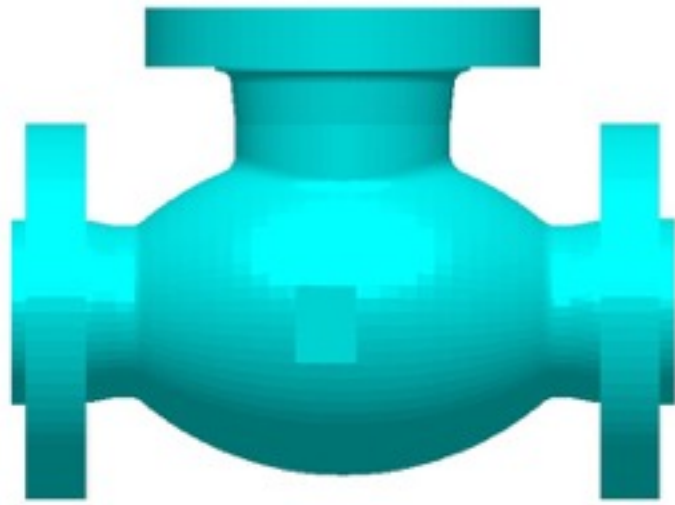
CENTRO DE INVESTIGACIÓN Y DE
ESTUDIOS AVANZADOS DEL
INSTITUTO POLITÉCNICO
NACIONAL
UNIDAD SALTILLO

REPORTE

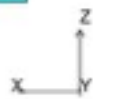
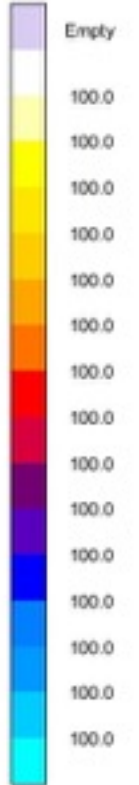
Asesoría Especializada para la Simulación de Sistema de Colada en Software Especializado (Cuerpo, Bonete y Brida para Válvula Globo)

SOLICITADO POR:

FUNDICIÓN DE ALEACIONES ESPECIALES DE MÉXICO S.A. DE C.V. como parte del proyecto: DISEÑO, DESARROLLO Y VALIDACIÓN DE PROTOTIPOS DE VÁLVULAS TIPO GLOBO EN ACERO INOXIDABLE 316L Y ASIENTOS POLIMÉRICOS.

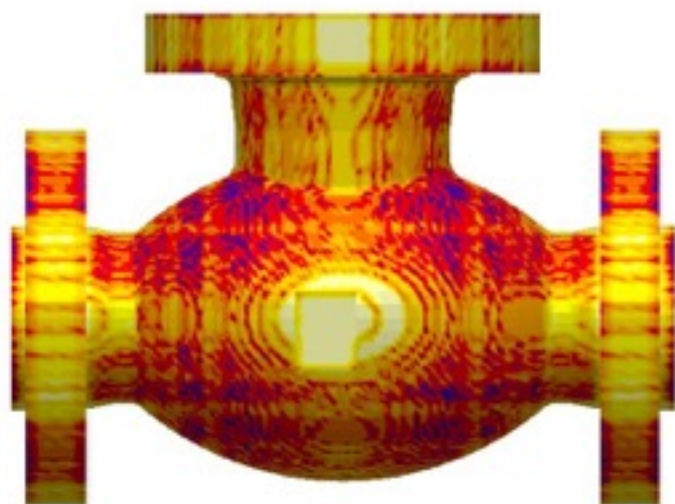


Fraction Liquid
%

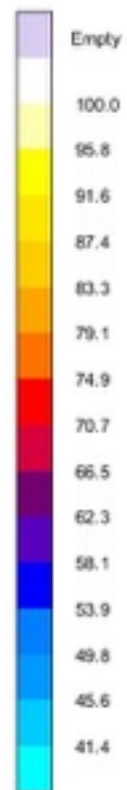


v06
Fraction Liquid
0.0ms 100.00 %



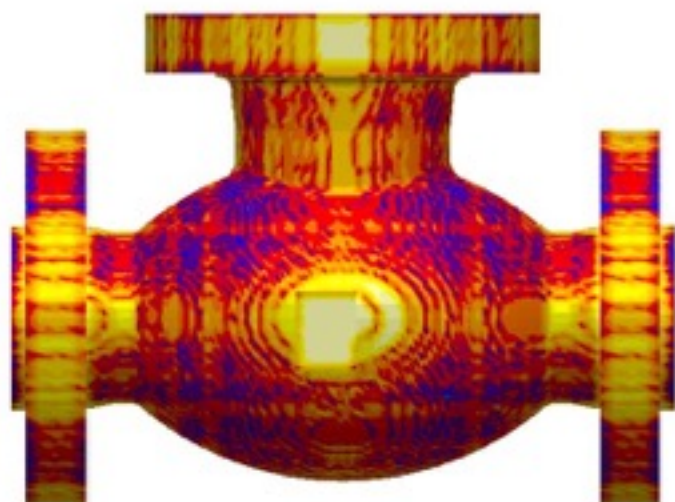


Fraction Liquid
%

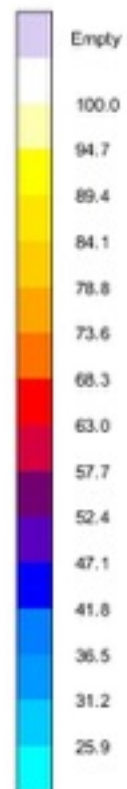


v06
Fraction Liquid
16.756s 97.31 %

MAGMA

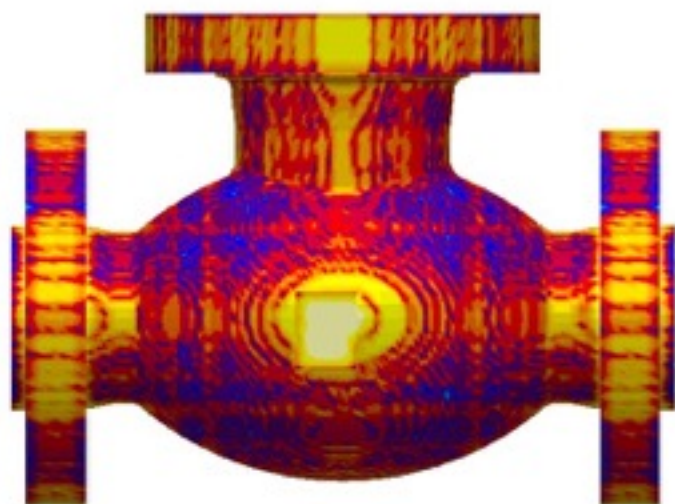


Fraction Liquid
%

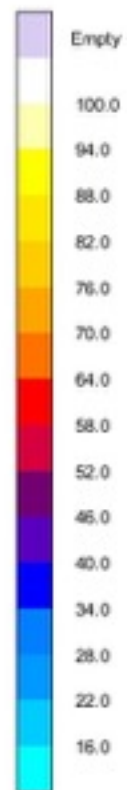


v06
Fraction Liquid
25.150s 95.53 %

MAGMA

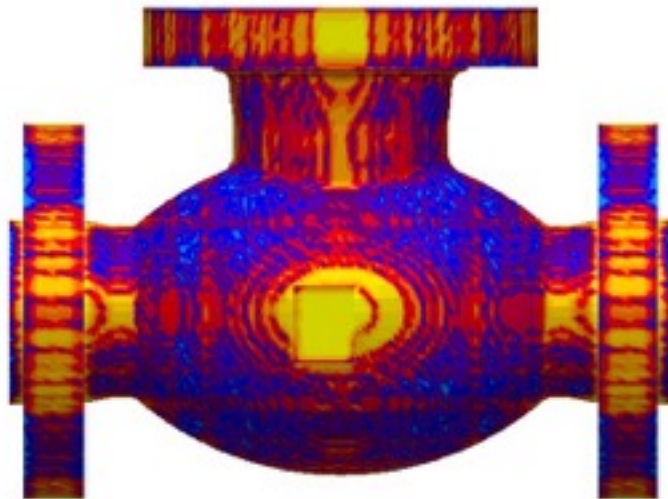


Fraction Liquid
%

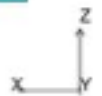
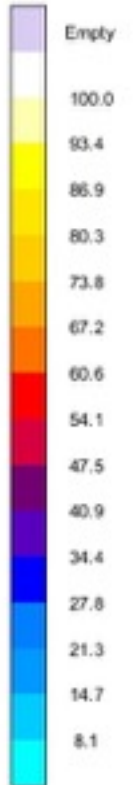


v06
Fraction Liquid
33.591s 93.94 %

MAGMA

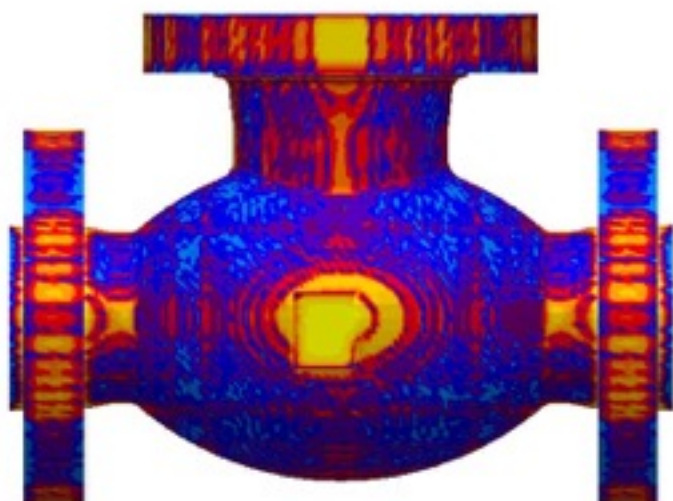


Fraction Liquid
%

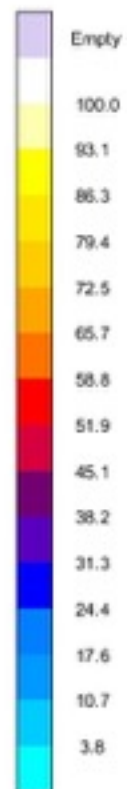


v06
Fraction Liquid
46.187s 91.79 %

MAGMA

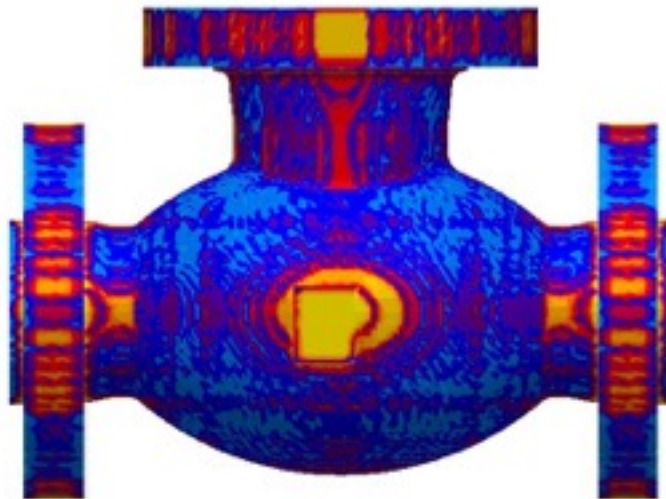


Fraction Liquid
%

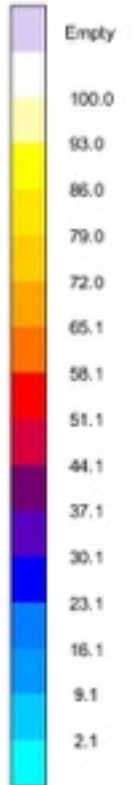


v06
Fraction Liquid
58.764s 89.84 %

MAGMA

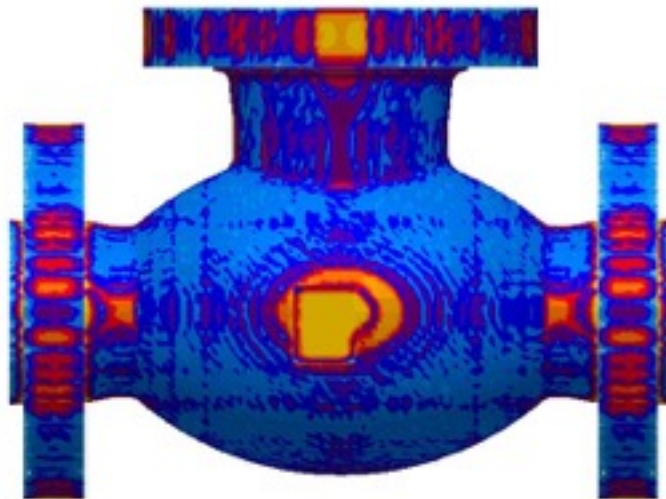


Fraction Liquid
%

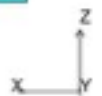
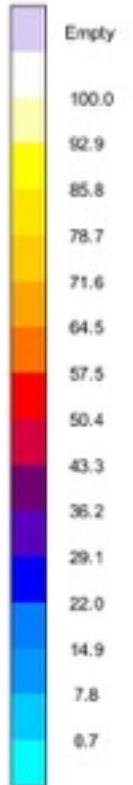


v06
Fraction Liquid
1min 11.0s 87.97 %

MAGMA

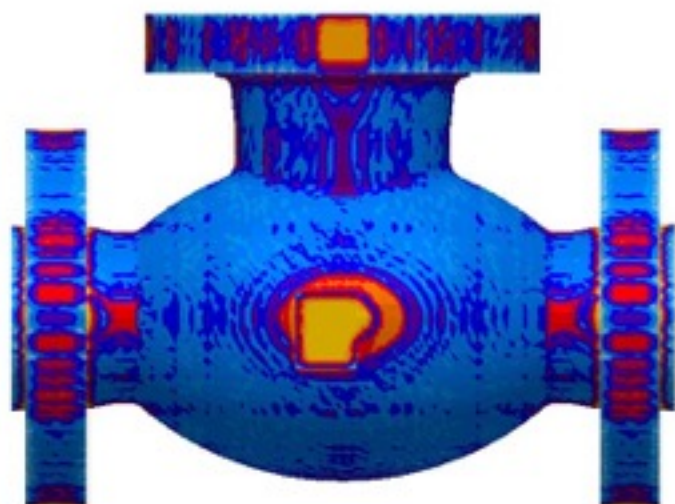


Fraction Liquid %

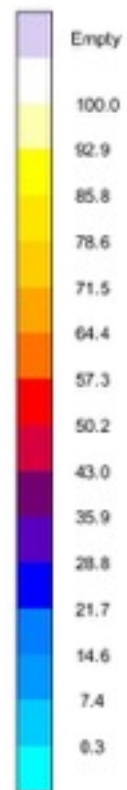


v06
Fraction Liquid
1min 28.0s 85.59 %



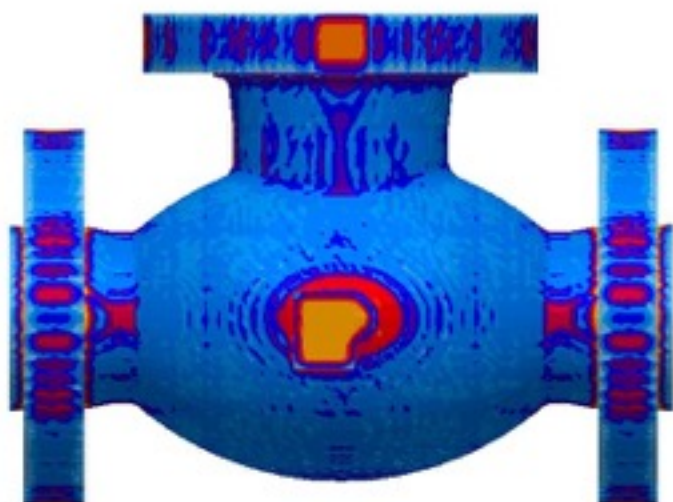


Fraction Liquid
%

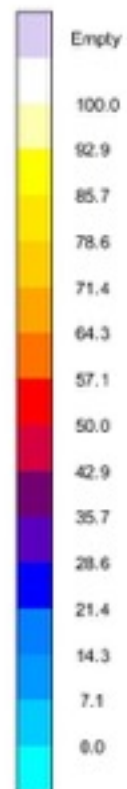


v06
Fraction Liquid
1min 41.0s 83.90 %

MAGMA

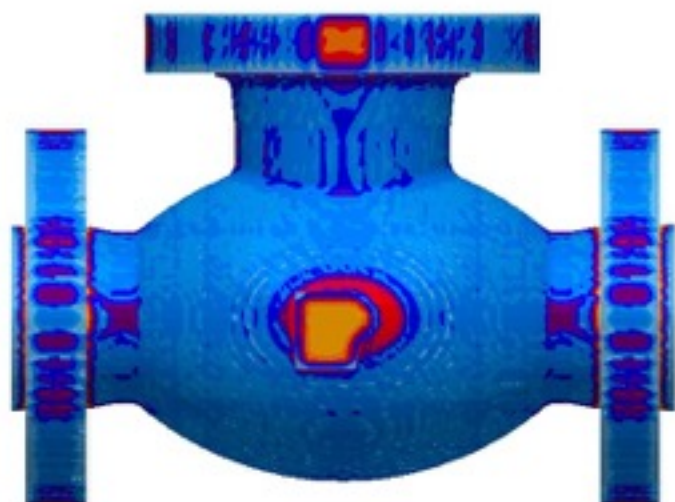


Fraction Liquid
%

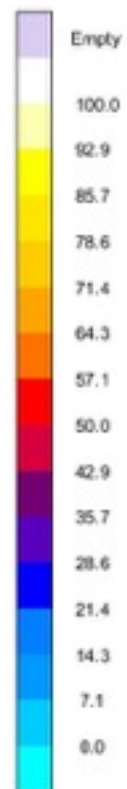


v06
Fraction Liquid
1min 58.0s 81.74 %

MAGMA

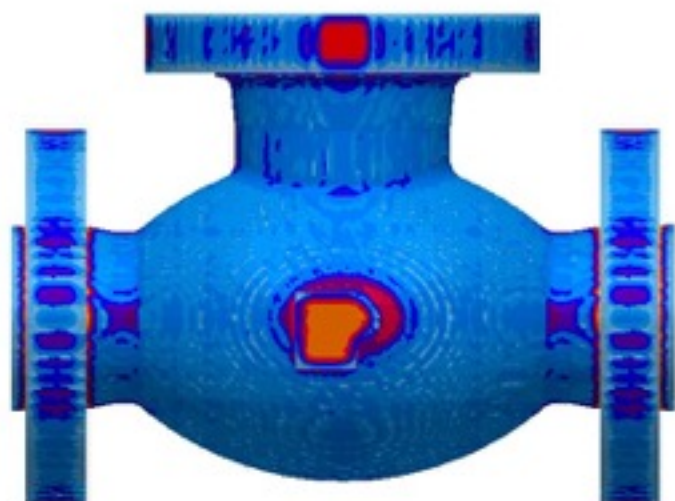


Fraction Liquid
%

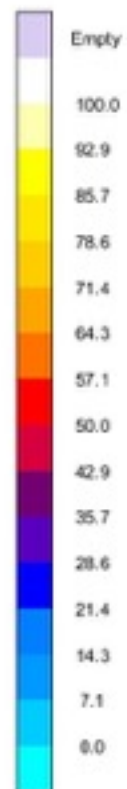


v06
Fraction Liquid
2min 14.0s 79.67 %

MAGMA

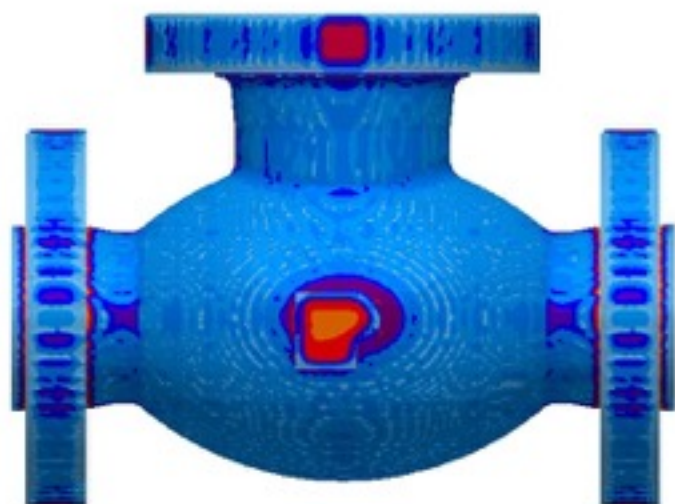


Fraction Liquid
%

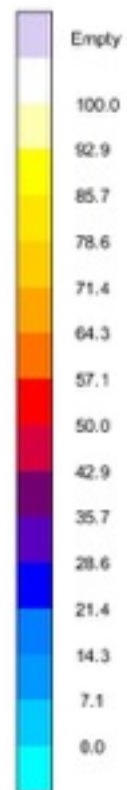


v06
Fraction Liquid
2min 31.0s 77.70 %

MAGMA



Fraction Liquid
%

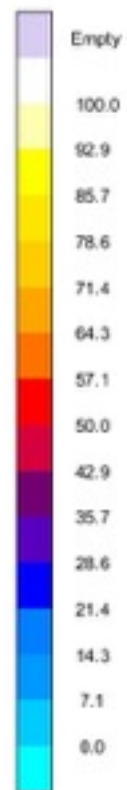


v06
Fraction Liquid
2min 48.0s 75.81 %

MAGMA



Fraction Liquid
%

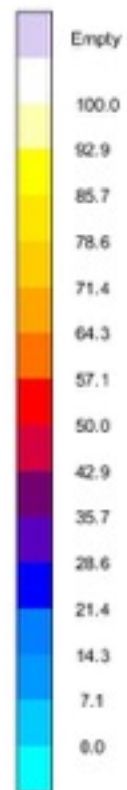


v06
Fraction Liquid
3min 9.0s 73.57 %

MAGMA



Fraction Liquid
%

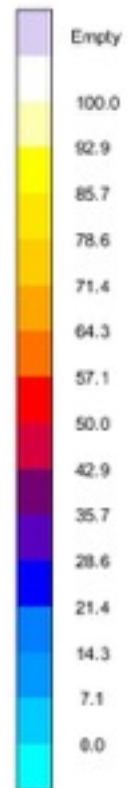


v06
Fraction Liquid
3min 26.0s 71.85 %

MAGMA



Fraction Liquid
%

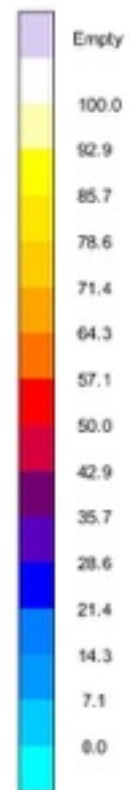


v06
Fraction Liquid
3min 47.0s 69.60 %

MAGMA

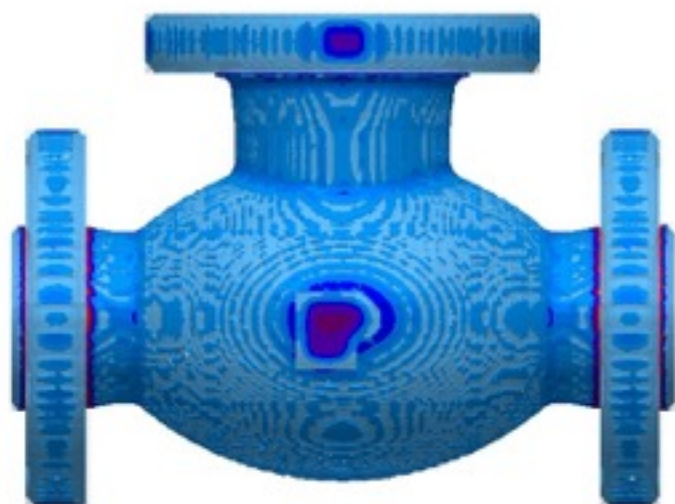


Fraction Liquid
%

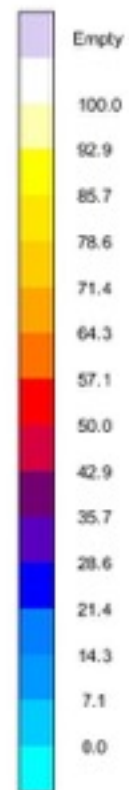


v06
Fraction Liquid
4min 8.0s 67.83 %

MAGMA

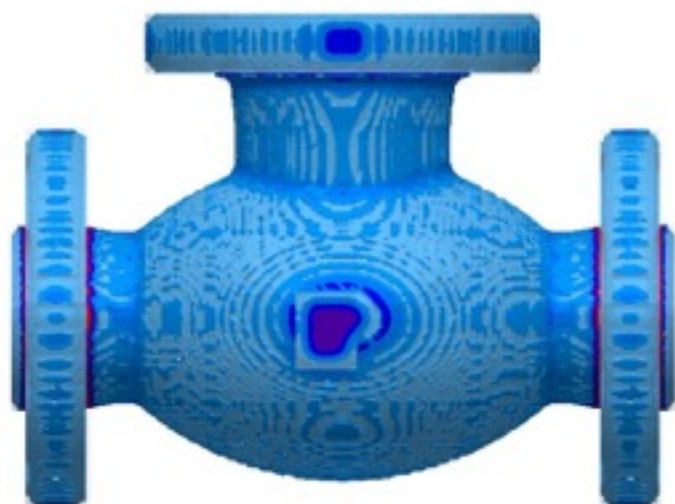


Fraction Liquid %

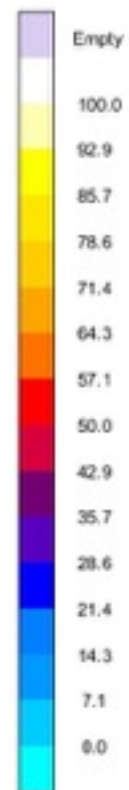


v06
Fraction Liquid
4min 29.0s 65.95 %

MAGMA

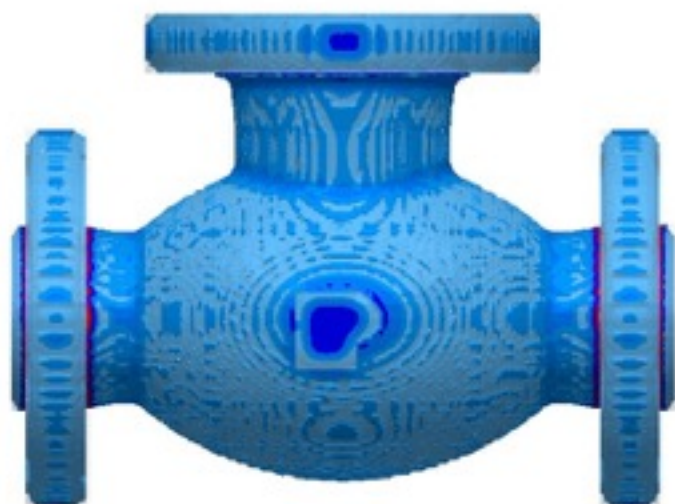


Fraction Liquid
%

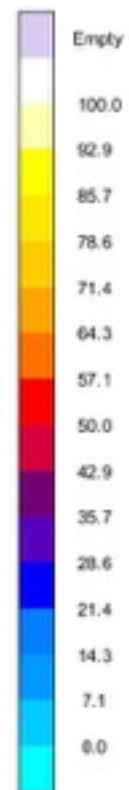


v06
Fraction Liquid
4min 54.0s 63.78 %

MAGMA

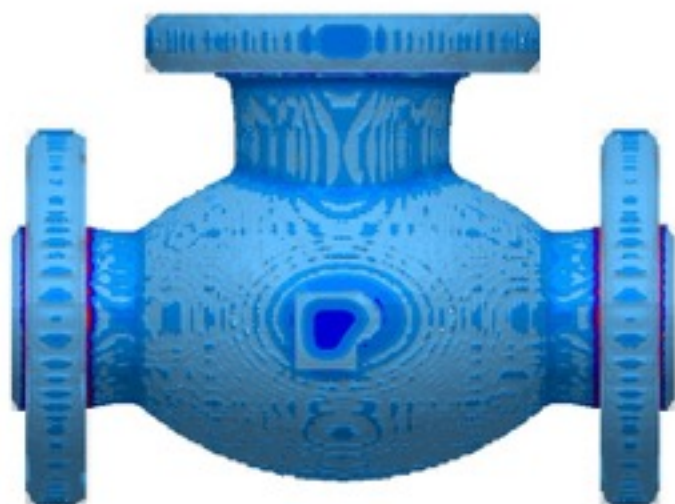


Fraction Liquid
%

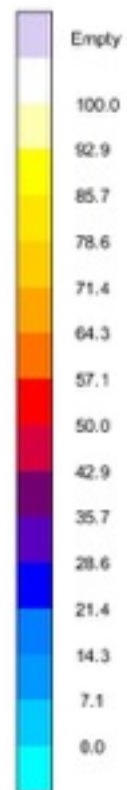


v06
Fraction Liquid
5min 19.0s 61.69 %

MAGMA

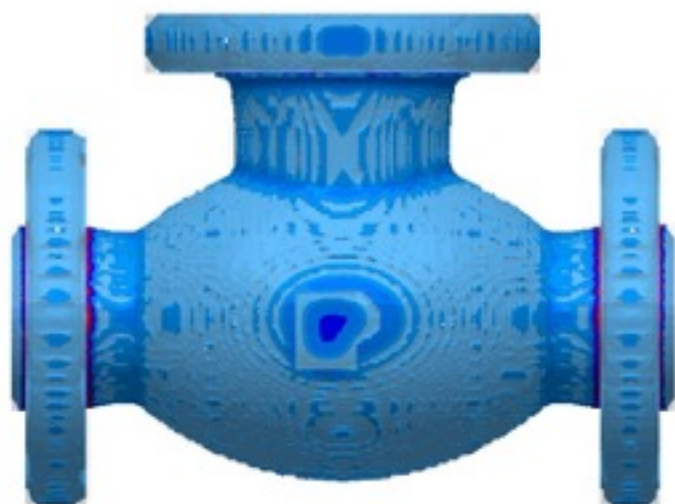


Fraction Liquid
%

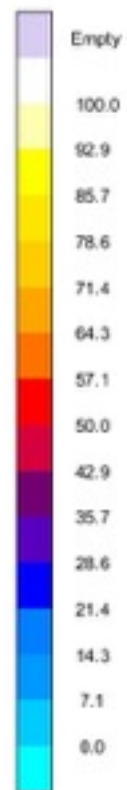


v06
Fraction Liquid
5min 44.0s 59.68 %

MAGMA

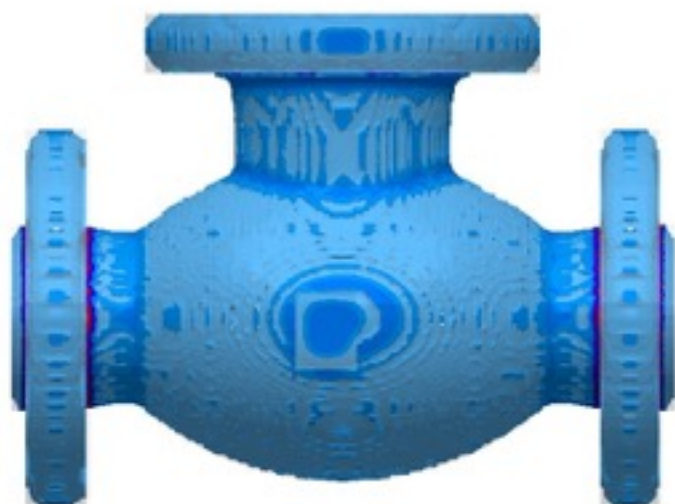


Fraction Liquid
%

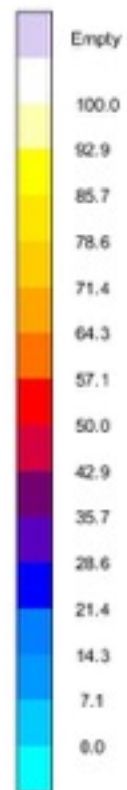


v06
Fraction Liquid
6min 9.0s 57.71 %

MAGMA



Fraction Liquid %

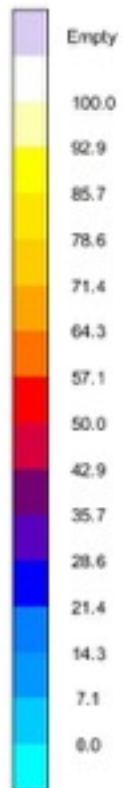


v06
Fraction Liquid
6min 35.0s 55.78 %

MAGMA



Fraction Liquid
%

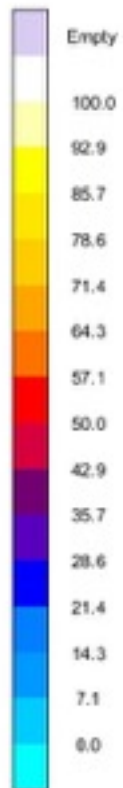


v06
Fraction Liquid
7min 0.0s 53.89 %

MAGMA

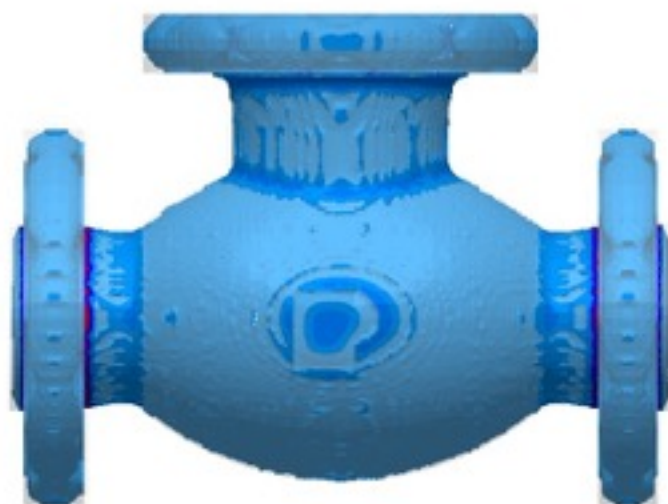


Fraction Liquid
%

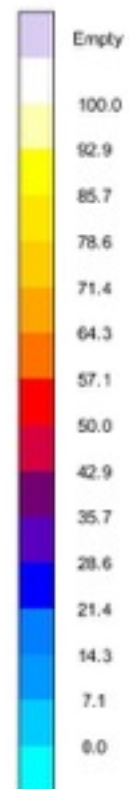


v06
Fraction Liquid
7min29.0s 51.77 %

MAGMA

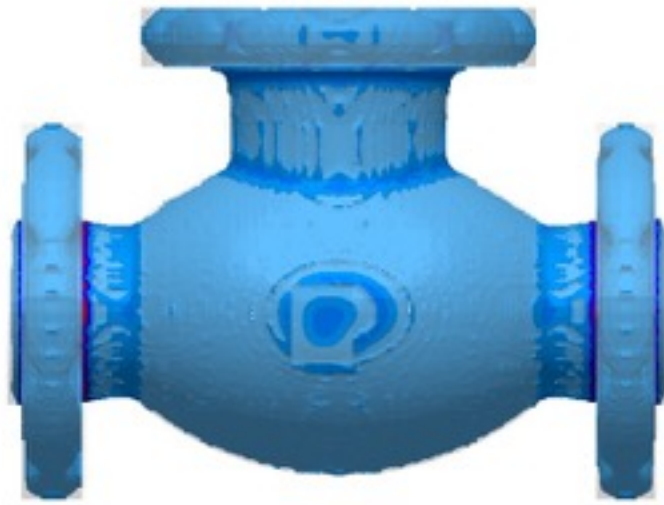


Fraction Liquid
%

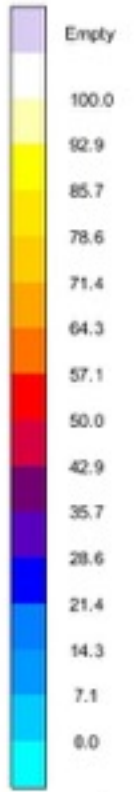


v06
Fraction Liquid
7min 59.0s 49.71 %

MAGMA



Fraction Liquid %

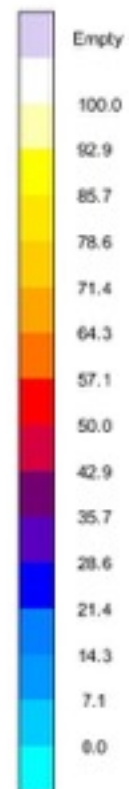


v06
Fraction Liquid
8min 28.0s 47.73 %





Fraction Liquid
%

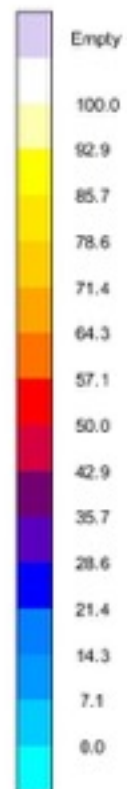


v06
Fraction Liquid
8min 57.0s 45.82 %

MAGMA



Fraction Liquid %

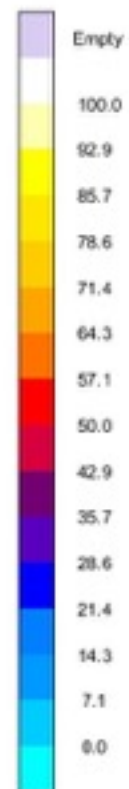


v06
Fraction Liquid
9min 27.0s 43.97 %

MAGMA



Fraction Liquid
%

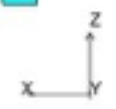
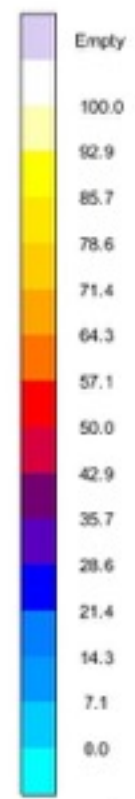


v06
Fraction Liquid
10min 0.0s 41.93 %

MAGMA



Fraction Liquid %

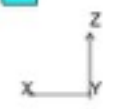
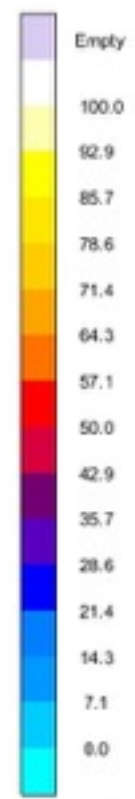


v06
Fraction Liquid
10min 34.0s 39.96 %





Fraction Liquid %

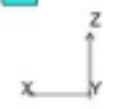
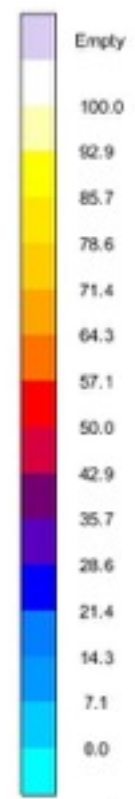


v06
Fraction Liquid
11min 12.0s 37.85 %



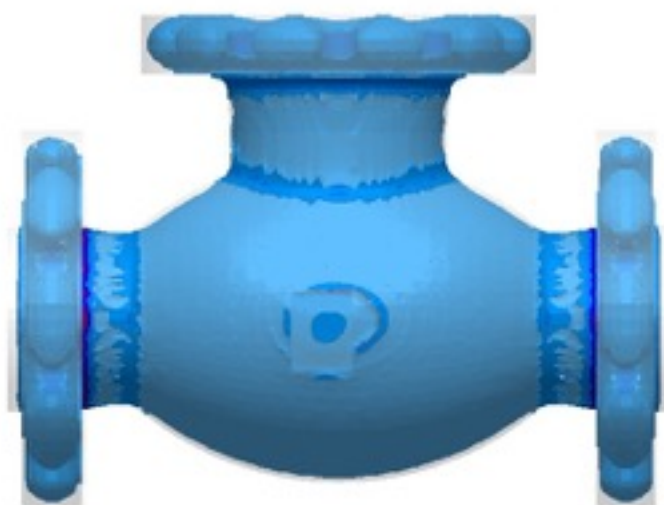


Fraction Liquid %

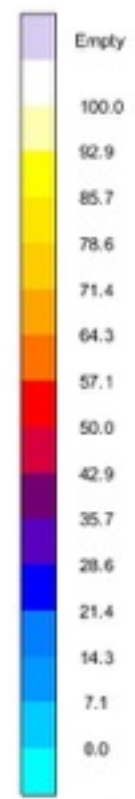


v06
Fraction Liquid
11min 50.0s 35.84 %



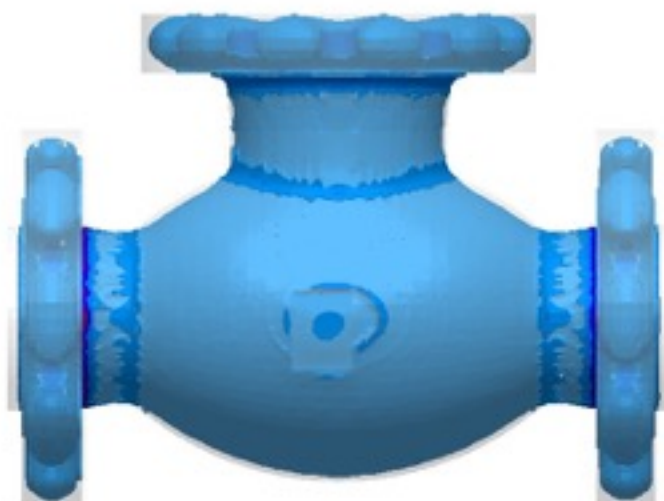


Fraction Liquid %

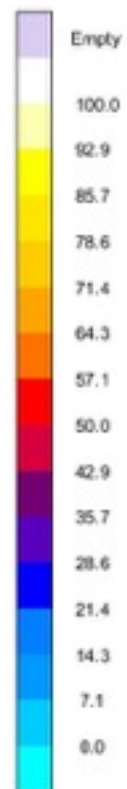


v06
Fraction Liquid
12min 27.0s 33.94 %



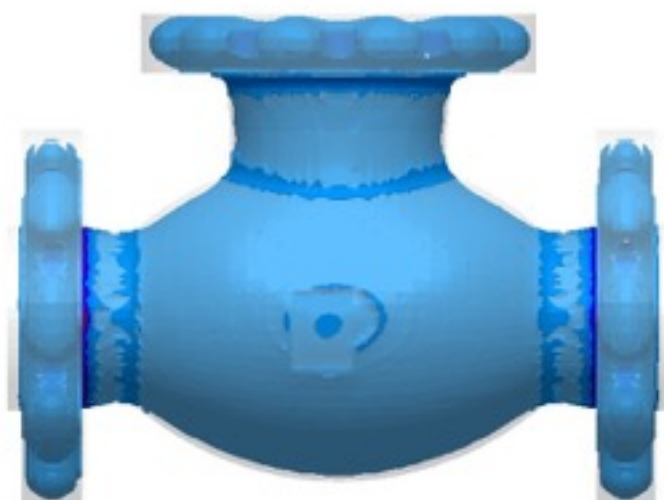


Fraction Liquid
%

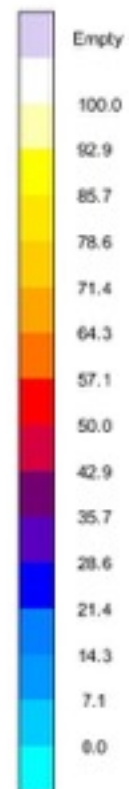


v06
Fraction Liquid
13min 9.0s 31.95 %

MAGMA



Fraction Liquid
%

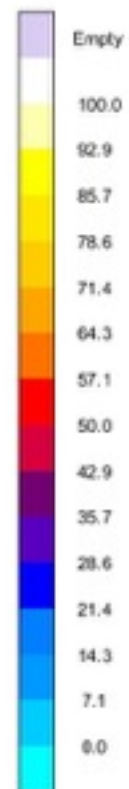


v06
Fraction Liquid
13min 56.0s 29.90 %

MAGMA



Fraction Liquid %

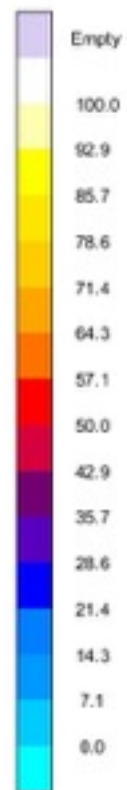


v06
Fraction Liquid
14min 42.0s 27.98 %

MAGMA

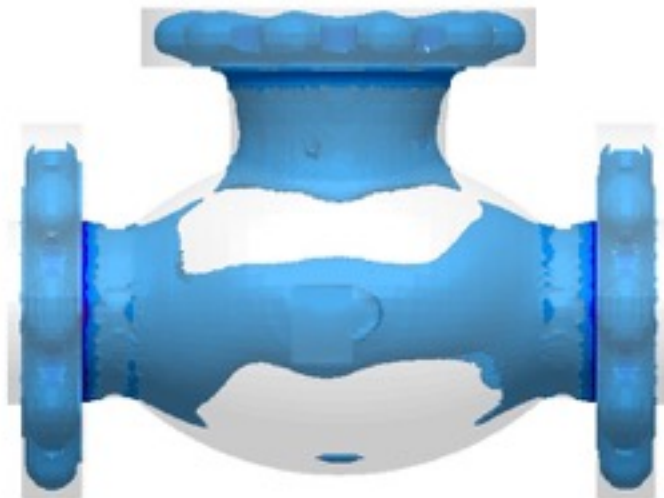


Fraction Liquid %

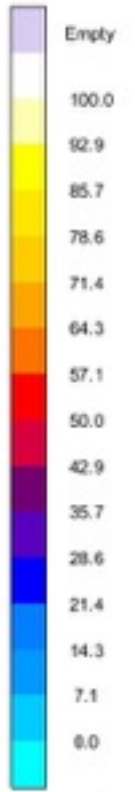


v06
Fraction Liquid
15min 36.0s 25.84 %

MAGMA

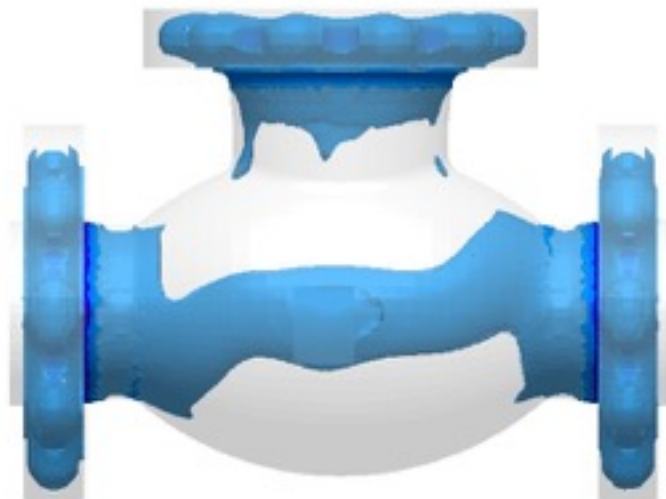


Fraction Liquid %

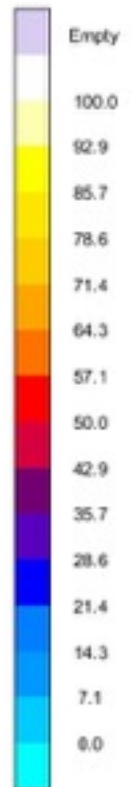


v06
Fraction Liquid
16min 31.0s 23.86 %



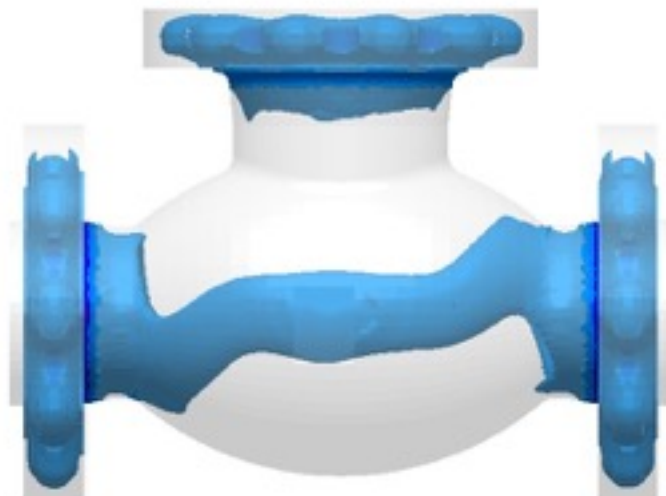


Fraction Liquid
%

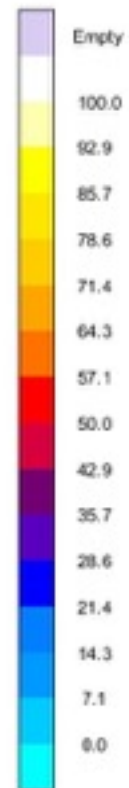


v06
Fraction Liquid
17min 25.0s 21.98 %

MAGMA

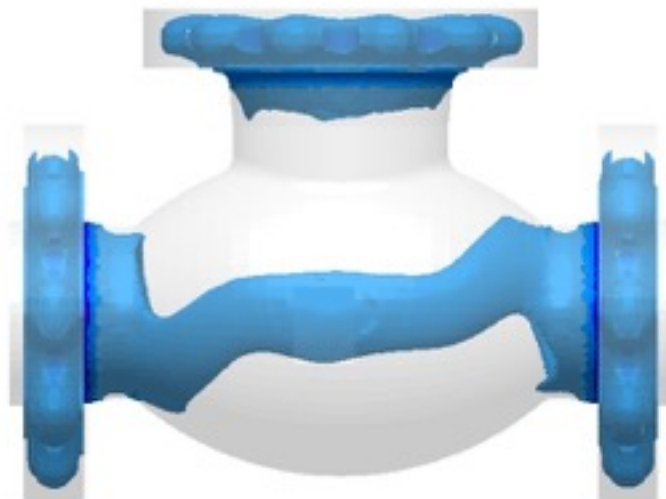


Fraction Liquid
%

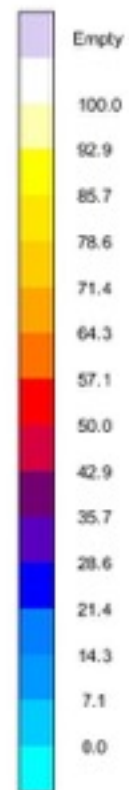


v06
Fraction Liquid
18min 32.0s 19.88 %

MAGMA

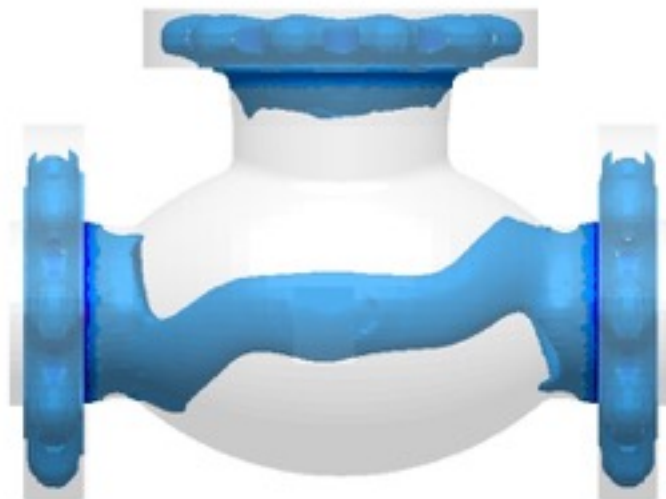


Fraction Liquid
%

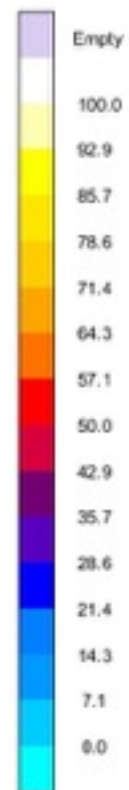


v06
Fraction Liquid
18min 36.0s 19.76 %

MAGMA



Fraction Liquid %

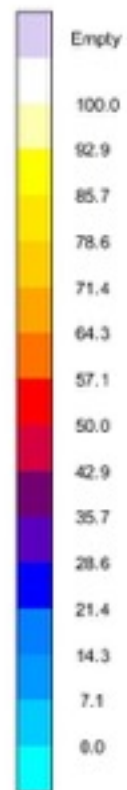


v06
Fraction Liquid
18min 44.0s 19.53 %

MAGMA

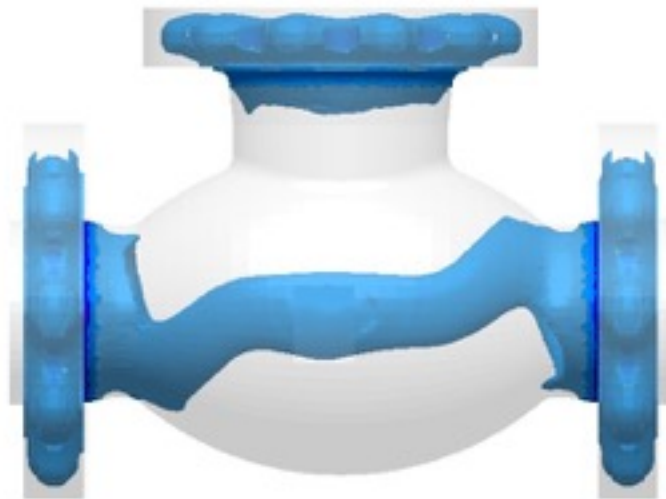


Fraction Liquid
%

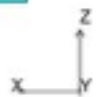
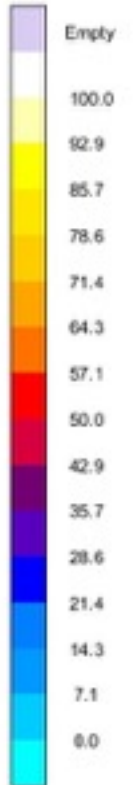


v06
Fraction Liquid
18min 52.0s 19.28 %

MAGMA

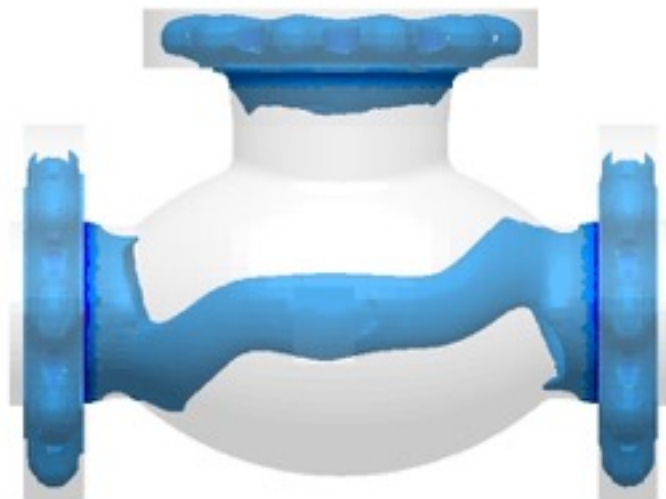


Fraction Liquid
%

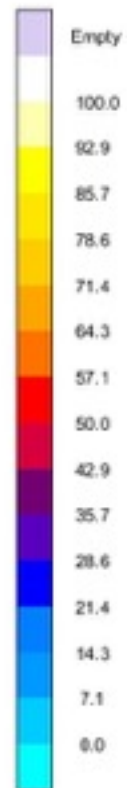


v06
Fraction Liquid
19min 0.0s 19.06 %

MAGMA

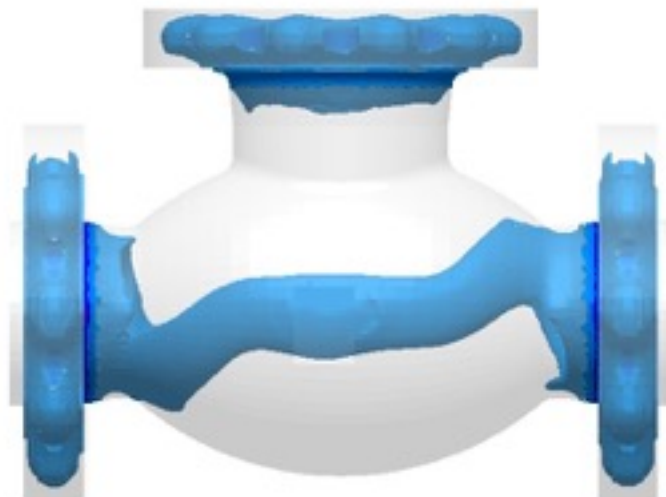


Fraction Liquid
%

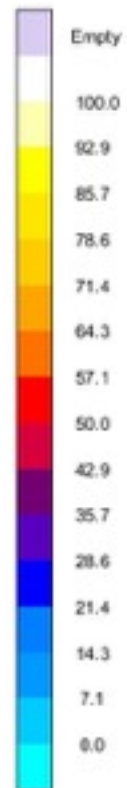


v06
Fraction Liquid
19min 5.0s 18.94 %

MAGMA

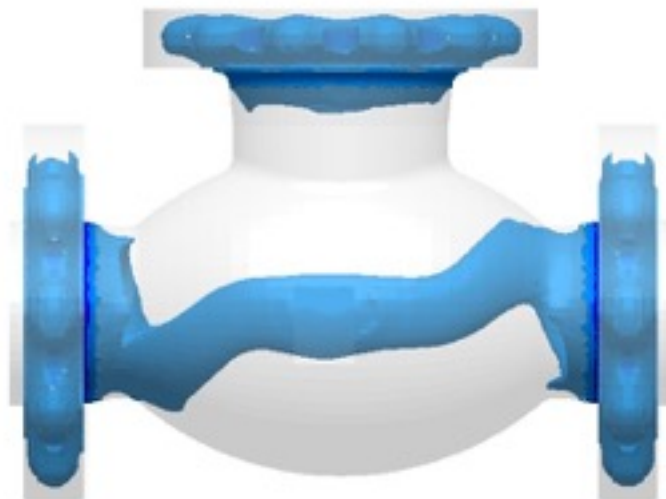


Fraction Liquid
%

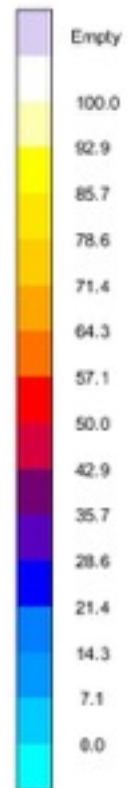


v06
Fraction Liquid
19min 13.0s 18.71 %

MAGMA

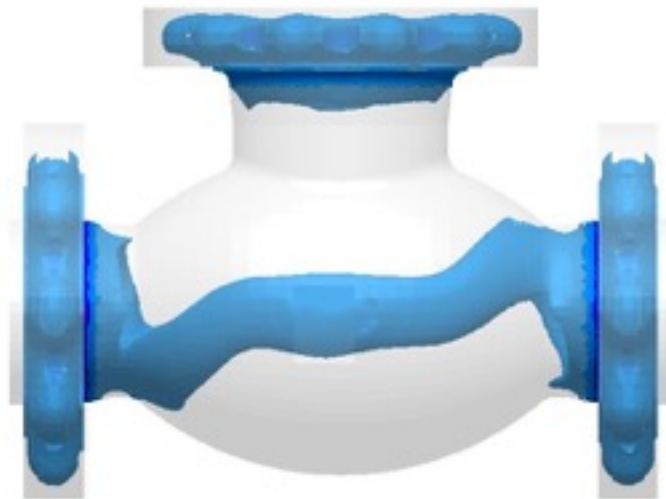


Fraction Liquid
%

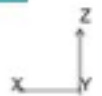
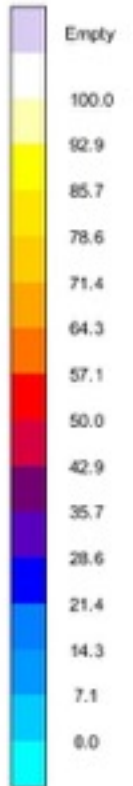


v06
Fraction Liquid
19min 17.0s 18.60 %

MAGMA

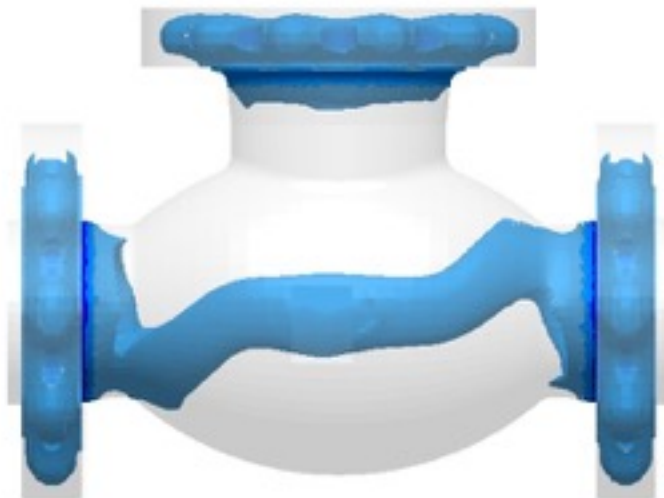


Fraction Liquid
%

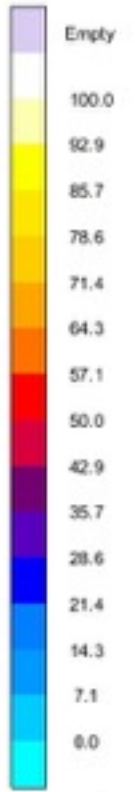


v06
Fraction Liquid
19min 26.0s 18.37 %

MAGMA

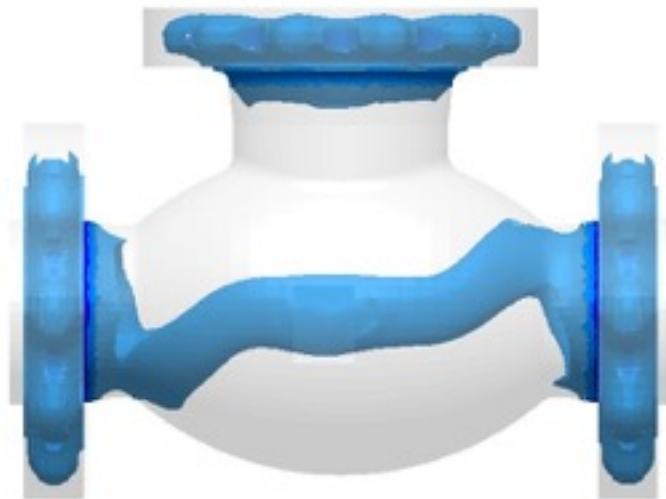


Fraction Liquid %

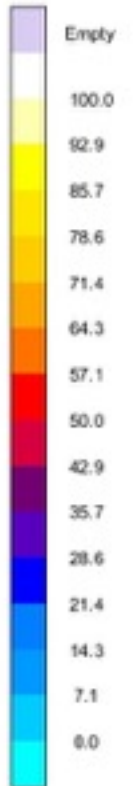


v06
Fraction Liquid
19min 34.0s 18.15 %





Fraction Liquid
%

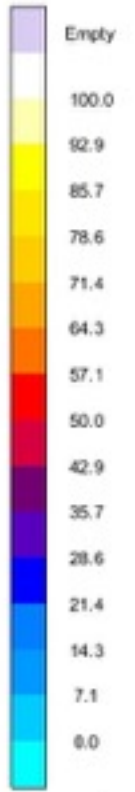


v06
Fraction Liquid
19min 42.0s 17.93 %





Fraction Liquid %

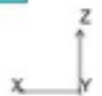
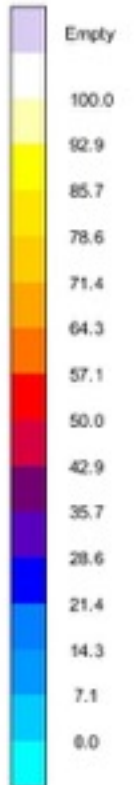


v06
Fraction Liquid
19min 50.0s 17.72 %





Fraction Liquid %

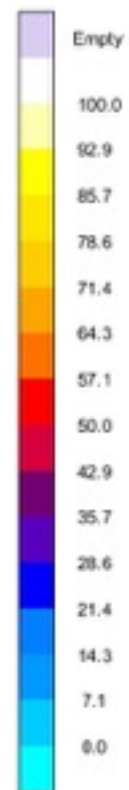


v06
Fraction Liquid
19min 58.0s 17.52 %





Fraction Liquid
%

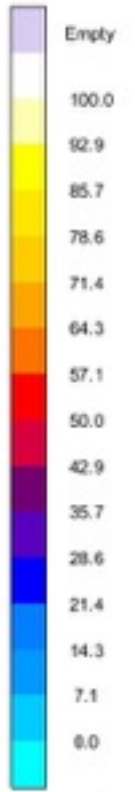


v06
Fraction Liquid
20min 7.0s 17.31 %

MAGMA



Fraction Liquid %

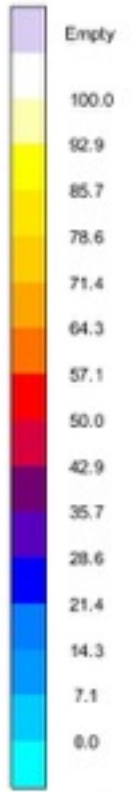


v06
Fraction Liquid
20min 15.0s 17.11 %





Fraction Liquid %

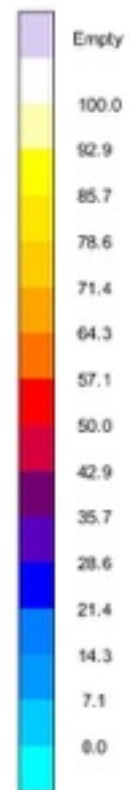


v06
Fraction Liquid
20min 27.0s 16.81 %





Fraction Liquid
%

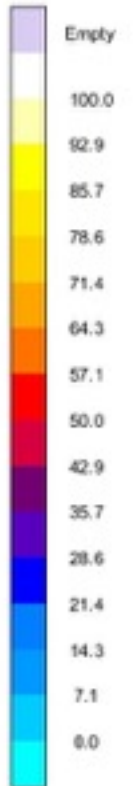


v06
Fraction Liquid
20min 32.0s 16.71 %

MAGMA



Fraction Liquid
%

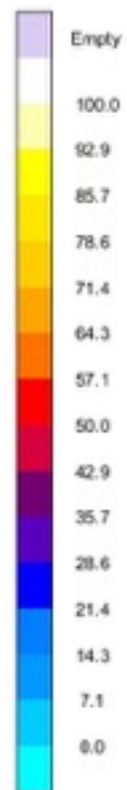


v06
Fraction Liquid
20min 40.0s 16.51 %

MAGMA

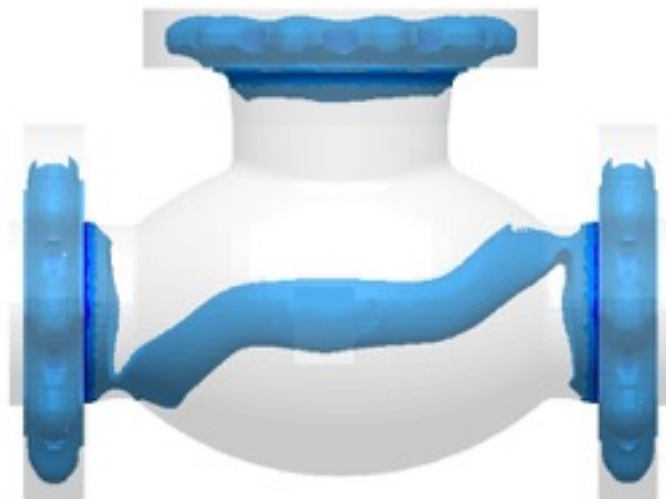


Fraction Liquid
%

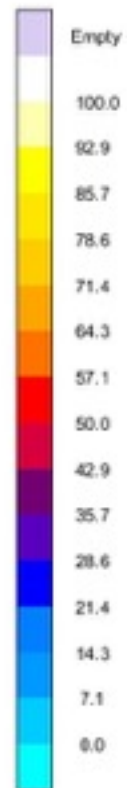


v06
Fraction Liquid
20min 48.0s 16.32 %

MAGMA



Fraction Liquid
%

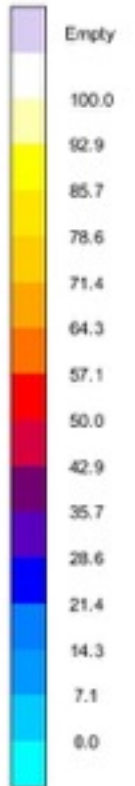


v06
Fraction Liquid
20min 57.0s 16.13 %

MAGMA

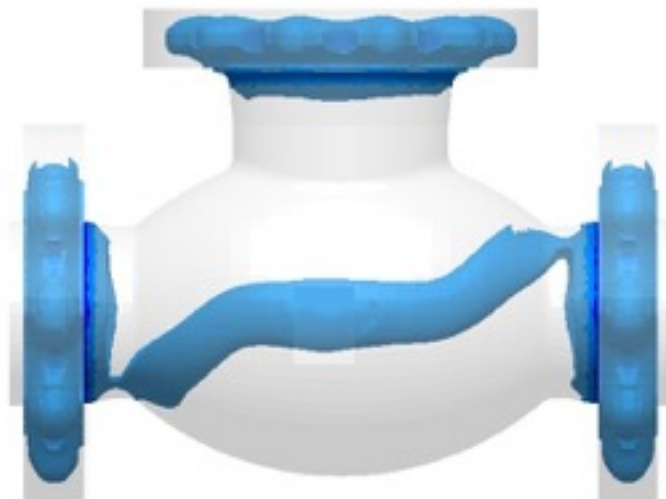


Fraction Liquid %

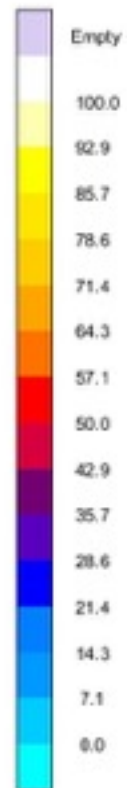


v06
Fraction Liquid
21min 9.0s 15.86 %





Fraction Liquid
%

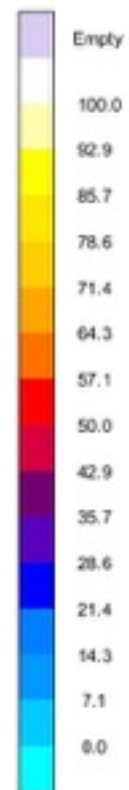


v06
Fraction Liquid
21min 13.0s 15.77 %

MAGMA



Fraction Liquid %

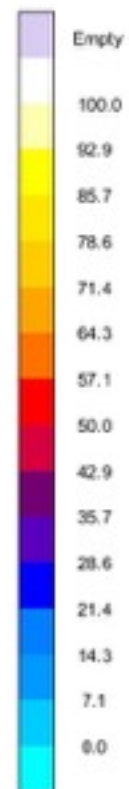


v06
Fraction Liquid
21min 25.0s 15.50 %

MAGMA

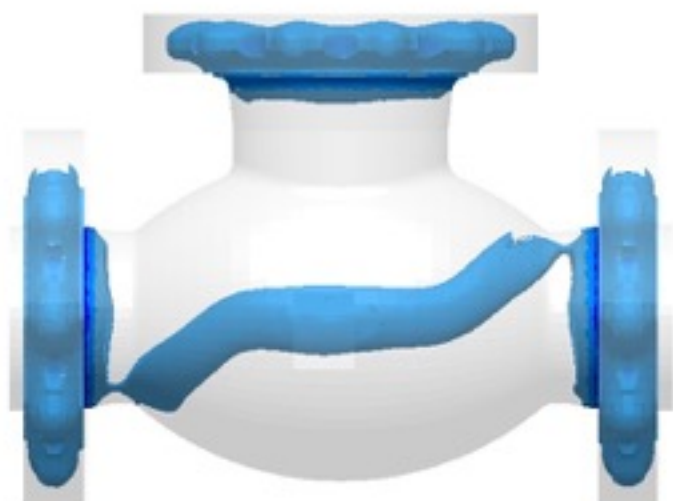


Fraction Liquid %

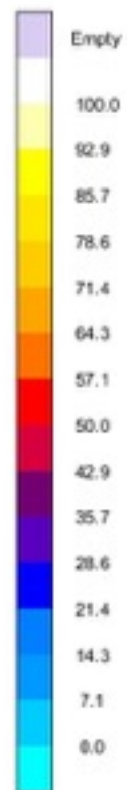


v06
Fraction Liquid
21min 34.0s 15.32 %

MAGMA

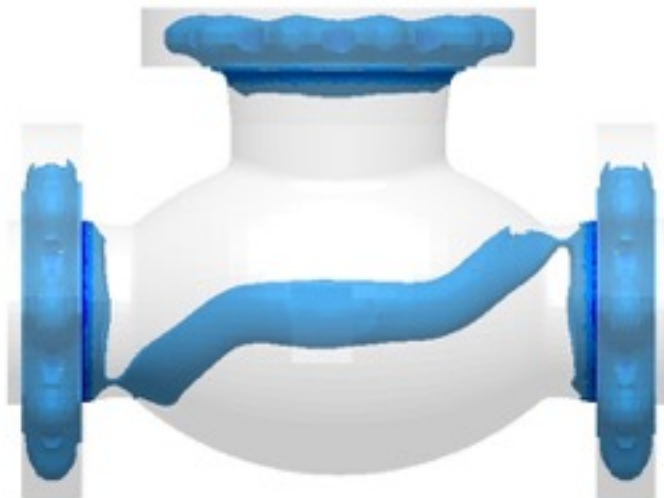


Fraction Liquid %

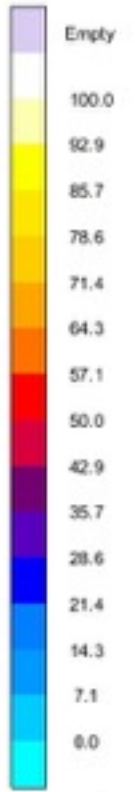


v06
Fraction Liquid
21min 42.0s 15.16 %

MAGMA



Fraction Liquid %

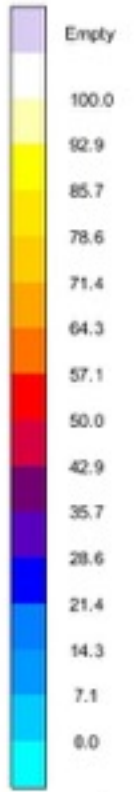


v06
Fraction Liquid
21min 50.0s 14.98 %





Fraction Liquid %

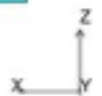
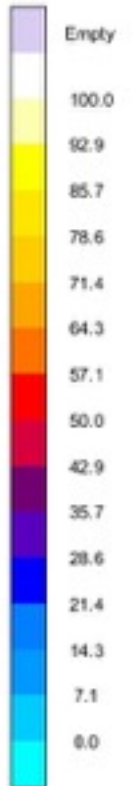


v06
Fraction Liquid
22min 2.0s 14.74 %





Fraction Liquid
%

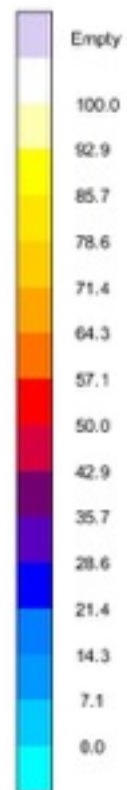


v06
Fraction Liquid
22min 14.0s 14.49 %





Fraction Liquid %

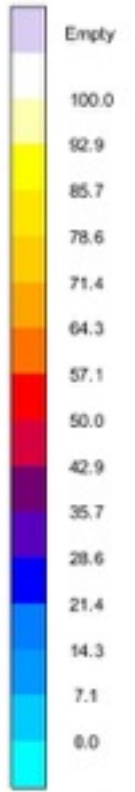


v06
Fraction Liquid
22min 23.0s 14.33 %

MAGMA

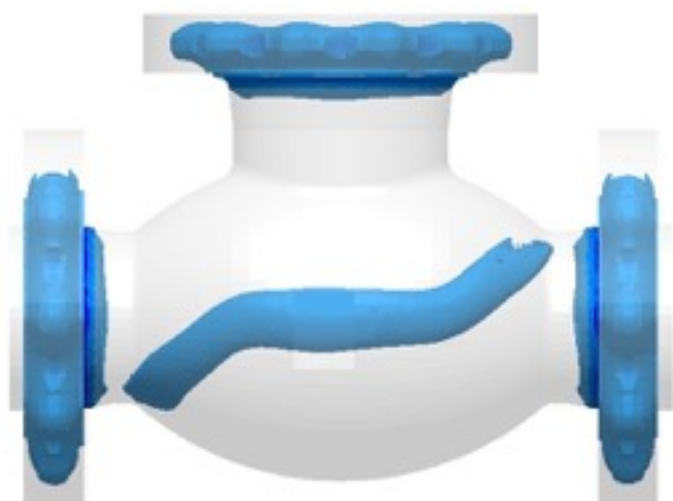


Fraction Liquid %

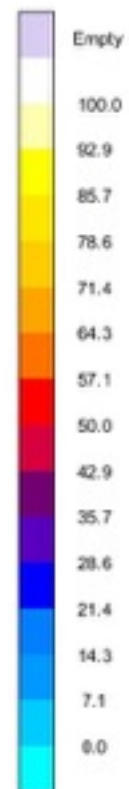


v06
Fraction Liquid
22min 31.0s 14.17 %





Fraction Liquid
%

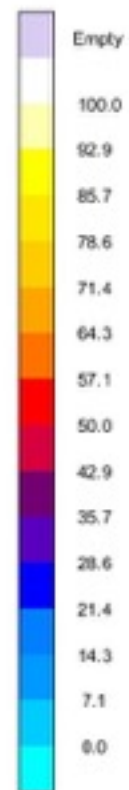


v06
Fraction Liquid
22min 47.0s 13.86 %

MAGMA



Fraction Liquid %

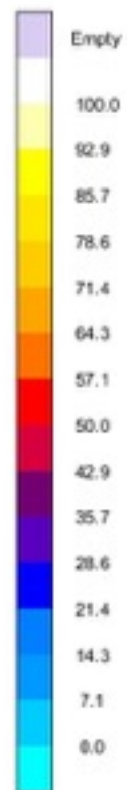


v06
Fraction Liquid
22min 51.0s 13.78 %

MAGMA



Fraction Liquid %

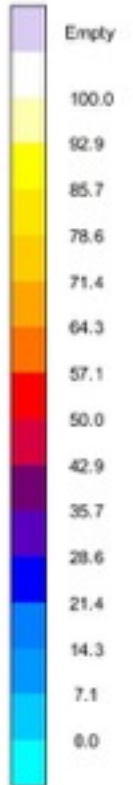


v06
Fraction Liquid
23min 4.0s 13.55 %





Fraction Liquid
%

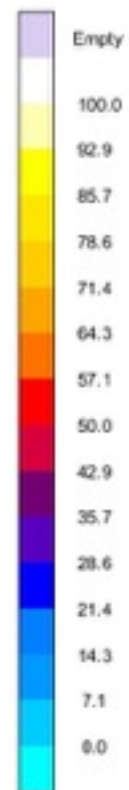


v06
Fraction Liquid
23min 12.0s 13.40 %

MAGMA



Fraction Liquid %

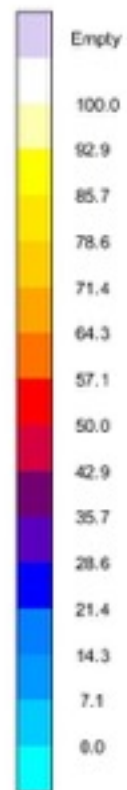


v06
Fraction Liquid
23min 24.0s 13.18 %

MAGMA



Fraction Liquid
%

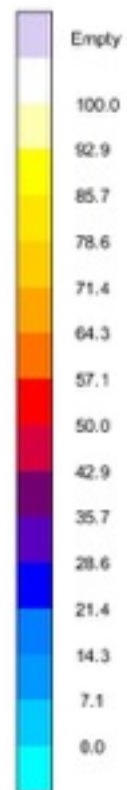


v06
Fraction Liquid
23min 37.0s 12.95 %

MAGMA



Fraction Liquid
%

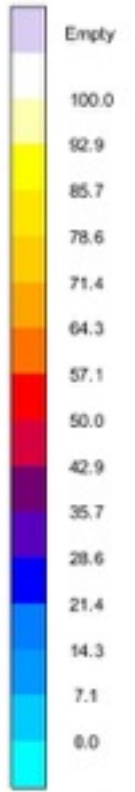


v06
Fraction Liquid
23min 49.0s 12.74 %

MAGMA



Fraction Liquid %

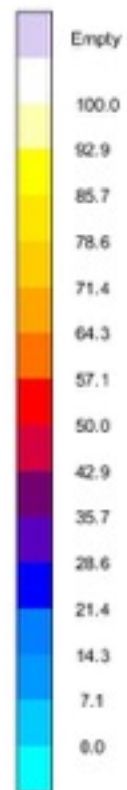


v06
Fraction Liquid
23min 57.0s 12.59 %





Fraction Liquid
%

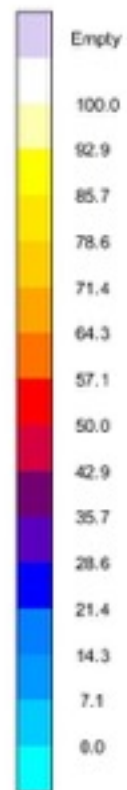


v06
Fraction Liquid
24min 10.0s 12.38 %

MAGMA



Fraction Liquid
%

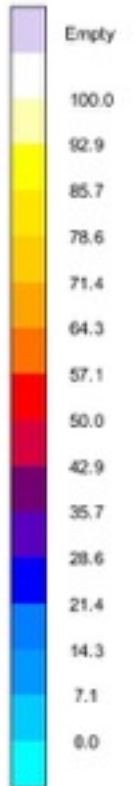


v06
Fraction Liquid
24min 22.0s 12.17 %

MAGMA



Fraction Liquid %

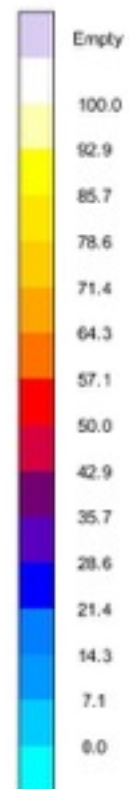


v06
Fraction Liquid
24min 35.0s 11.95 %





Fraction Liquid
%

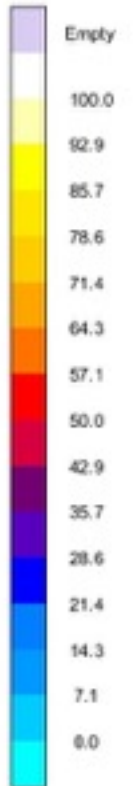


v06
Fraction Liquid
24min 48.0s 11.74 %

MAGMA



Fraction Liquid
%

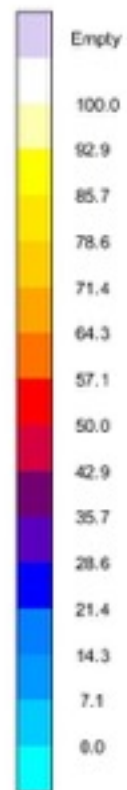


v06
Fraction Liquid
25min 0.0s 11.54 %

MAGMA



Fraction Liquid
%

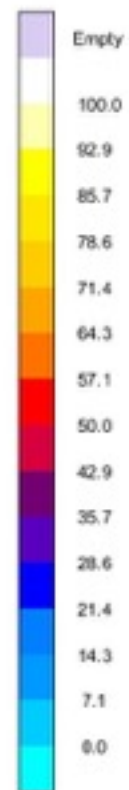


v06
Fraction Liquid
25min 13.0s 11.34 %





Fraction Liquid
%

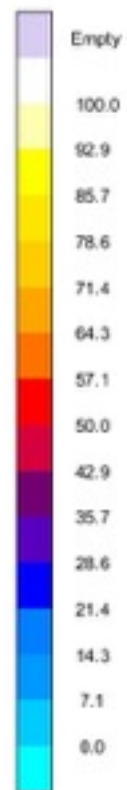


v06
Fraction Liquid
25min 25.0s 11.14 %

MAGMA



Fraction Liquid
%

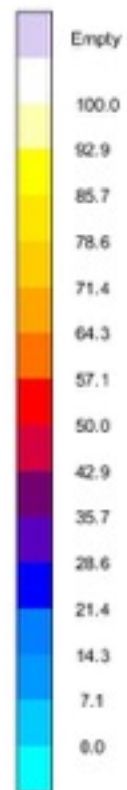


v06
Fraction Liquid
25min 38.0s 10.95 %

MAGMA



Fraction Liquid
%

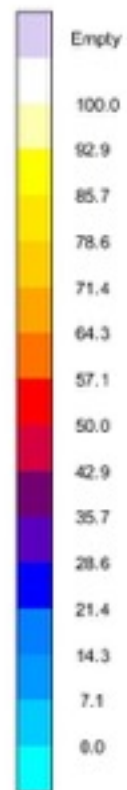


v06
Fraction Liquid
25min 50.0s 10.76 %

MAGMA



Fraction Liquid
%

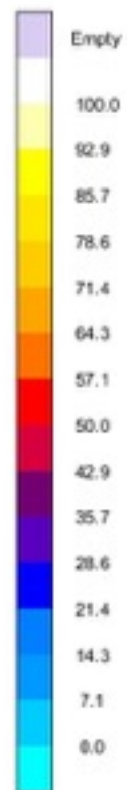


v06
Fraction Liquid
26min 2.0s 10.57 %

MAGMA



Fraction Liquid
%

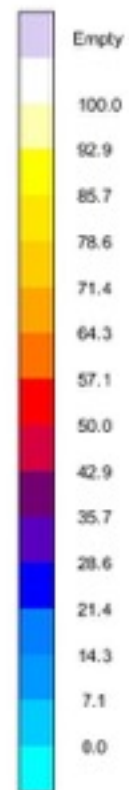


v06
Fraction Liquid
26min 19.0s 10.33 %

MAGMA



Fraction Liquid %

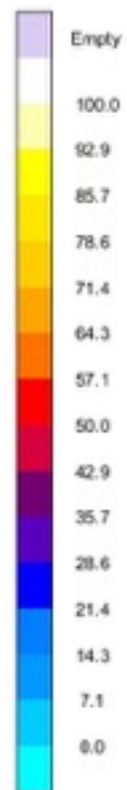


v06
Fraction Liquid
26min 35.0s 10.09 %

MAGMA



Fraction Liquid %

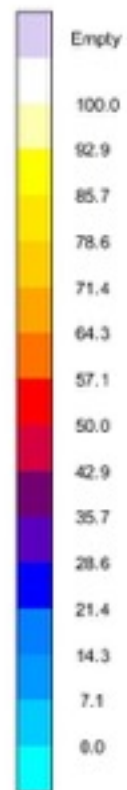


v06
Fraction Liquid
26min 44.0s 9.96 %

MAGMA



Fraction Liquid %

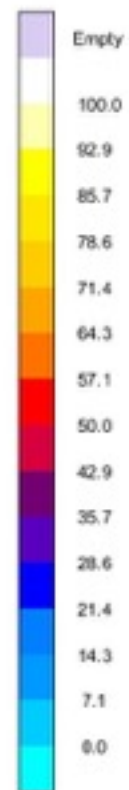


v06
Fraction Liquid
26min 56.0s 9.79 %

MAGMA



Fraction Liquid %

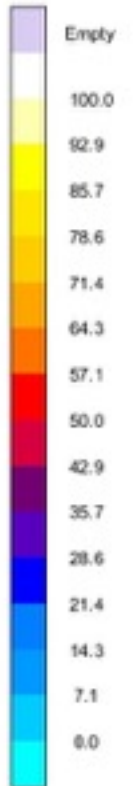


v06
Fraction Liquid
27min 12.0s 9.56 %

MAGMA



Fraction Liquid %

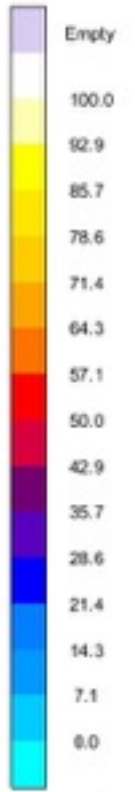


v06
Fraction Liquid
27min 25.0s 9.39 %

MAGMA



Fraction Liquid %

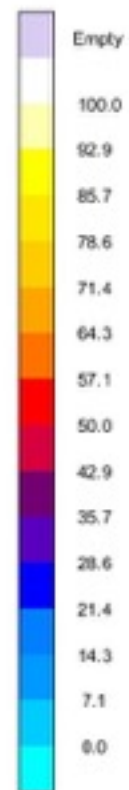


v06
Fraction Liquid
27min 41.0s 9.16 %





Fraction Liquid %

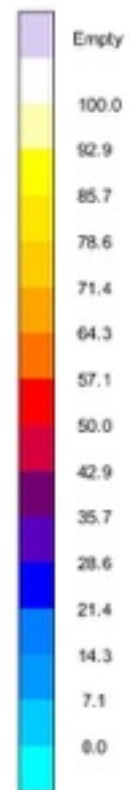


v06
Fraction Liquid
27min 54.0s 8.99 %





Fraction Liquid
%

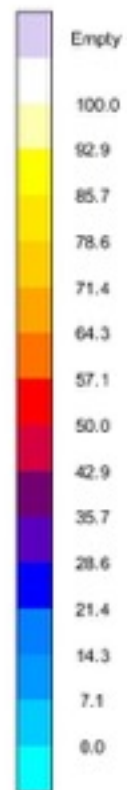


v06
Fraction Liquid
28min 10.0s 8.78 %

MAGMA



Fraction Liquid %

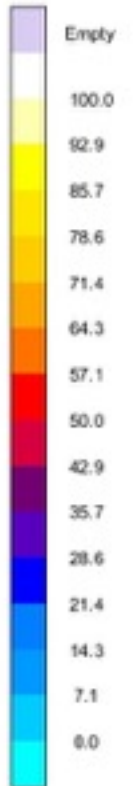


v06
Fraction Liquid
28min 26.0s 8.57 %

MAGMA



Fraction Liquid %

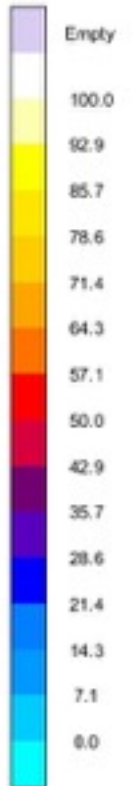


v06
Fraction Liquid
28min 43.0s 8.36 %

MAGMA



Fraction Liquid %

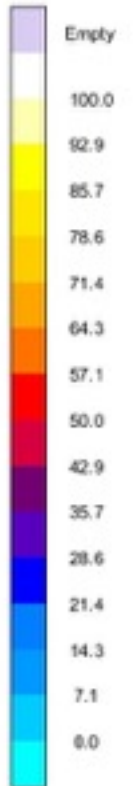


v06
Fraction Liquid
28min 59.0s 8.15 %





Fraction Liquid
%

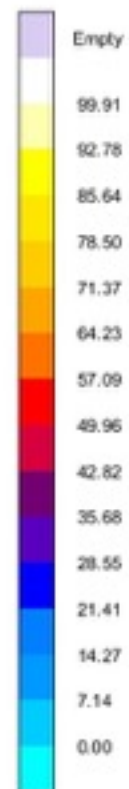


v06
Fraction Liquid
29min 11.0s 8.00 %

MAGMA



Fraction Liquid %

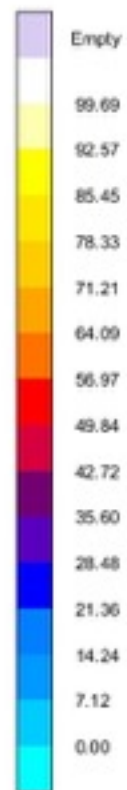


v06
Fraction Liquid
29min 28.0s 7.60 %

MAGMA



Fraction Liquid
%

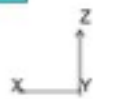
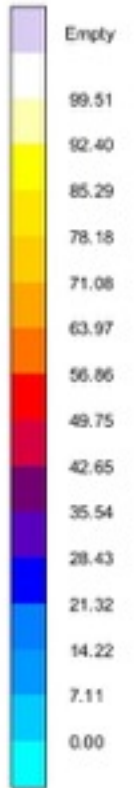


v06
Fraction Liquid
29min 48.0s 7.55 %

MAGMA



Fraction Liquid %

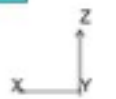
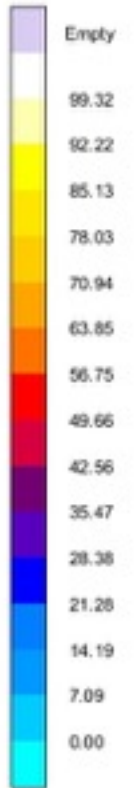


v06
Fraction Liquid
30min 5.0s 7.36 %



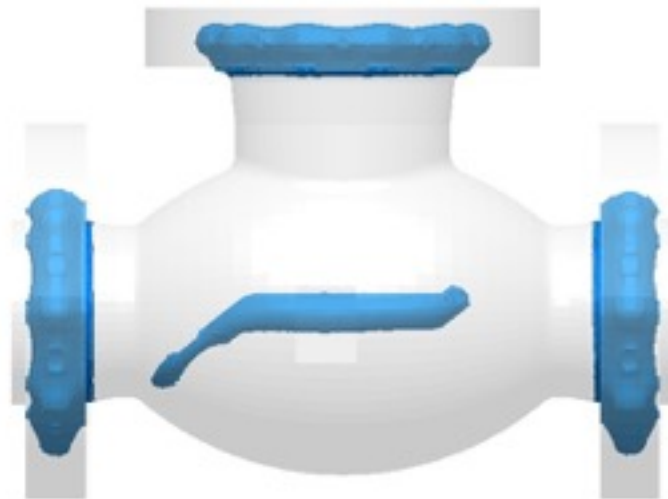


Fraction Liquid %

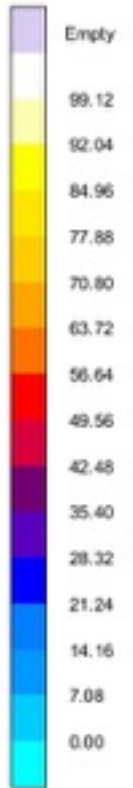


v06
Fraction Liquid
30min 21.0s 7.18 %





Fraction Liquid
%

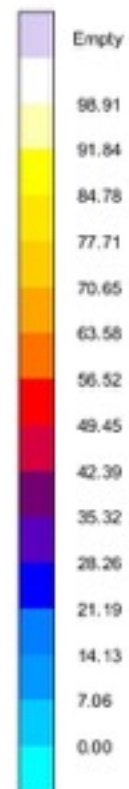


v06
Fraction Liquid
30min 37.0s 6.98 %

MAGMA



Fraction Liquid %

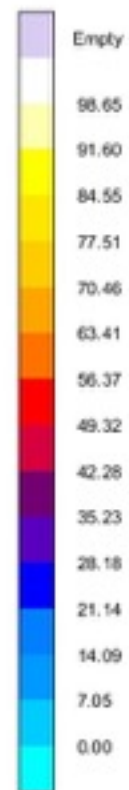


v06
Fraction Liquid
30min 54.0s 6.80 %

MAGMA

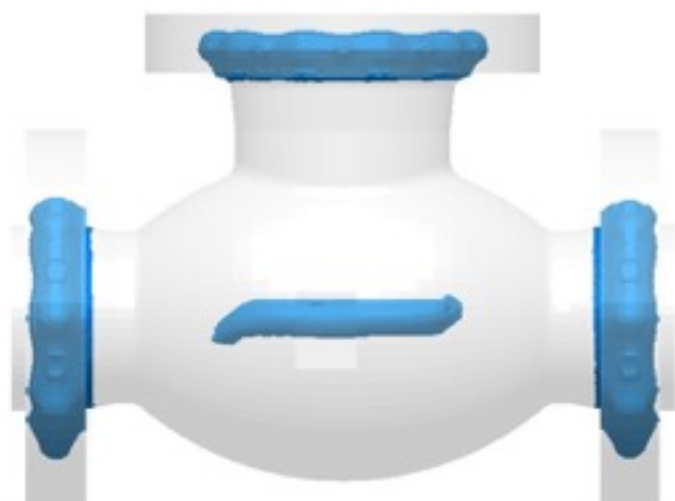


Fraction Liquid %

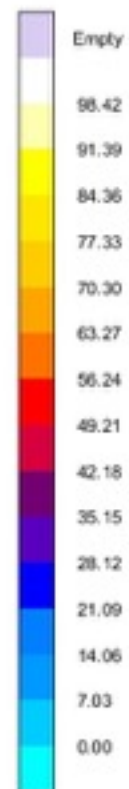


v06
Fraction Liquid
31min 15.0s 6.57 %

MAGMA

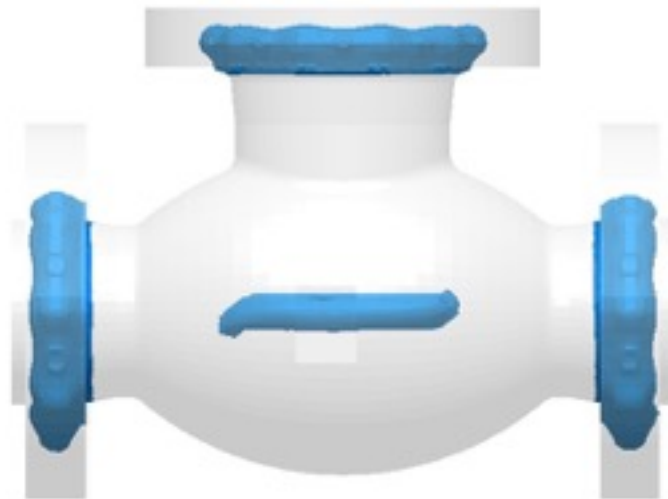


Fraction Liquid %

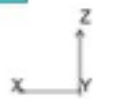
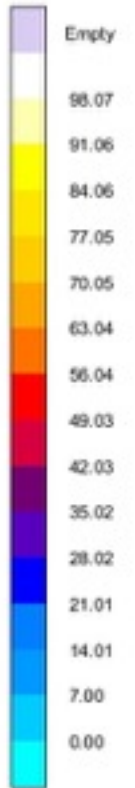


v06
Fraction Liquid
31min 32.0s 6.39 %

MAGMA

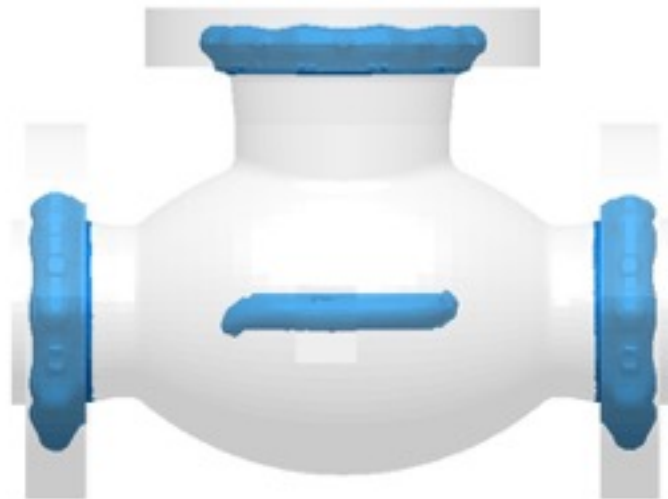


Fraction Liquid %

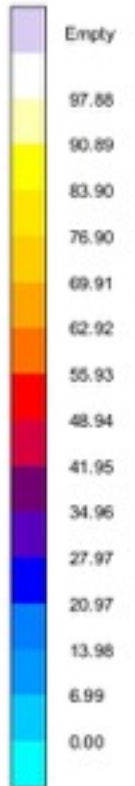


v06
Fraction Liquid
31min 56.0s 6.13 %





Fraction Liquid %

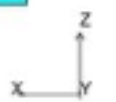
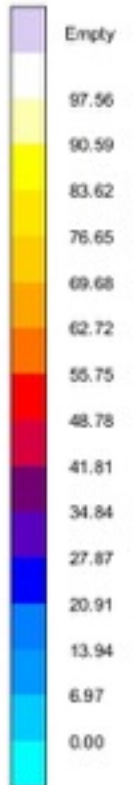


v06
Fraction Liquid
32min 9.0s 6.00 %





Fraction Liquid %

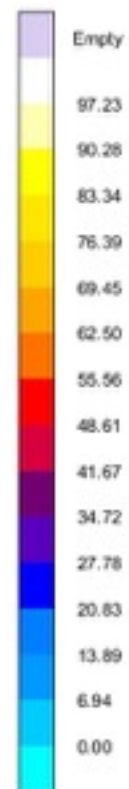


v06
Fraction Liquid
32min 30.0s 5.78 %



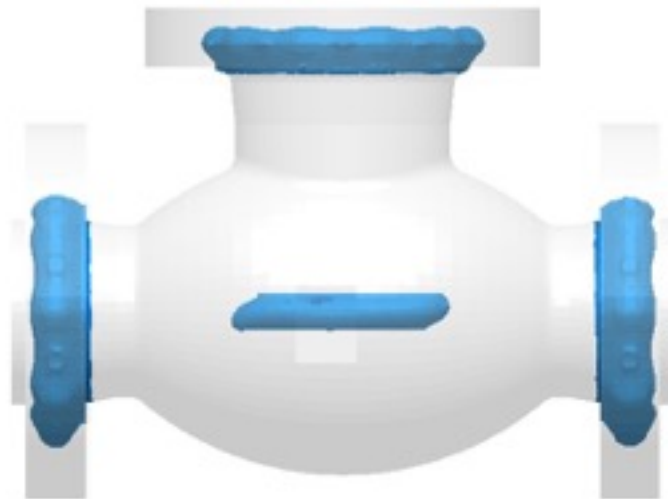


Fraction Liquid %

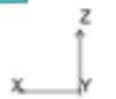
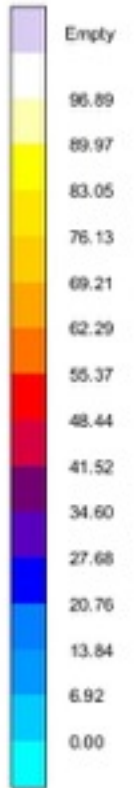


v06
Fraction Liquid
32min 51.0s 5.58 %



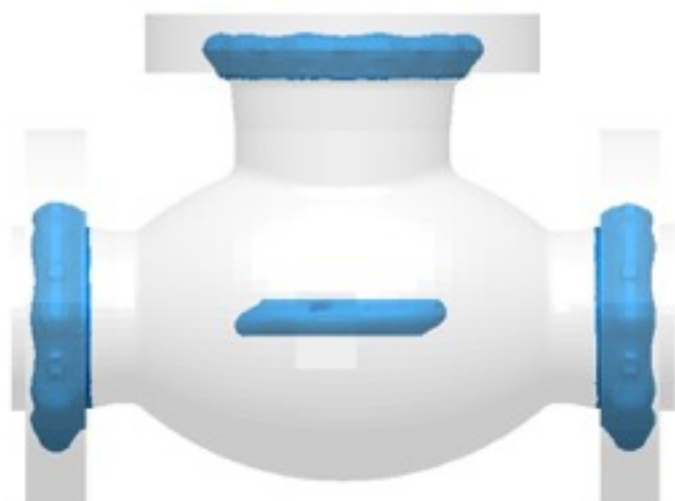


Fraction Liquid %

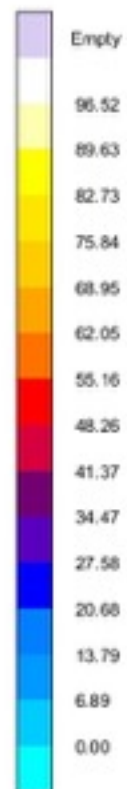


v06
Fraction Liquid
33min 12.0s 5.37 %





Fraction Liquid %

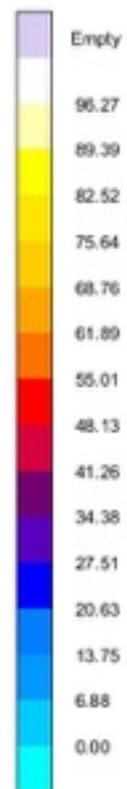


v06
Fraction Liquid
33min 36.0s 5.14 %

MAGMA

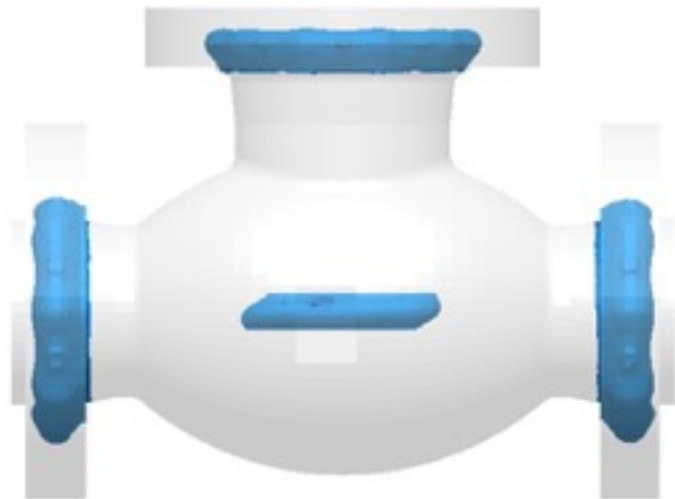


Fraction Liquid %

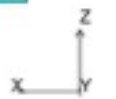
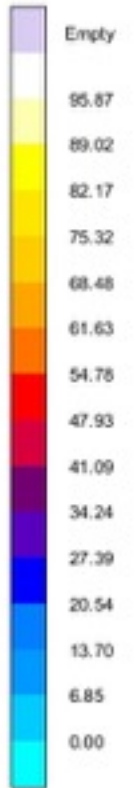


v06
Fraction Liquid
33min 52.0s 4.99 %

MAGMA



Fraction Liquid %

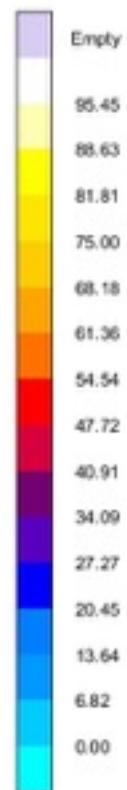


v06
Fraction Liquid
34min 17.0s 4.77 %





Fraction Liquid %

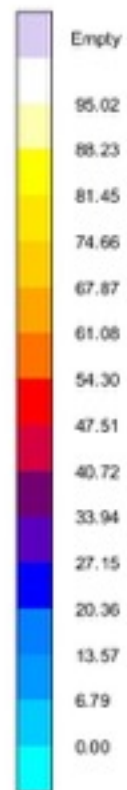


v06
Fraction Liquid
34min 41.0s 4.55 %

MAGMA



Fraction Liquid %

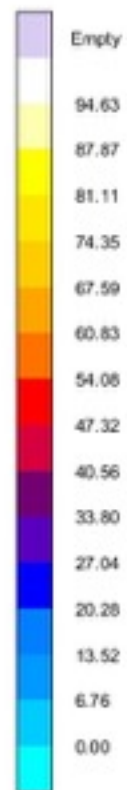


v06
Fraction Liquid
35min 5.0s 4.34 %

MAGMA



Fraction Liquid %

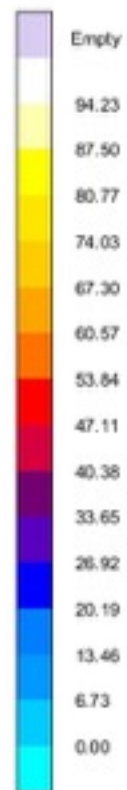


v06
Fraction Liquid
35min 26.0s 4.17 %

MAGMA



Fraction Liquid
%

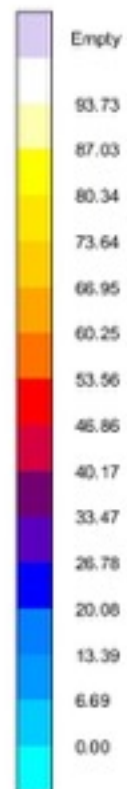


v06
Fraction Liquid
35min 46.0s 3.99 %

MAGMA



Fraction Liquid
%

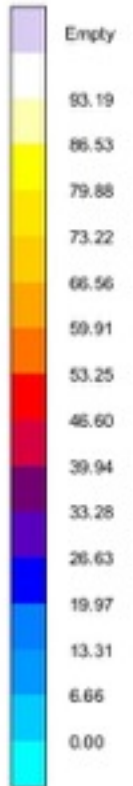


v06
Fraction Liquid
35min 11.0s 3.80 %

MAGMA



Fraction Liquid %

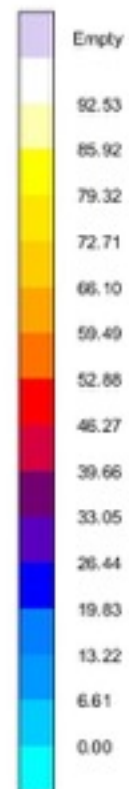


v06
Fraction Liquid
35min 36.0s 3.60 %





Fraction Liquid %

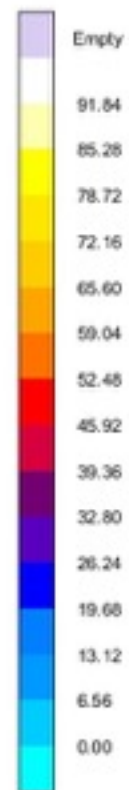


v06
Fraction Liquid
37min 4.0s 3.38 %

MAGMA



Fraction Liquid %

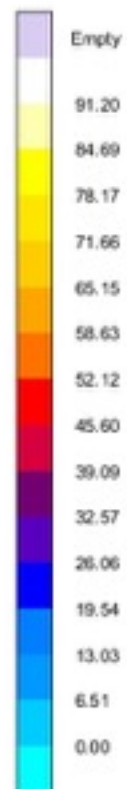


v06
Fraction Liquid
37min 33.0s 3.16 %





Fraction Liquid %

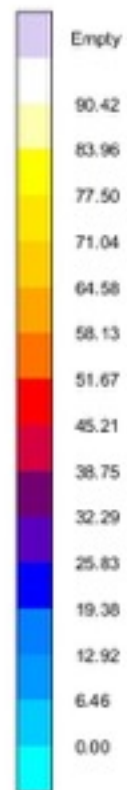


v06
Fraction Liquid
37min 57.0s 2.99 %

MAGMA



Fraction Liquid
%

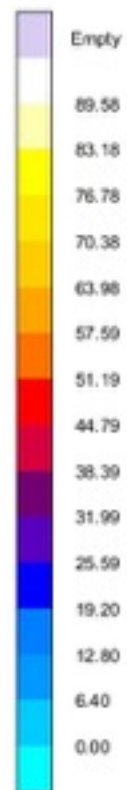


v06
Fraction Liquid
38min 26.0s 2.79 %

MAGMA



Fraction Liquid %

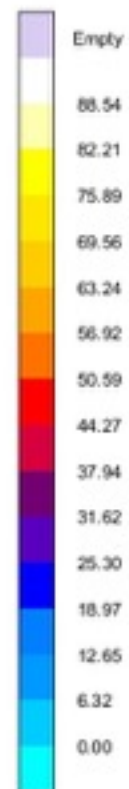


v06
Fraction Liquid
38min 55.0s 2.60 %





Fraction Liquid
%

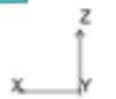
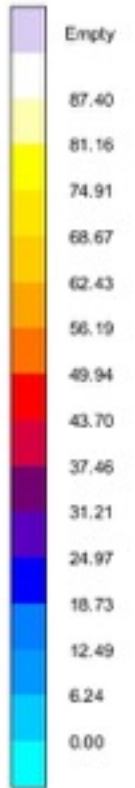


v06
Fraction Liquid
39min 27.0s 2.39 %





Fraction Liquid %

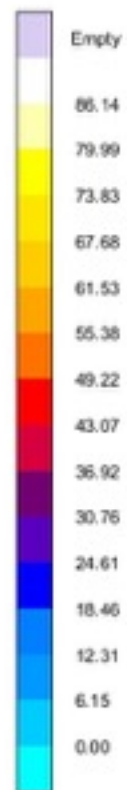


v06
Fraction Liquid
40min 0.0s 2.18 %

MAGMA



Fraction Liquid %

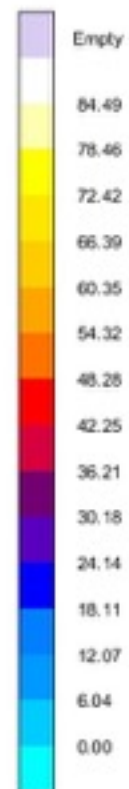


v06
Fraction Liquid
40min 33.0s 1.99 %

MAGMA



Fraction Liquid %

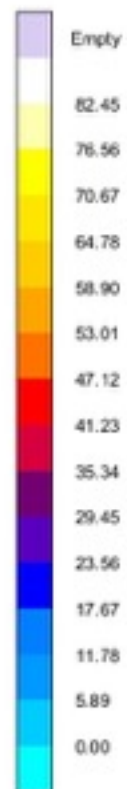


v06
Fraction Liquid
41min 10.0s 1.78 %

MAGMA



Fraction Liquid %

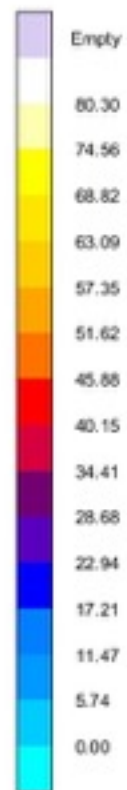


v06
Fraction Liquid
41min 51.0s 1.58 %

MAGMA



Fraction Liquid
%

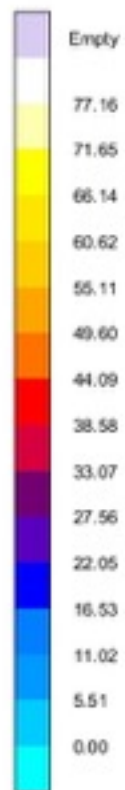


v06
Fraction Liquid
42min 28.0s 1.40 %

MAGMA



Fraction Liquid
%

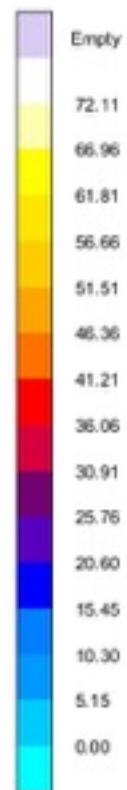


v06
Fraction Liquid
43min 12.0s 1.20 %

MAGMA



Fraction Liquid
%

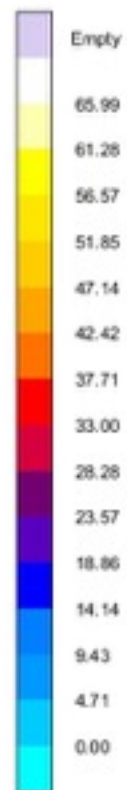


v06
Fraction Liquid
44min 9.0s 0.97 %

MAGMA



Fraction Liquid %

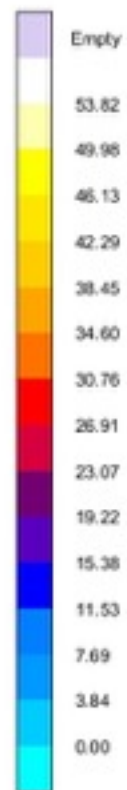


v06
Fraction Liquid
45min 2.0s 0.79 %

MAGMA



Fraction Liquid %

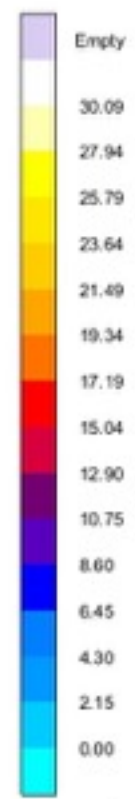


v06
Fraction Liquid
46min 10.0s 0.59 %

MAGMA



Fraction Liquid %

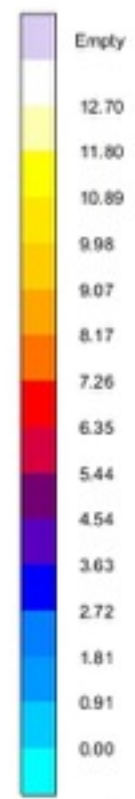


v06
Fraction Liquid
47min 31.0s 0.40 %





Fraction Liquid %

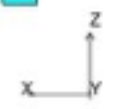
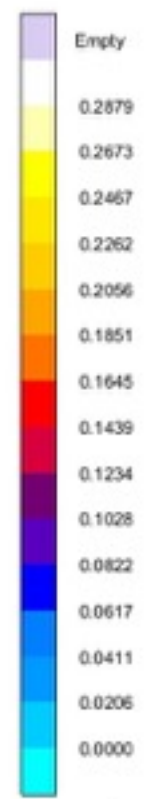


v06
Fraction Liquid
49min 24.0s 0.19 %



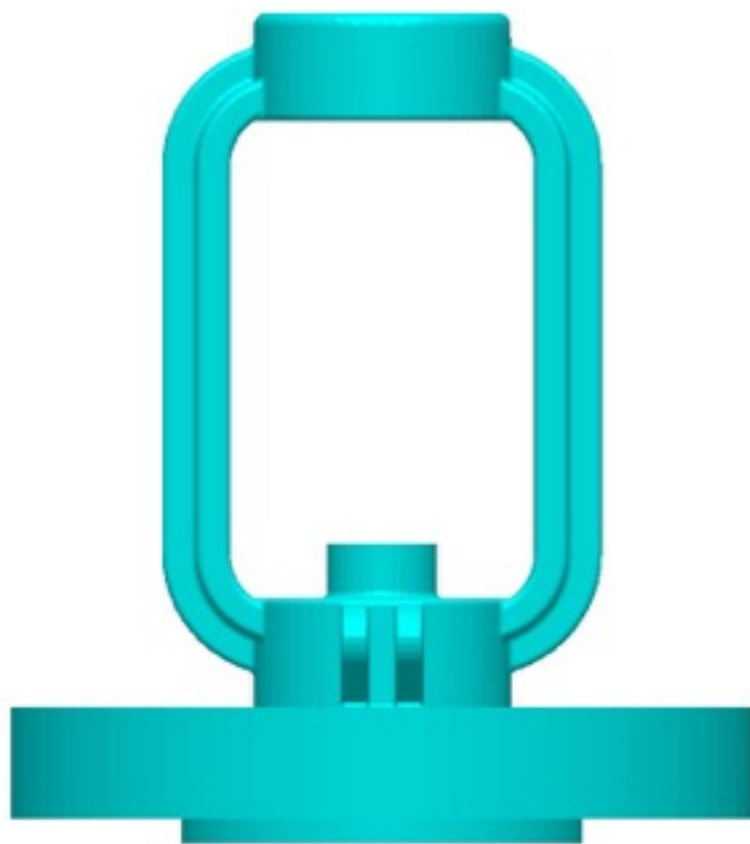


Fraction Liquid %

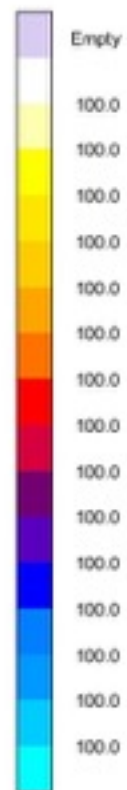


v06
Fraction Liquid
54min 59.0s 0.00 %





Fraction Liquid
%

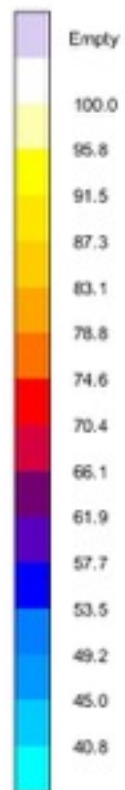


v04
Fraction Liquid
0.0ms 100.00 %



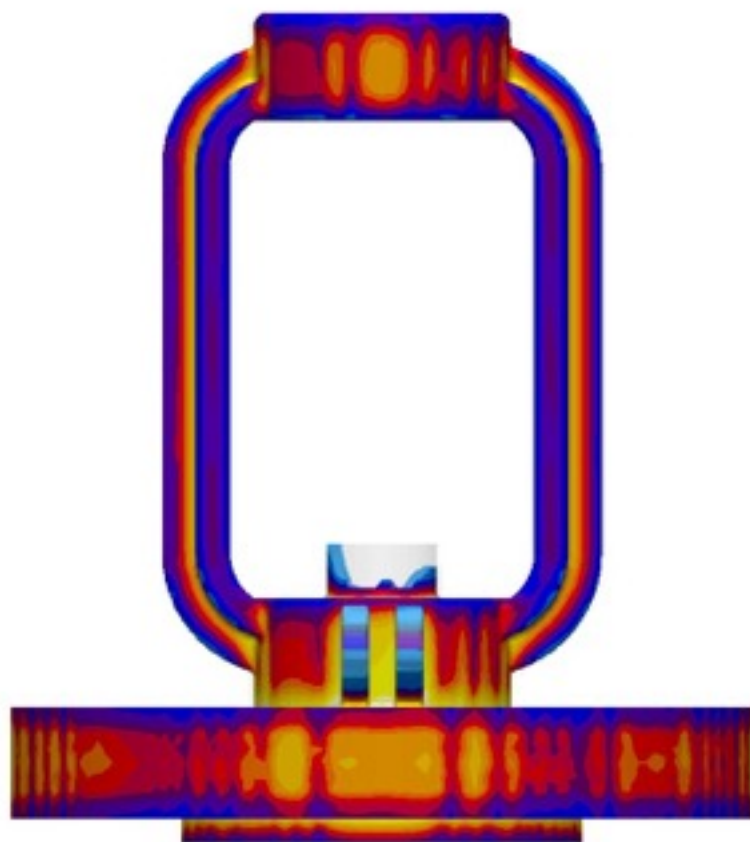


Fraction Liquid
%

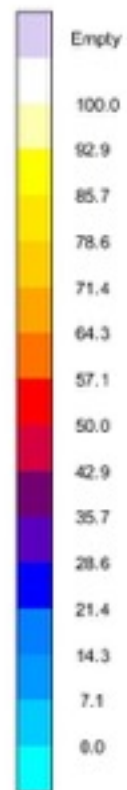


v04
Fraction Liquid
247.3ms 97.82 %

MAGMA



Fraction Liquid %



v04
Fraction Liquid
775.0ms 85.94 %

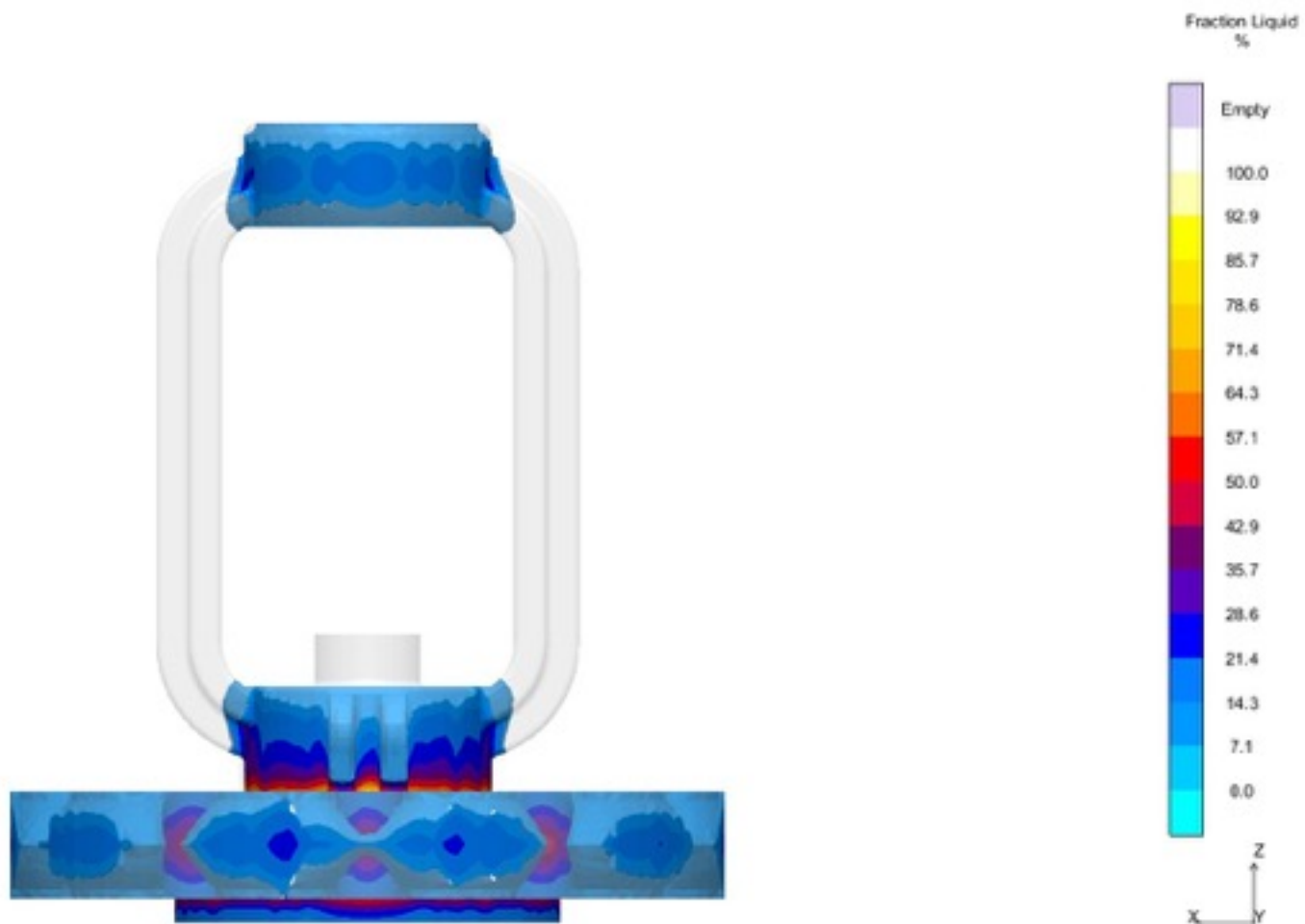
MAGMA



v04
 Fraction Liquid
 2.336s 57.76 %



v04
 Fraction Liquid
 2.467s 55.89 %

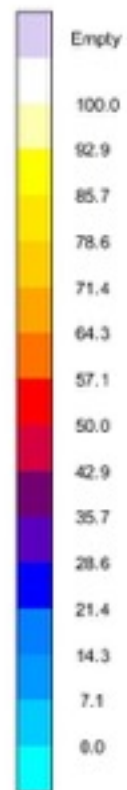


v04
Fraction Liquid
2.61fs 53.85 %

MAGMA

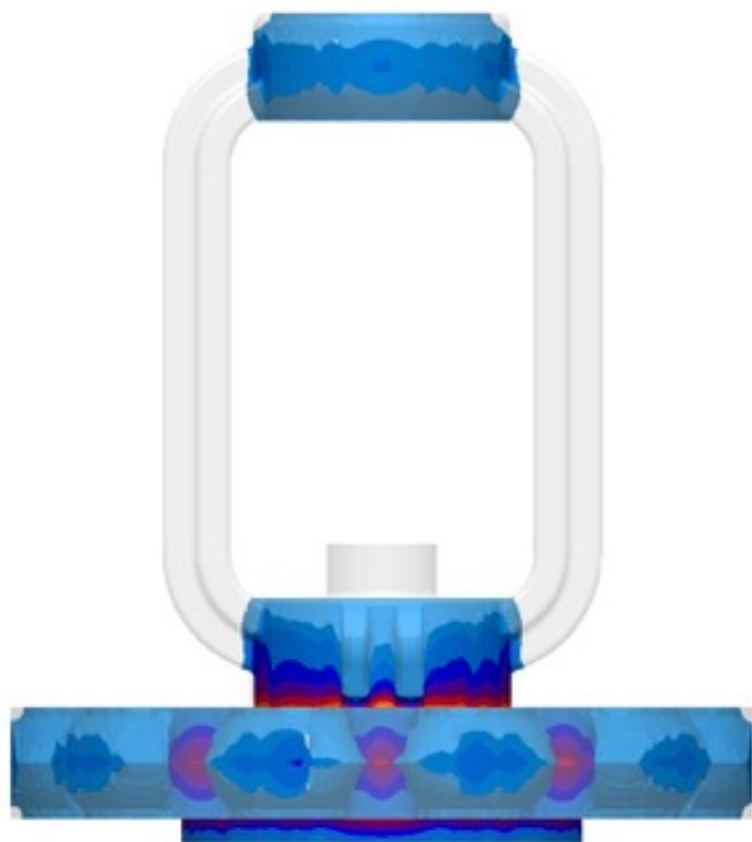


Fraction Liquid %

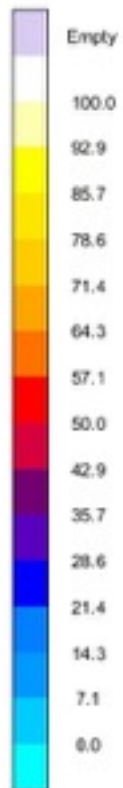


v04
Fraction Liquid
2.792s 51.62 %

MAGMA

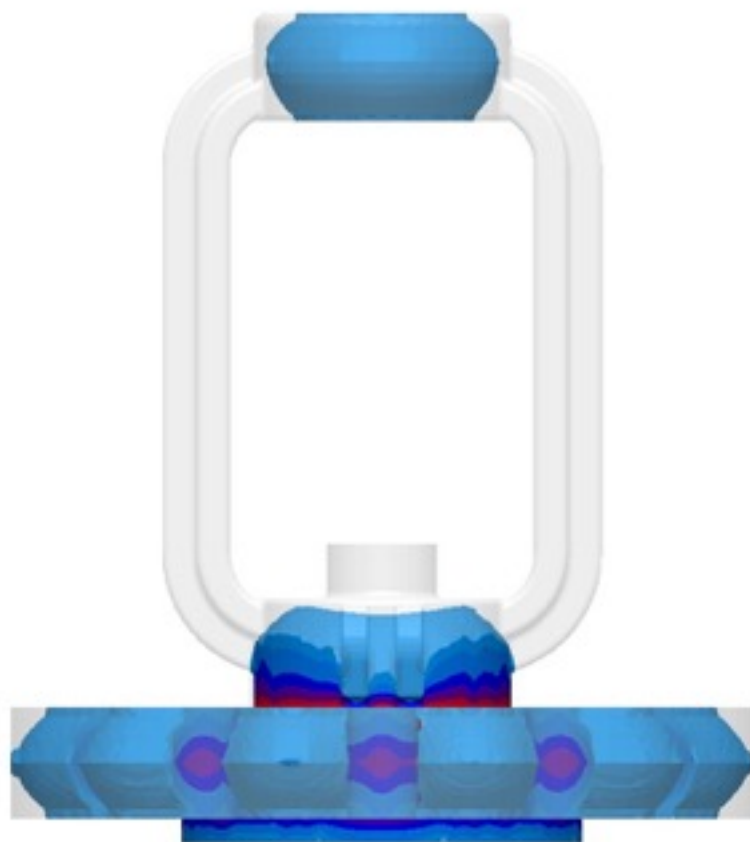


Fraction Liquid %

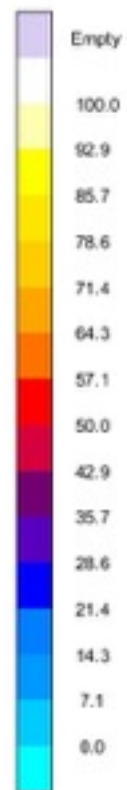


v04
Fraction Liquid
2.937s 49.89 %

MAGMA

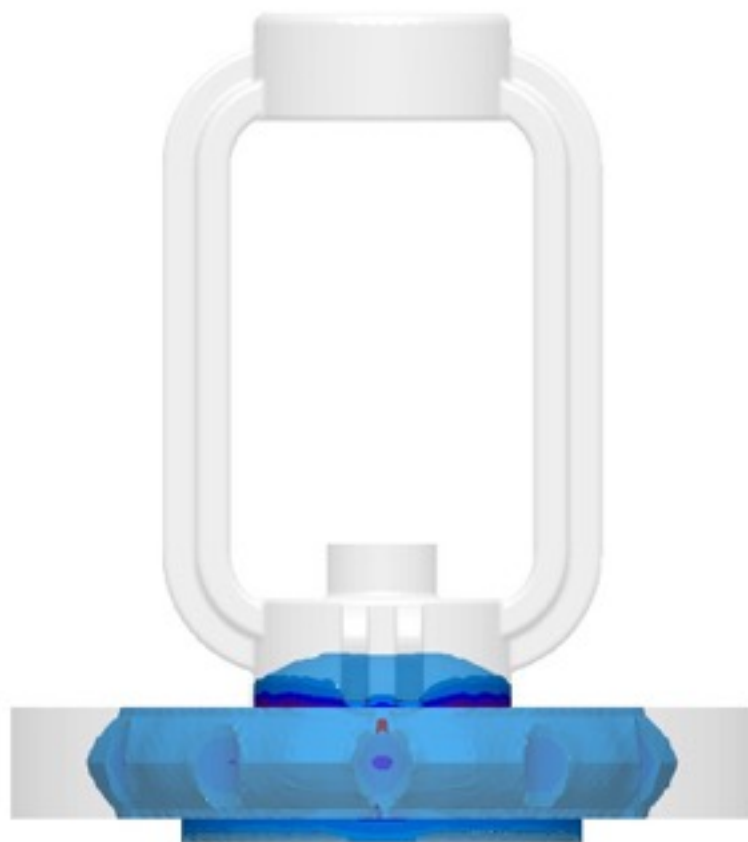


Fraction Liquid %

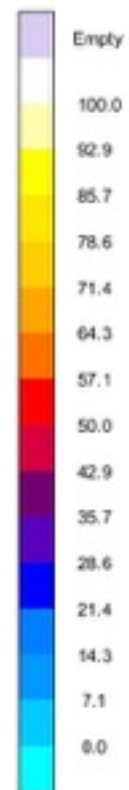


v04
Fraction Liquid
3.873s 39.85 %

MAGMA

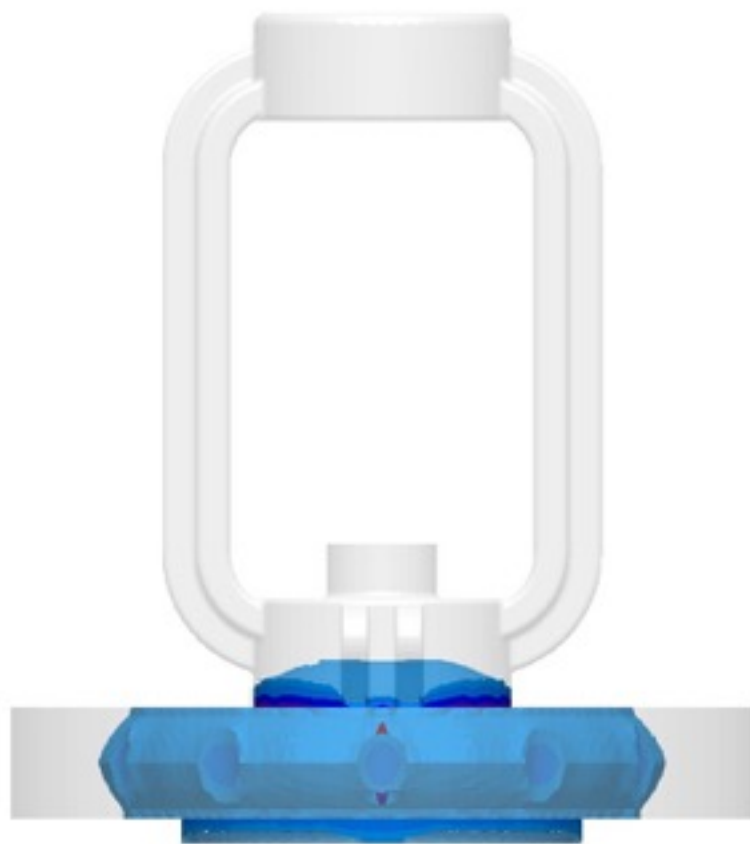


Fraction Liquid %

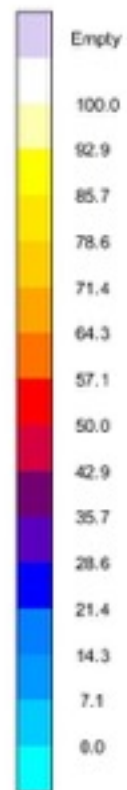


v04
Fraction Liquid
6.086s 23.84 %

MAGMA

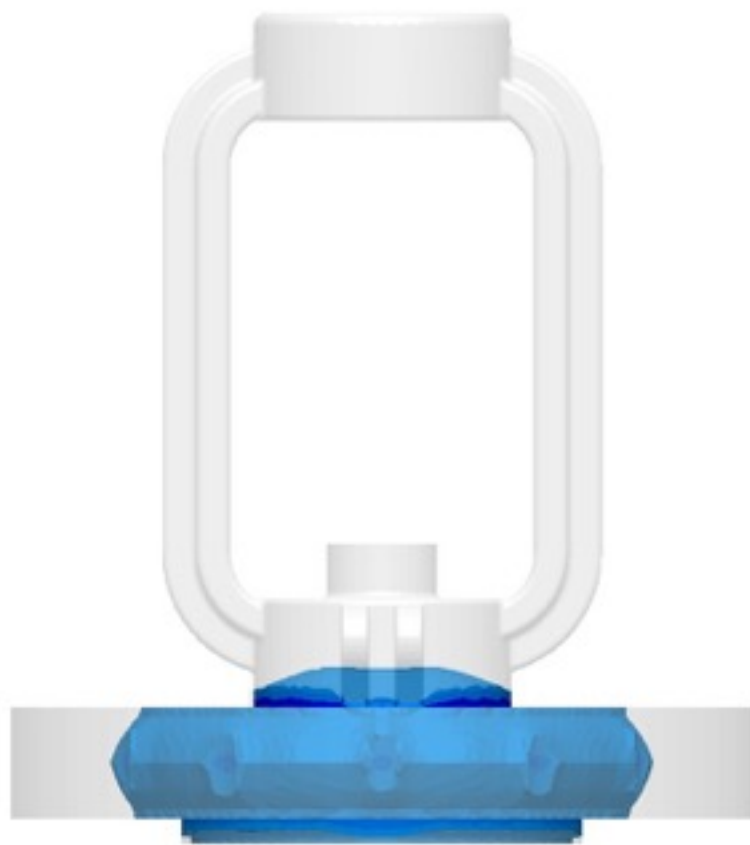


Fraction Liquid %

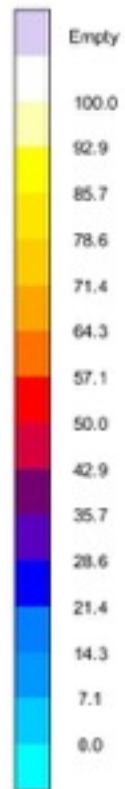


v04
Fraction Liquid
6.464s 21.93 %

MAGMA

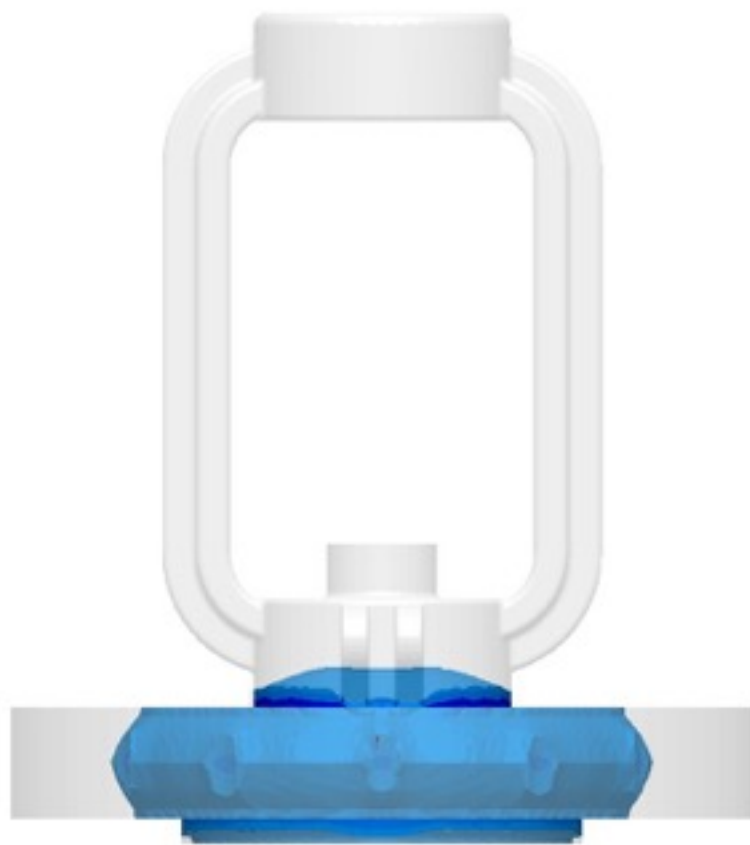


Fraction Liquid
%



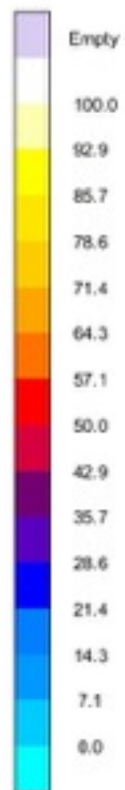
v04
Fraction Liquid
6.904s 19.81 %

MAGMA

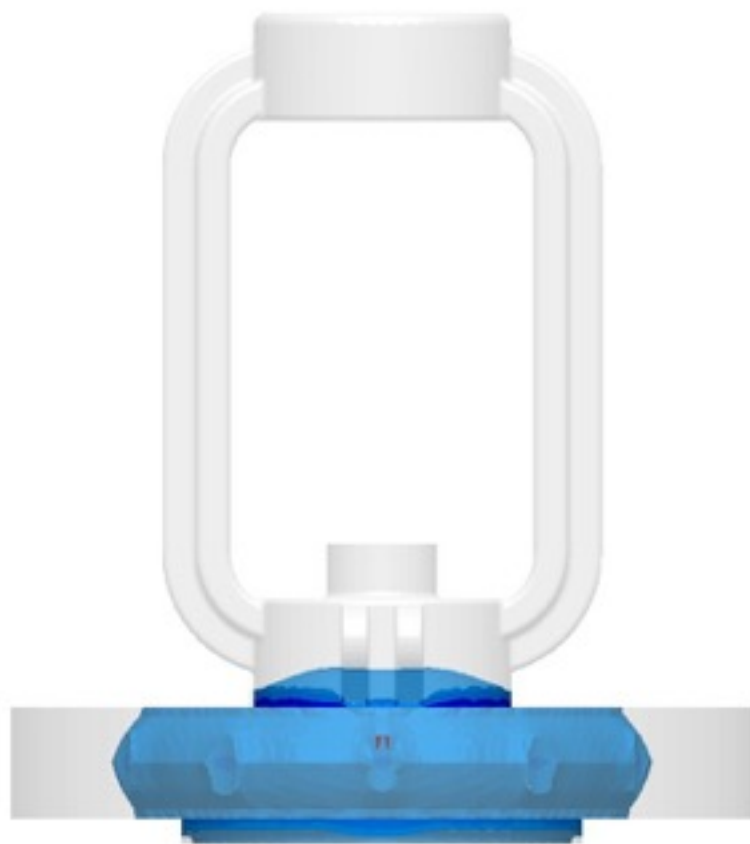


v04
Fraction Liquid
6.920s 19.73 %

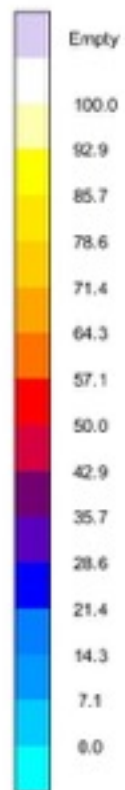
Fraction Liquid
%



MAGMA

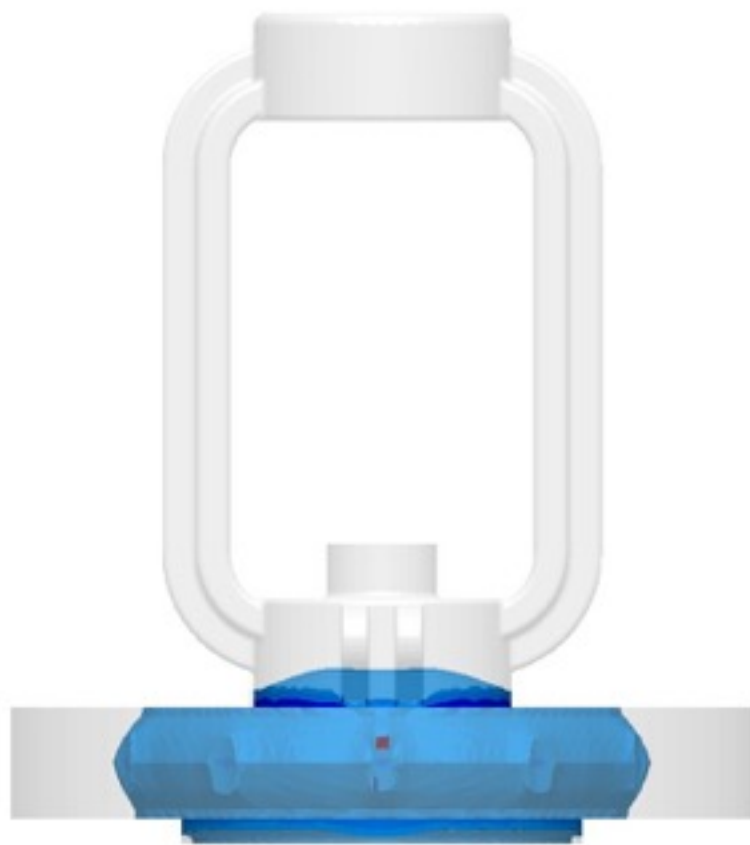


Fraction Liquid
%

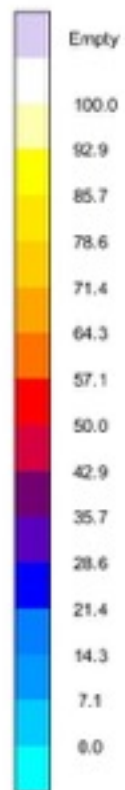


v04
Fraction Liquid
6.952s 19.59 %

MAGMA

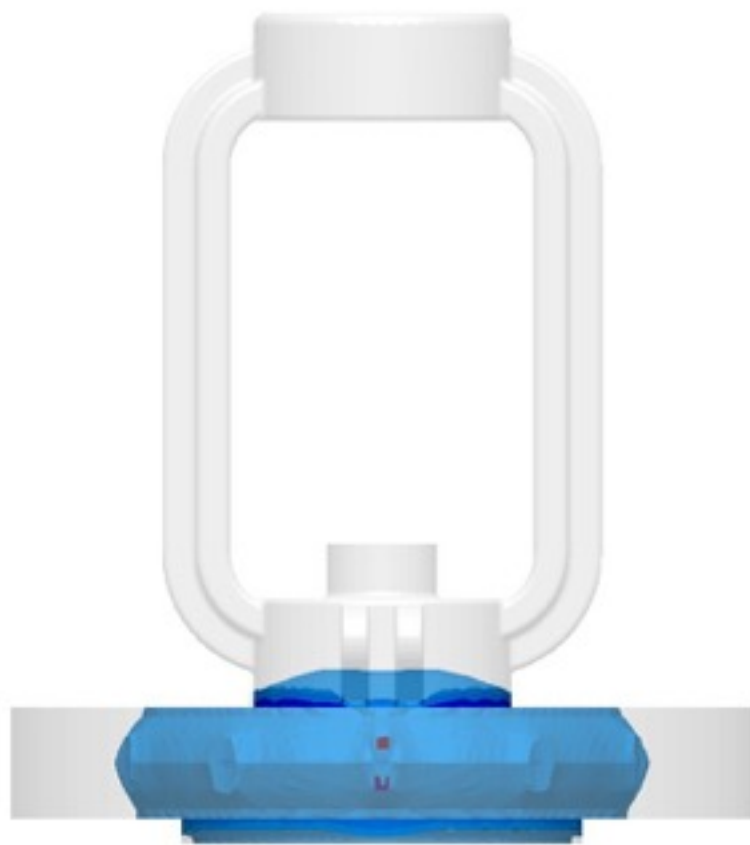


Fraction Liquid
%

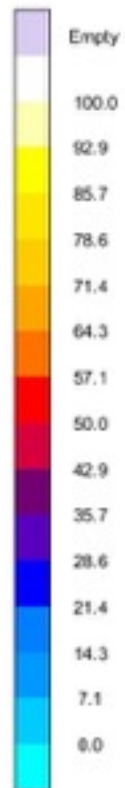


v04
Fraction Liquid
6.996s 19.37 %

MAGMA

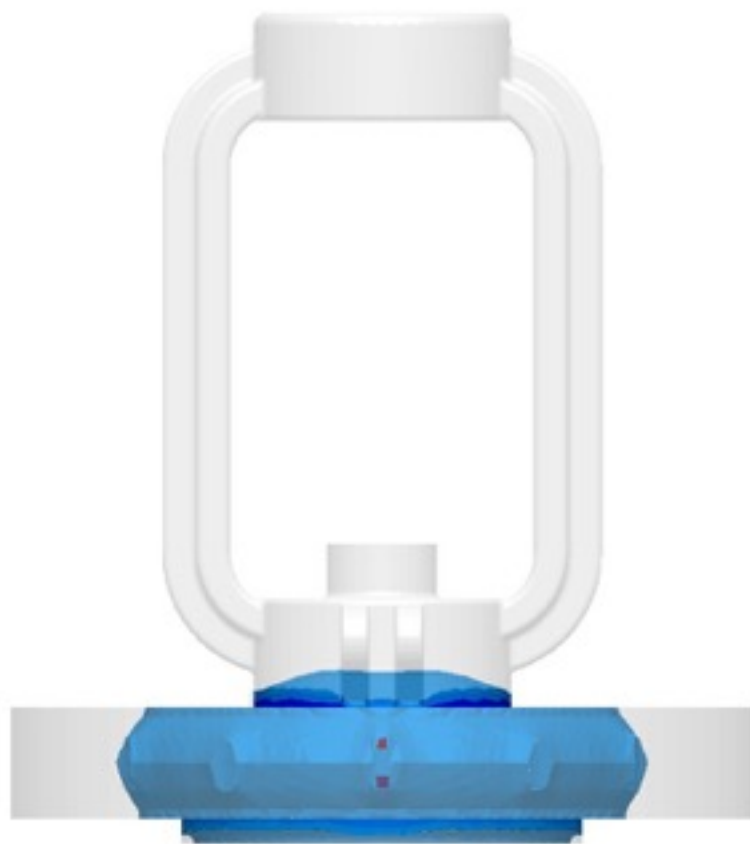


Fraction Liquid
%

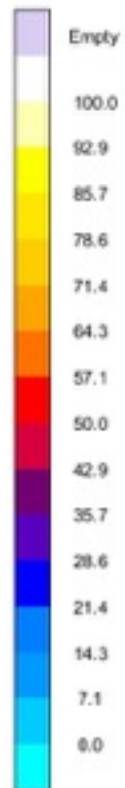


v04
Fraction Liquid
7.046e 19.16 %

MAGMA

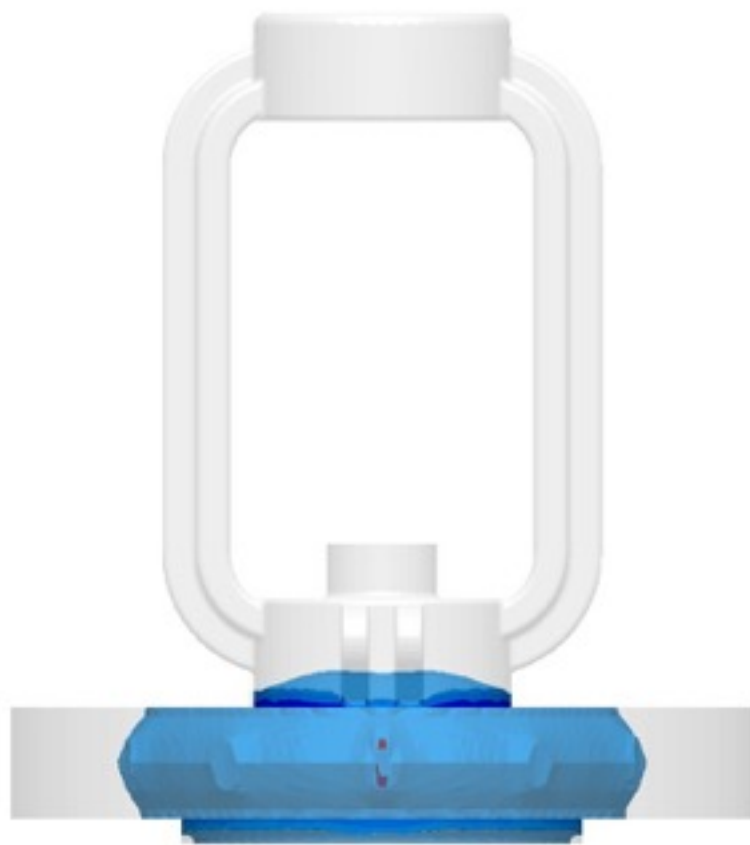


Fraction Liquid
%

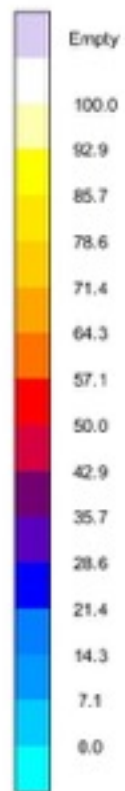


v04
Fraction Liquid
7.110s 18.87 %

MAGMA

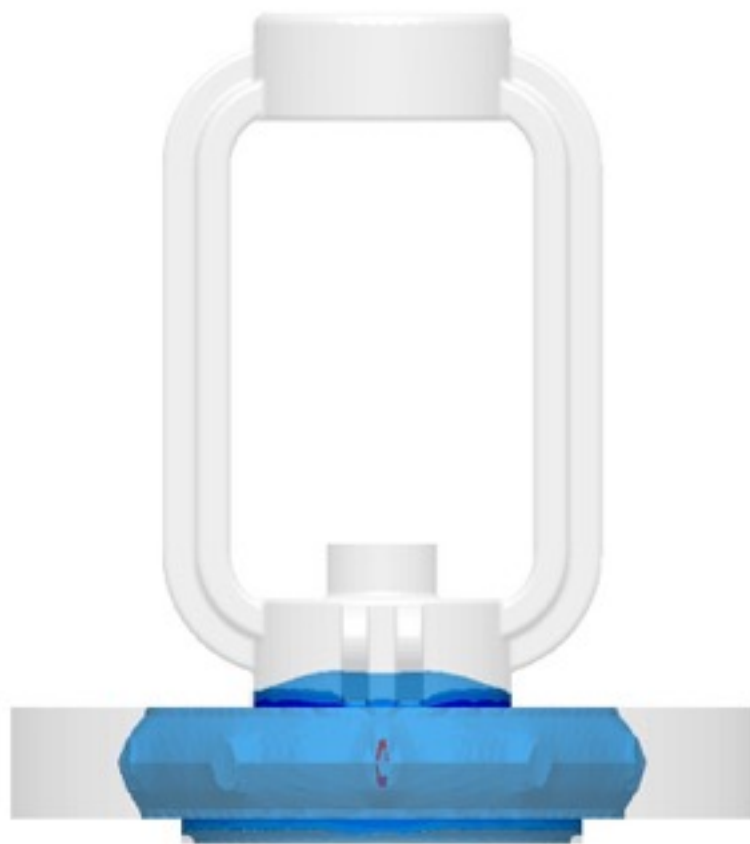


Fraction Liquid
%

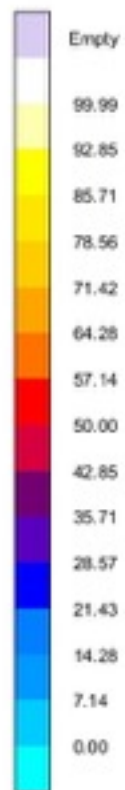


v04
Fraction Liquid
7.156e 18.66 %

MAGMA

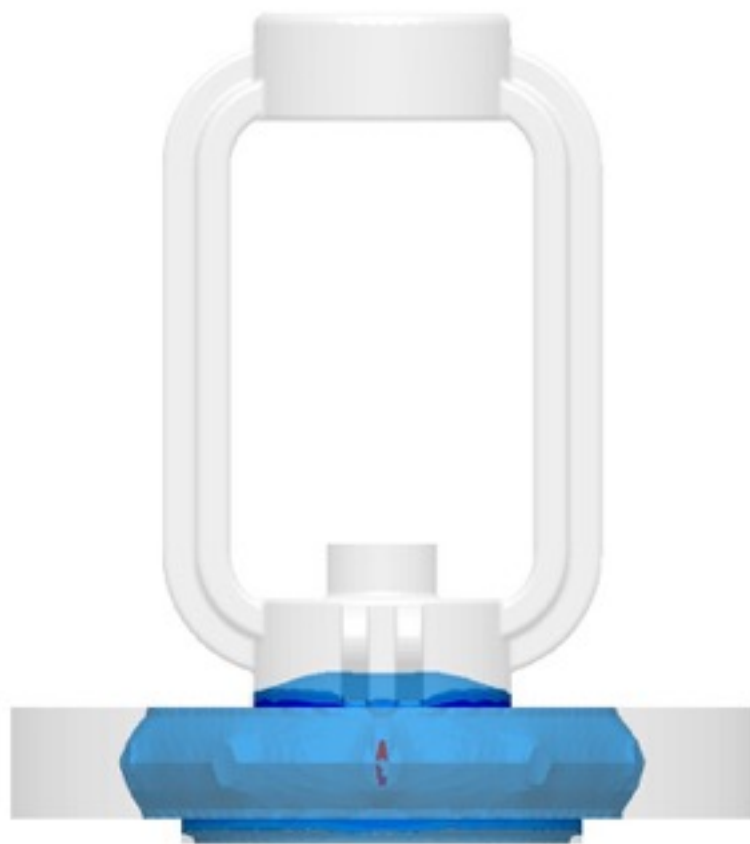


Fraction Liquid %

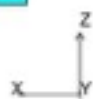
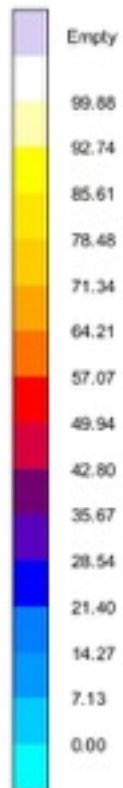


v04
Fraction Liquid
7.173e 18.59 %



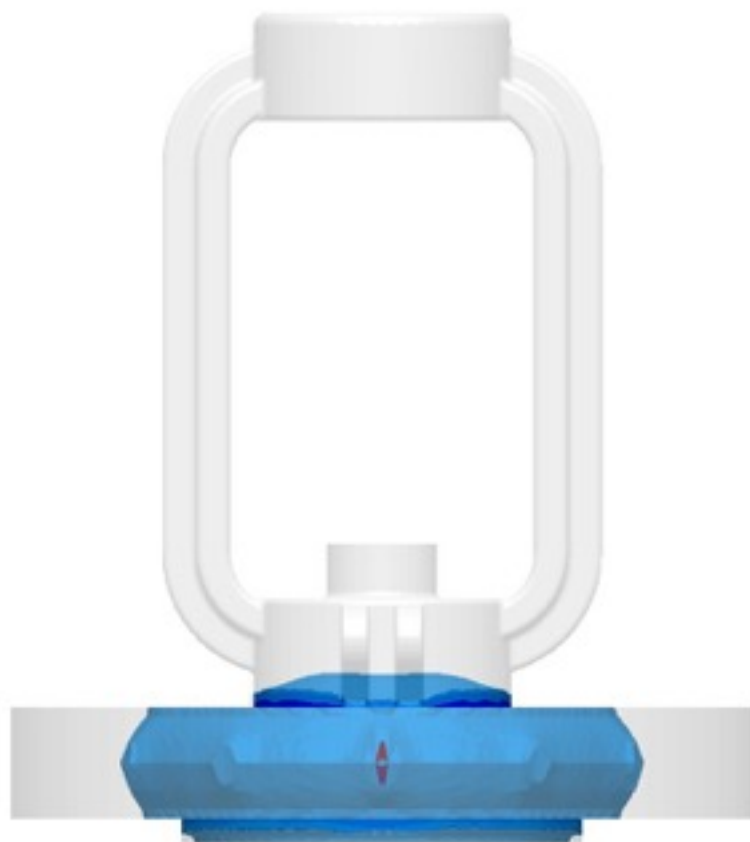


Fraction Liquid %

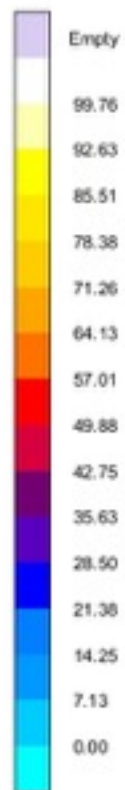


v04
Fraction Liquid
7.221s 18.37 %

MAGMA

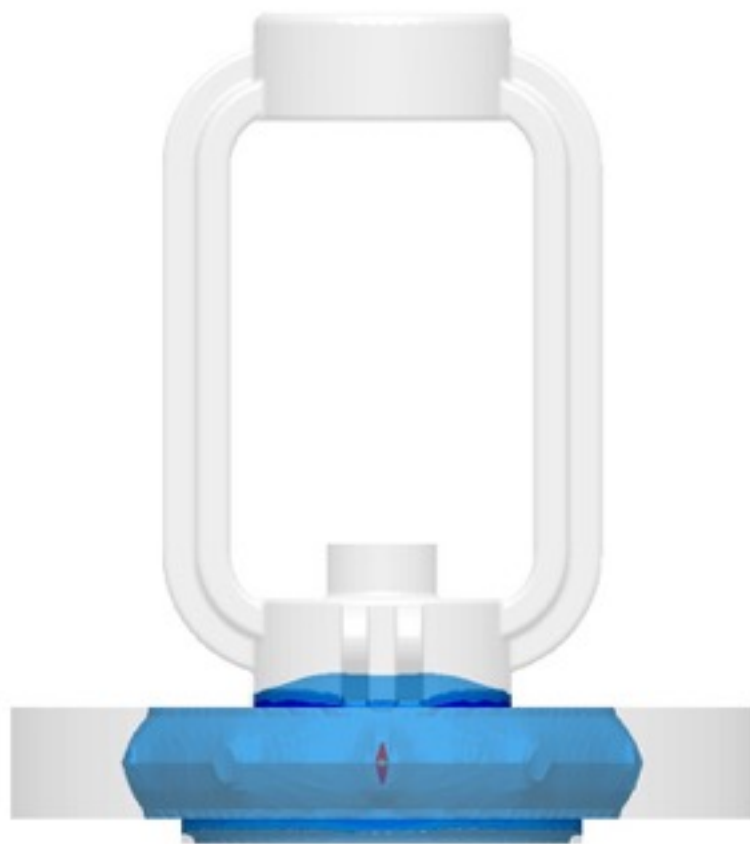


Fraction Liquid
%

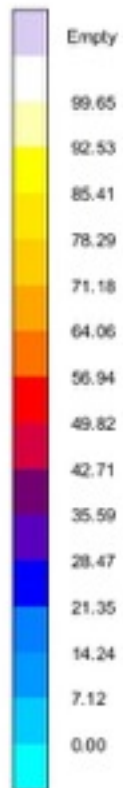


v04
Fraction Liquid
7.268s 18.16 %

MAGMA

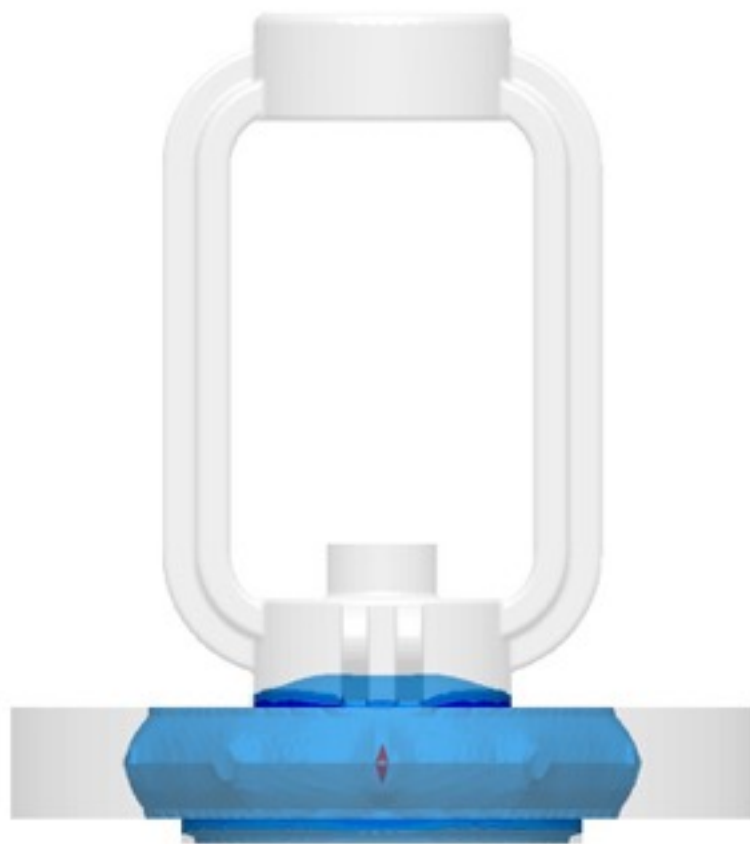


Fraction Liquid %

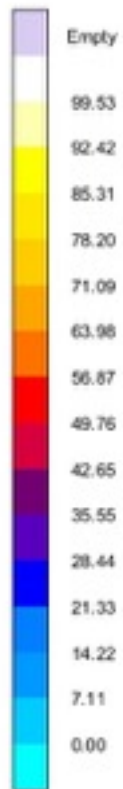


v04
Fraction Liquid
7.315e 17.95 %

MAGMA

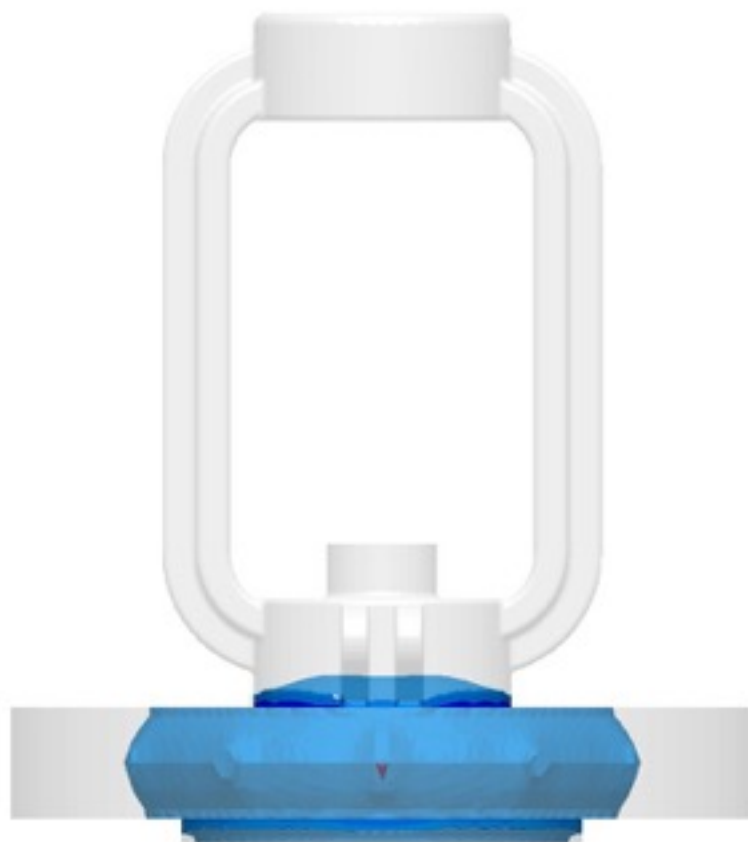


Fraction Liquid
%

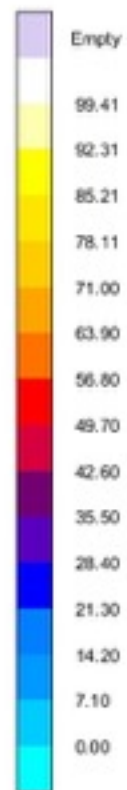


v04
Fraction Liquid
7.362s 17.74 %

MAGMA

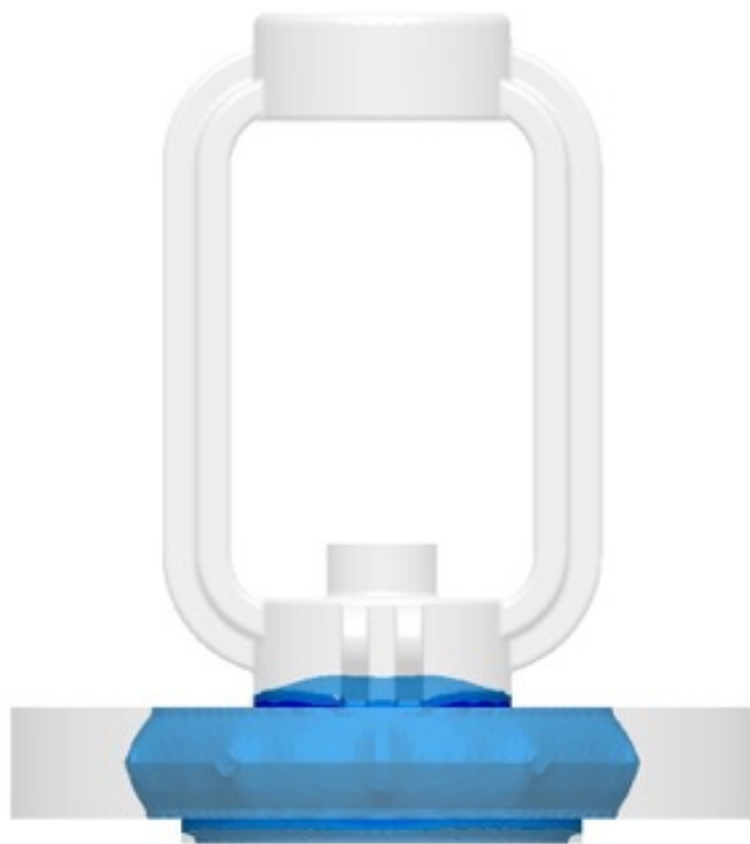


Fraction Liquid
%

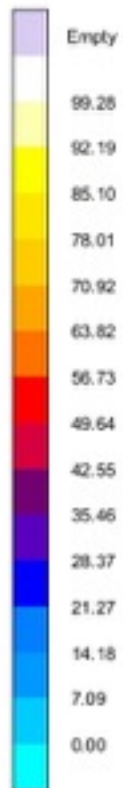


v04
Fraction Liquid
7.406s 17.54 %

MAGMA

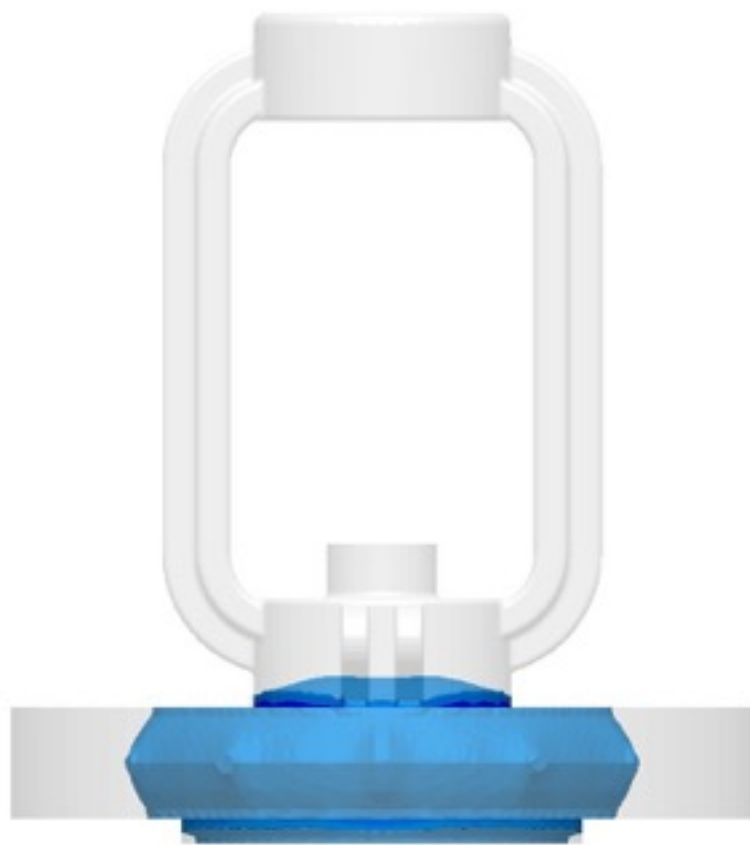


Fraction Liquid
%

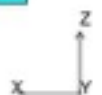
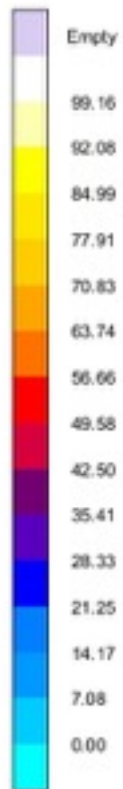


v04
Fraction Liquid
7.456e 17.33 %

MAGMA

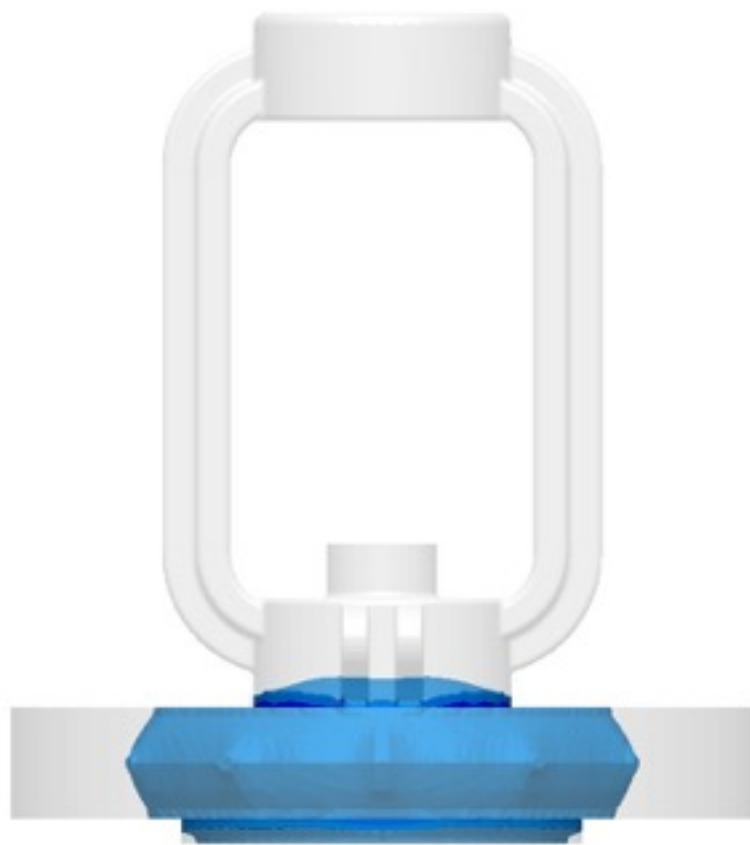


Fraction Liquid
%

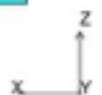
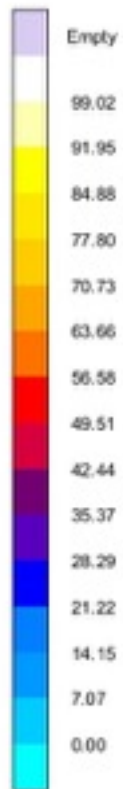


v04
Fraction Liquid
7.502s 17.13 %

MAGMA

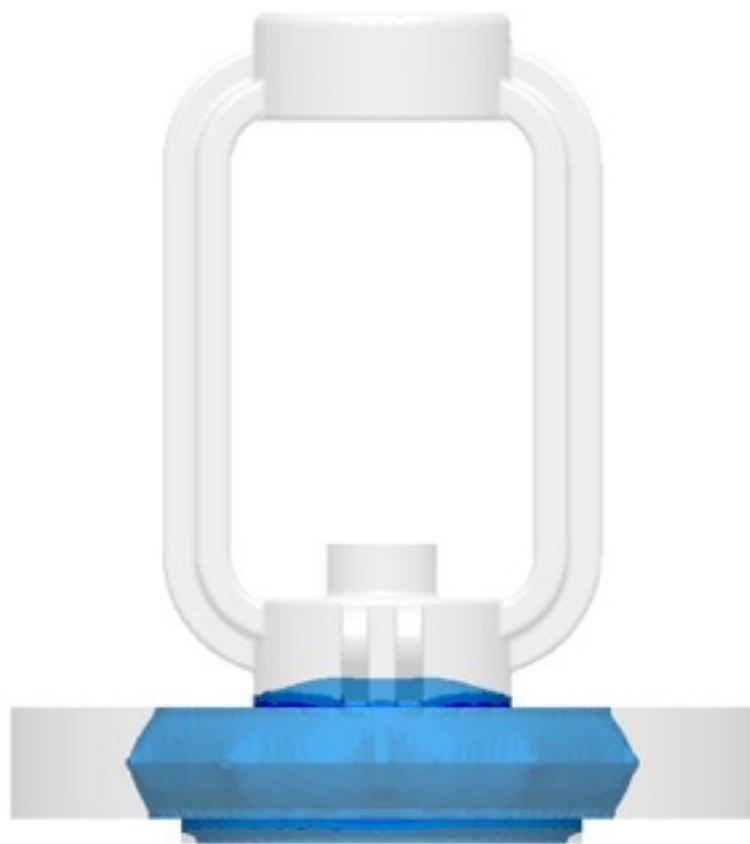


Fraction Liquid
%

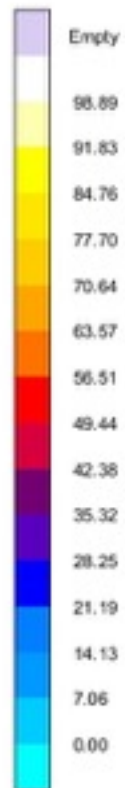


v04
Fraction Liquid
7.550s 16.92 %

MAGMA

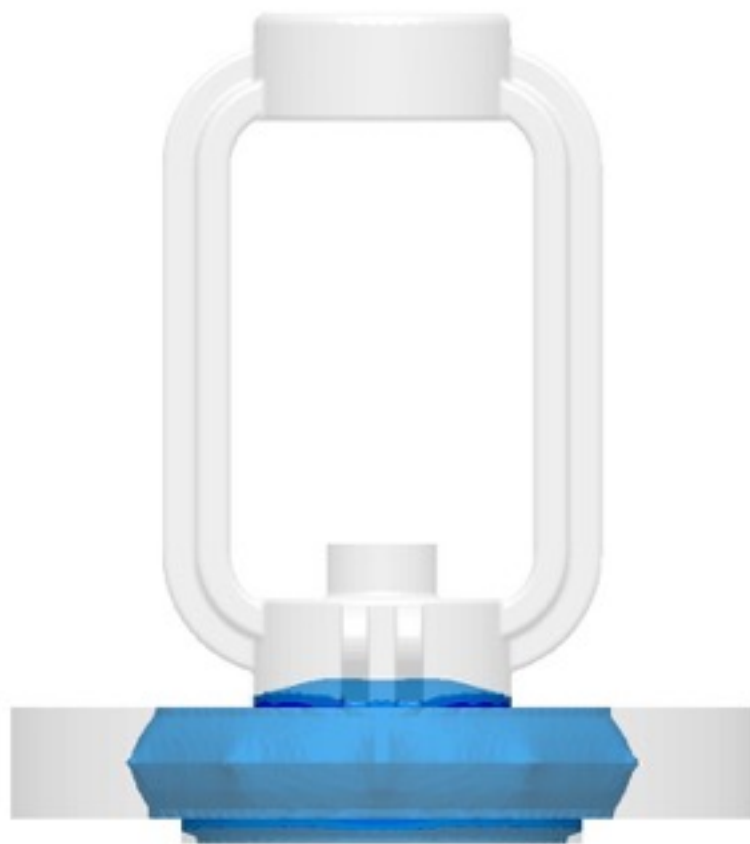


Fraction Liquid %

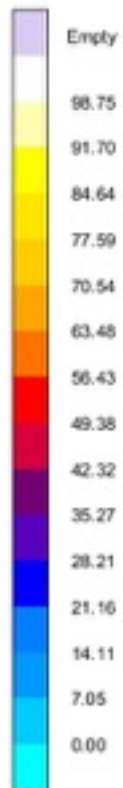


v04
Fraction Liquid
7.596e 16.72 %

MAGMA

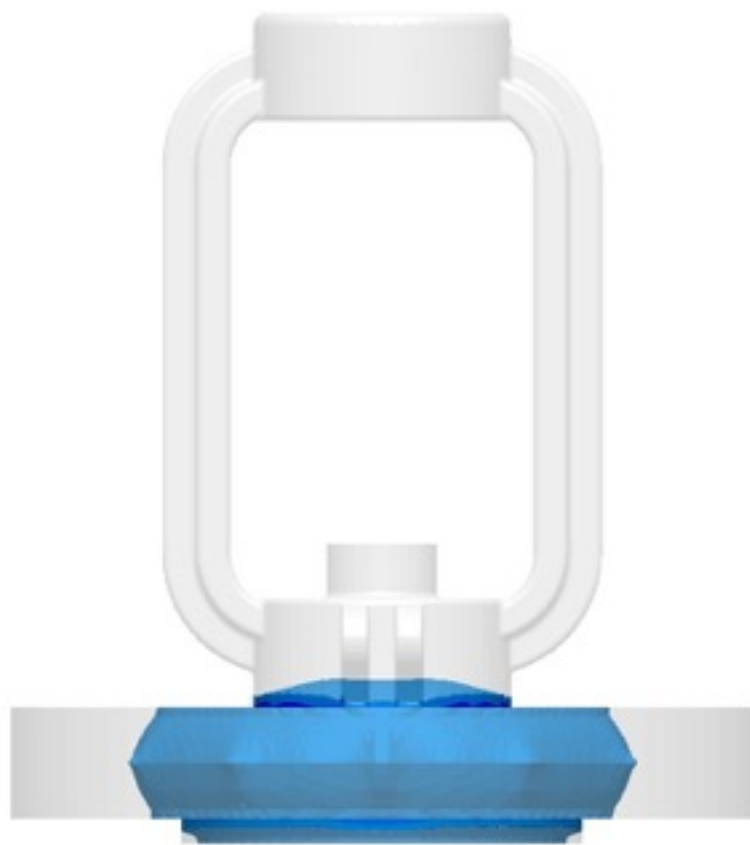


Fraction Liquid
%

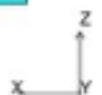
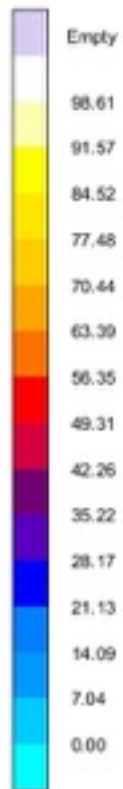


v04
Fraction Liquid
7.644s 16.52 %



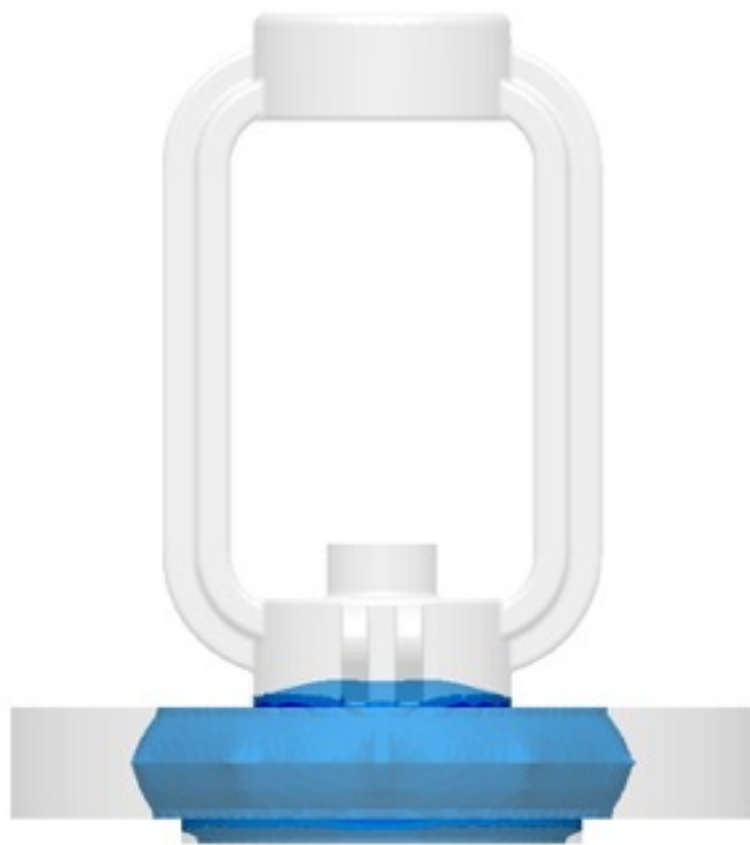


Fraction Liquid
%

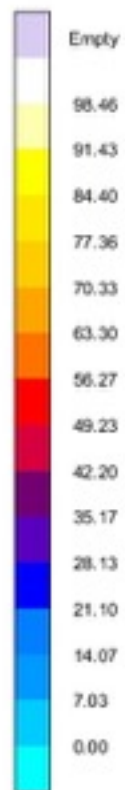


v04
Fraction Liquid
7.690s 16.32 %

MAGMA

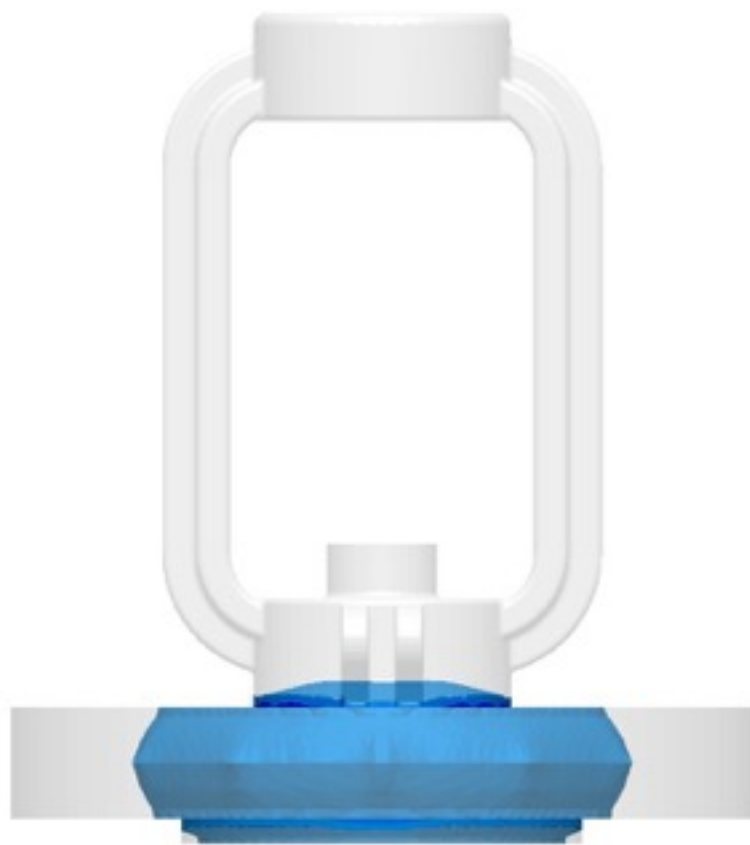


Fraction Liquid
%



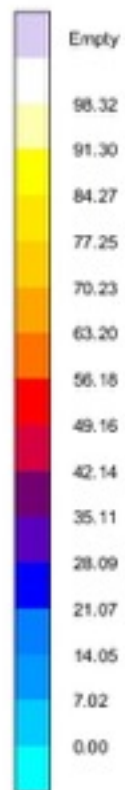
v04
Fraction Liquid
7.738s 16.12 %

MAGMA

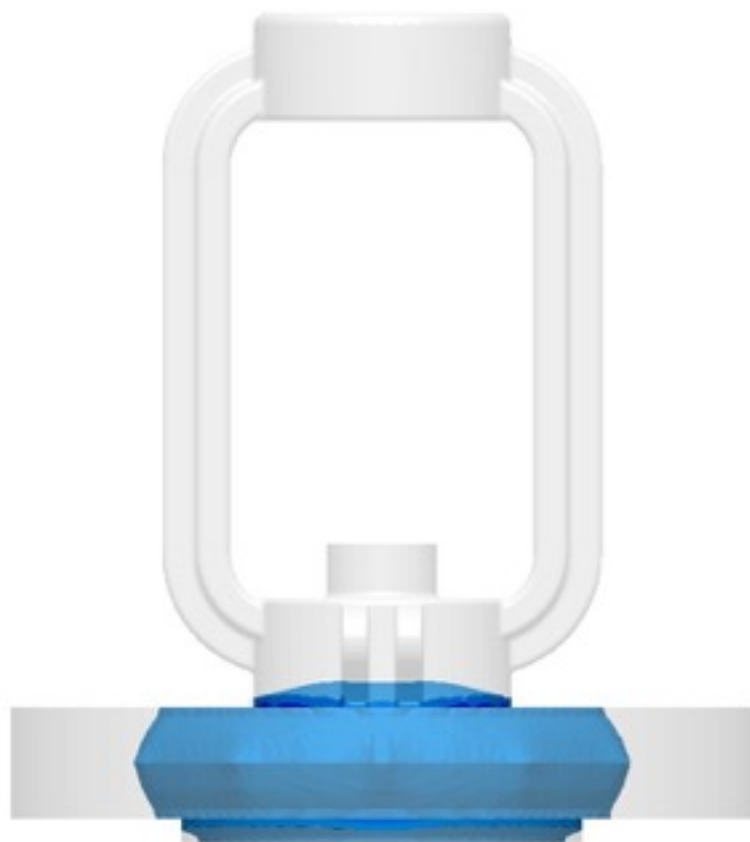


v04
Fraction Liquid
7.784s 15.92 %

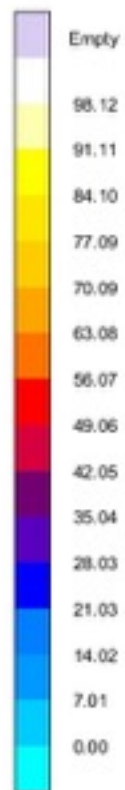
Fraction Liquid
%



MAGMA

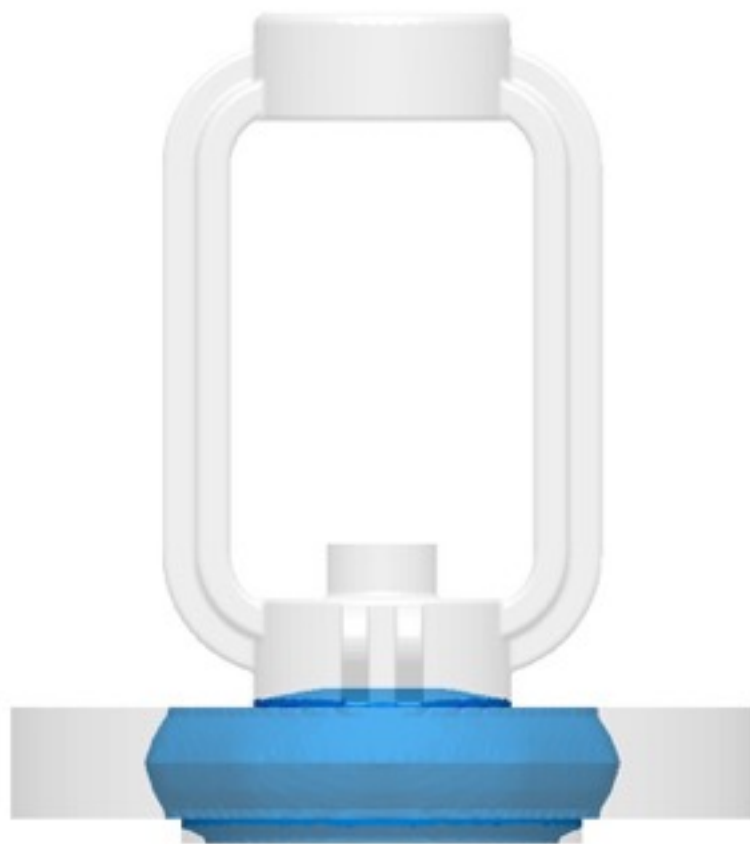


Fraction Liquid
%

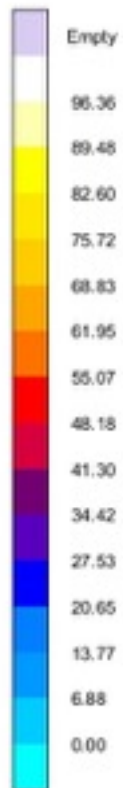


v04
Fraction Liquid
7.845e 15.67 %

MAGMA

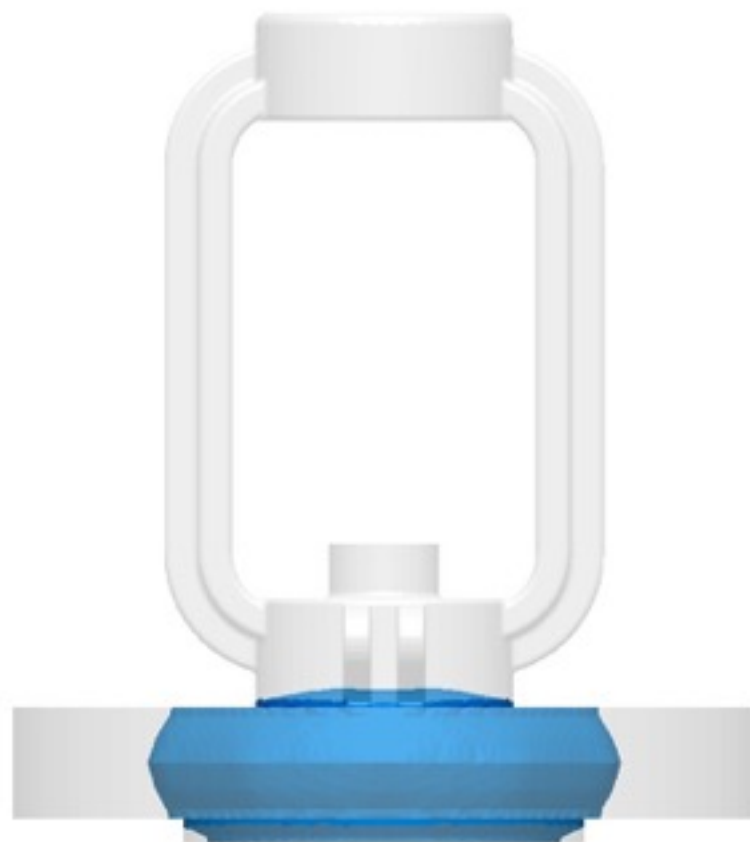


Fraction Liquid
%

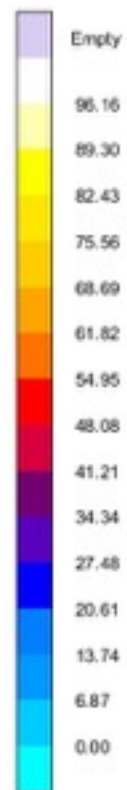


v04
Fraction Liquid
8.31fs 13.75 %



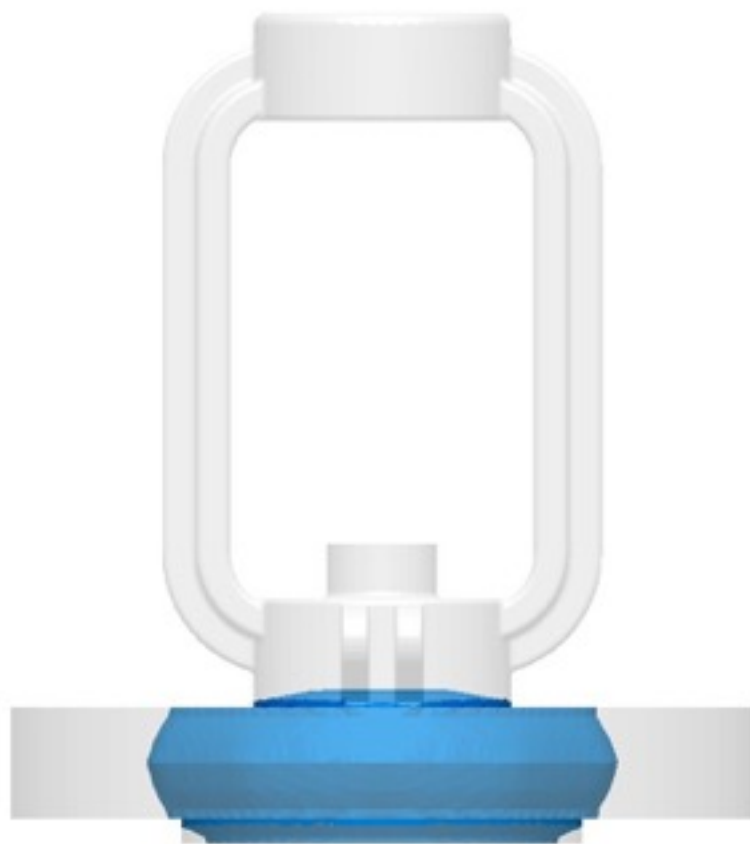


Fraction Liquid
%

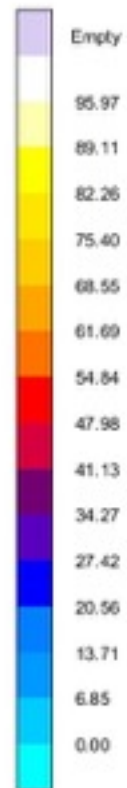


v04
Fraction Liquid
8.367s 13.56 %

MAGMA

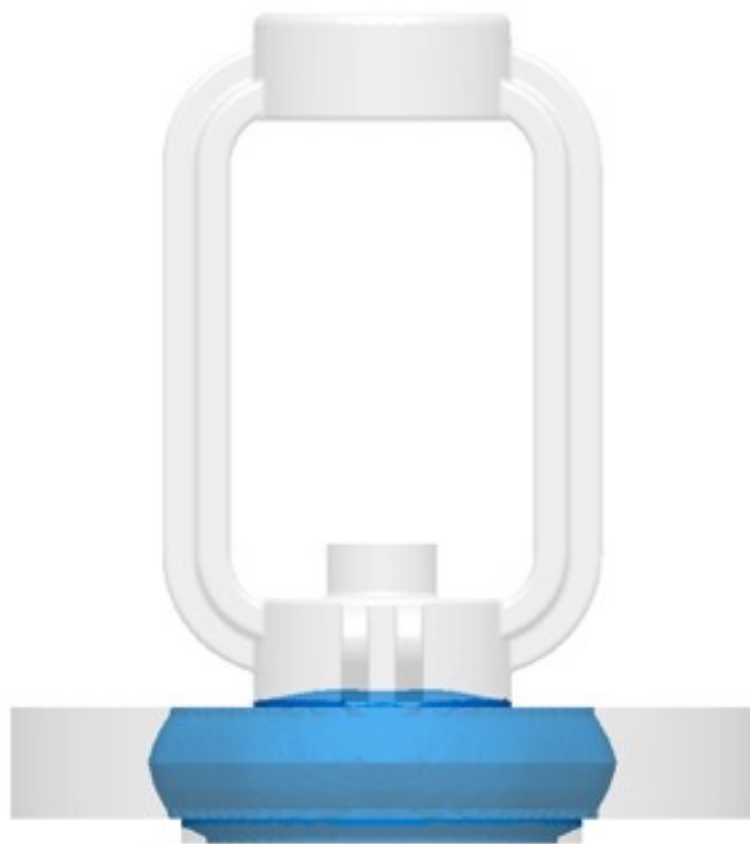


Fraction Liquid
%

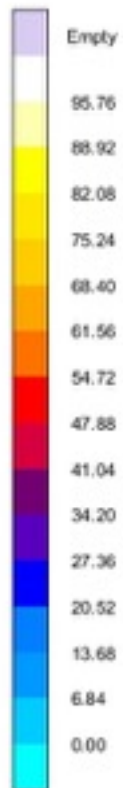


v04
Fraction Liquid
8.413s 13.38 %

MAGMA

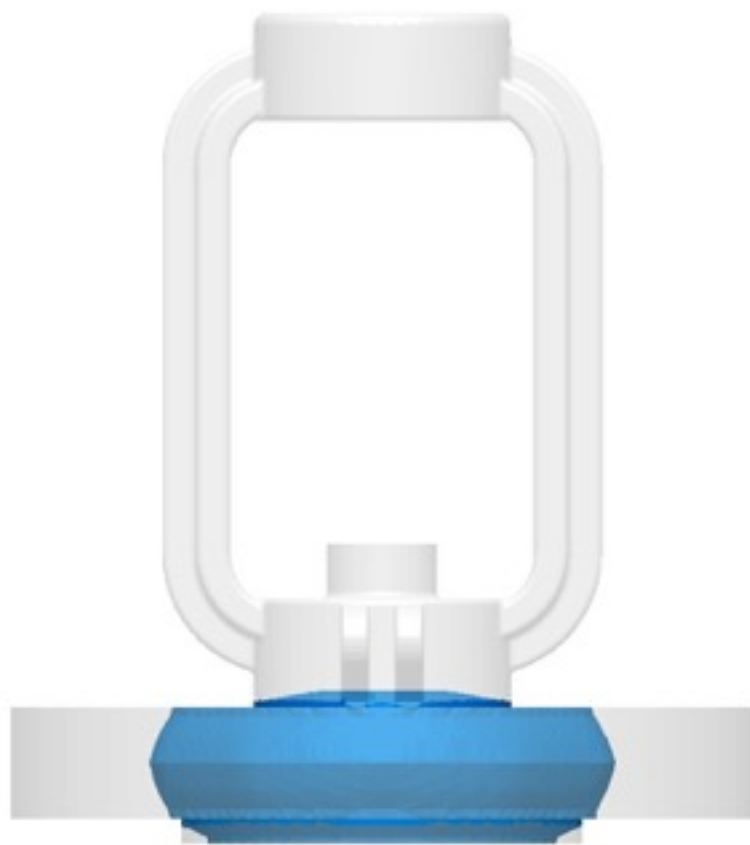


Fraction Liquid
%

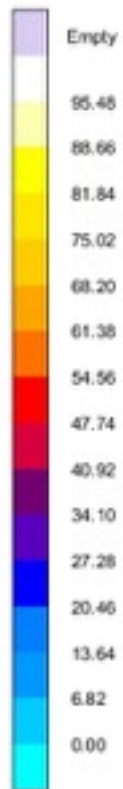


v04
Fraction Liquid
8.460s 13.19 %



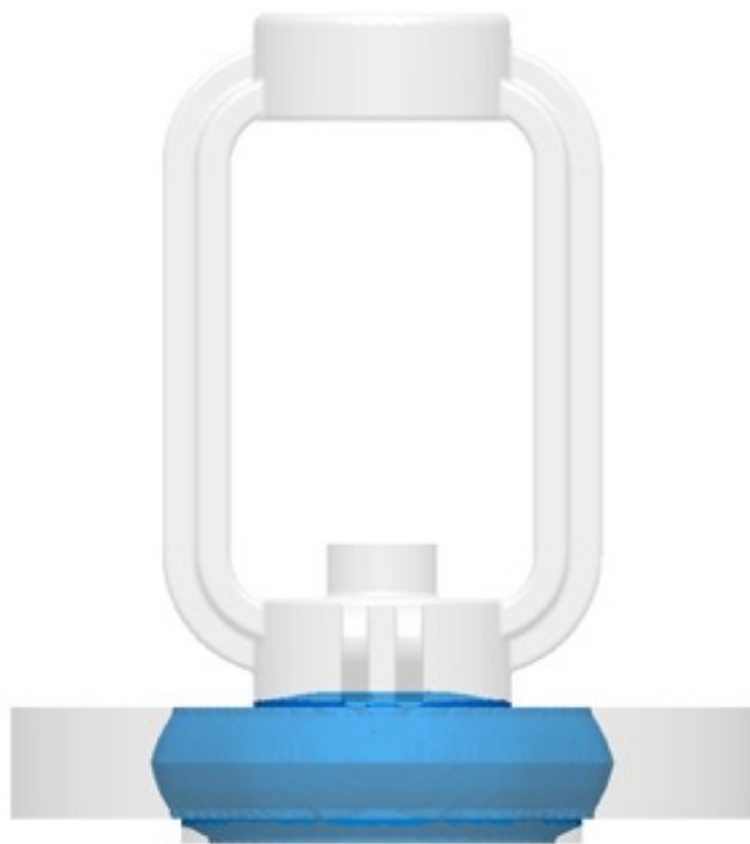


Fraction Liquid
%

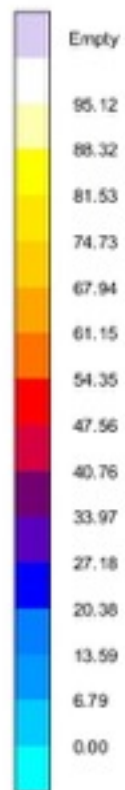


v04
Fraction Liquid
8.523s 12.95 %

MAGMA

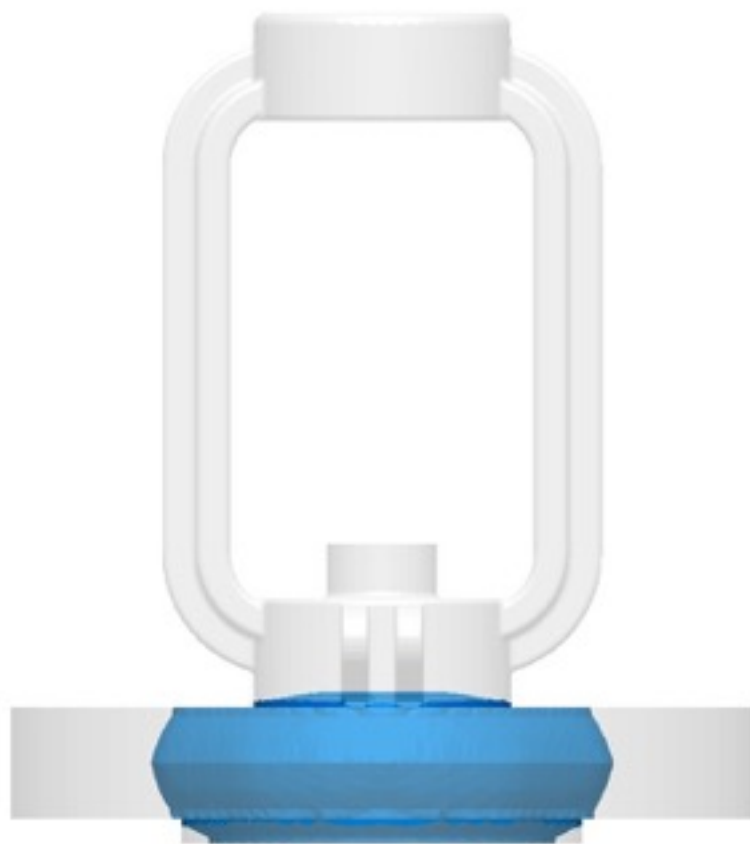


Fraction Liquid
%

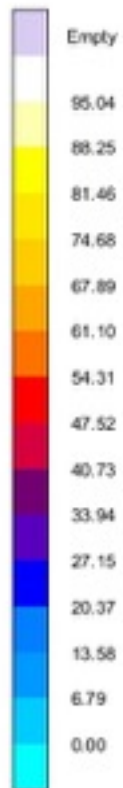


v04
Fraction Liquid
8.601s 12.66 %

MAGMA

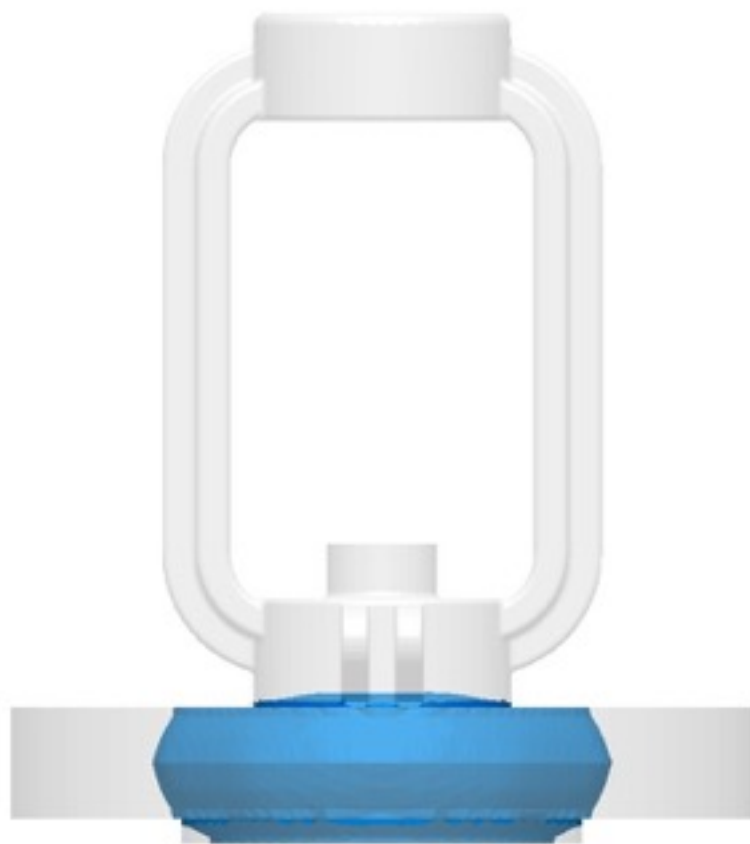


Fraction Liquid
%

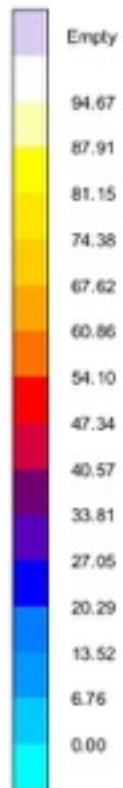


v04
Fraction Liquid
8.617s 12.59 %

MAGMA

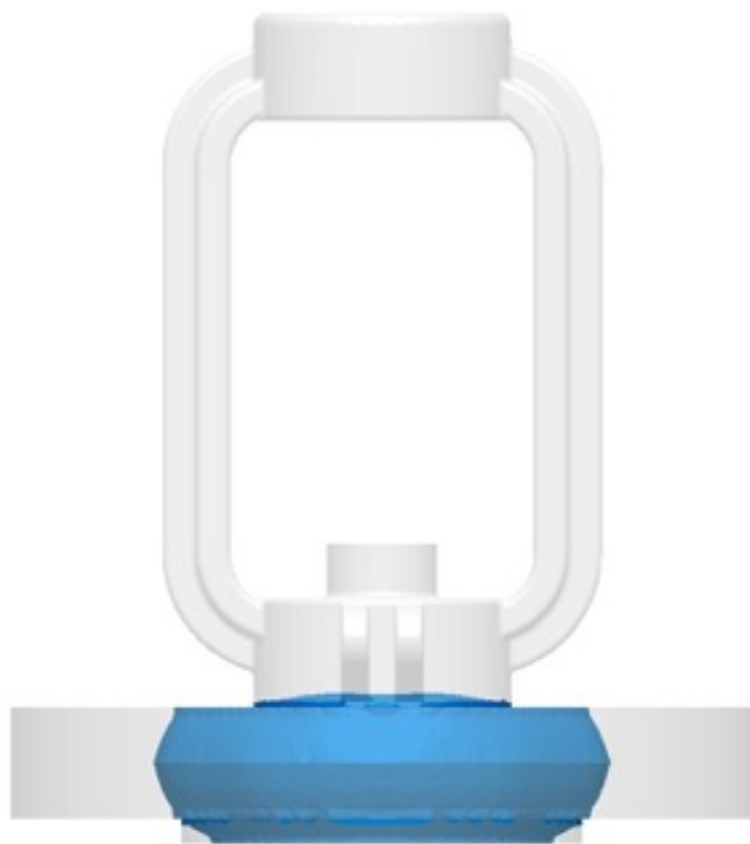


Fraction Liquid
%

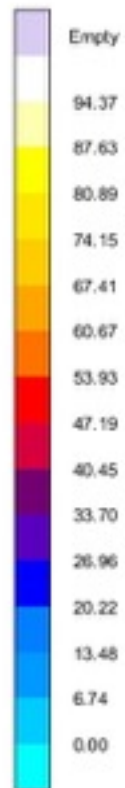


v04
Fraction Liquid
8.695e 12.30 %



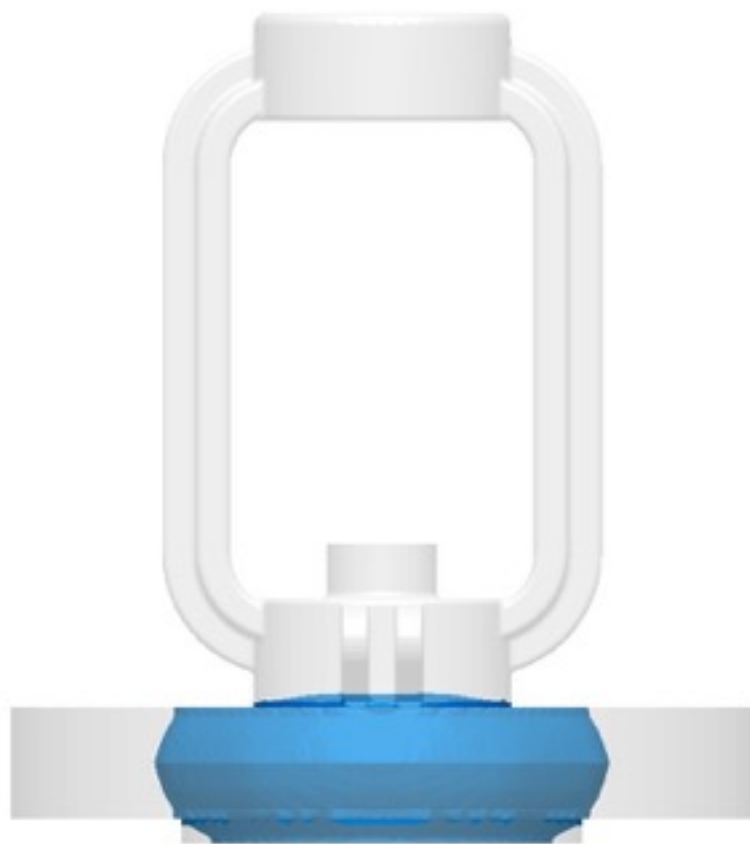


Fraction Liquid
%

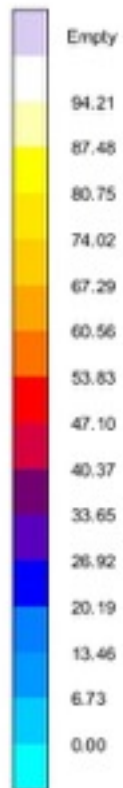


v04
Fraction Liquid
8.756e 12.07 %

MAGMA

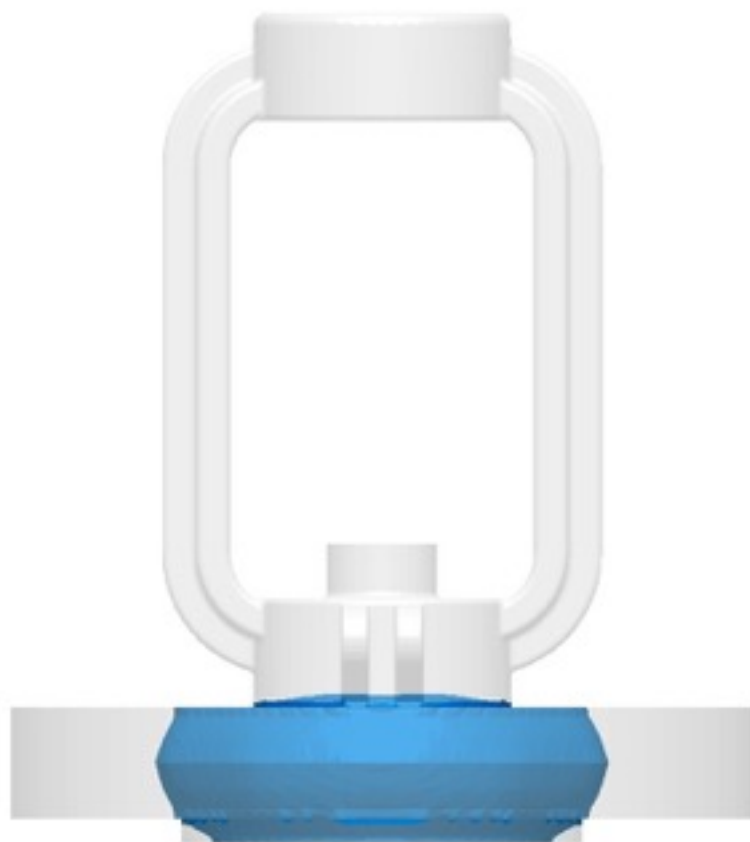


Fraction Liquid %



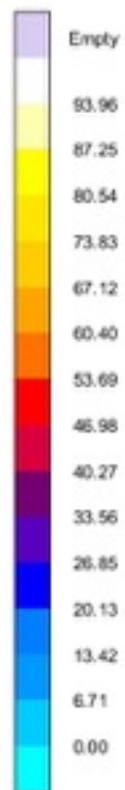
v04
Fraction Liquid
8.78% 11.95 %

MAGMA

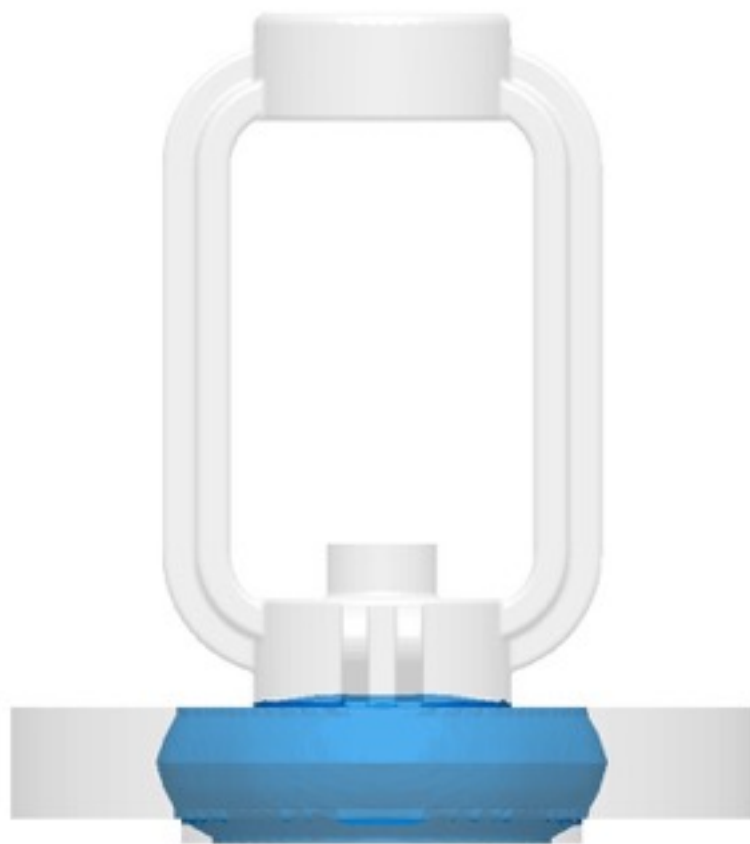


v04
Fraction Liquid
8.836e 11.77 %

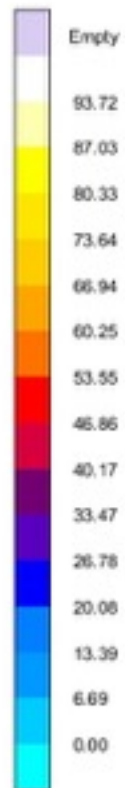
Fraction Liquid
%



MAGMA

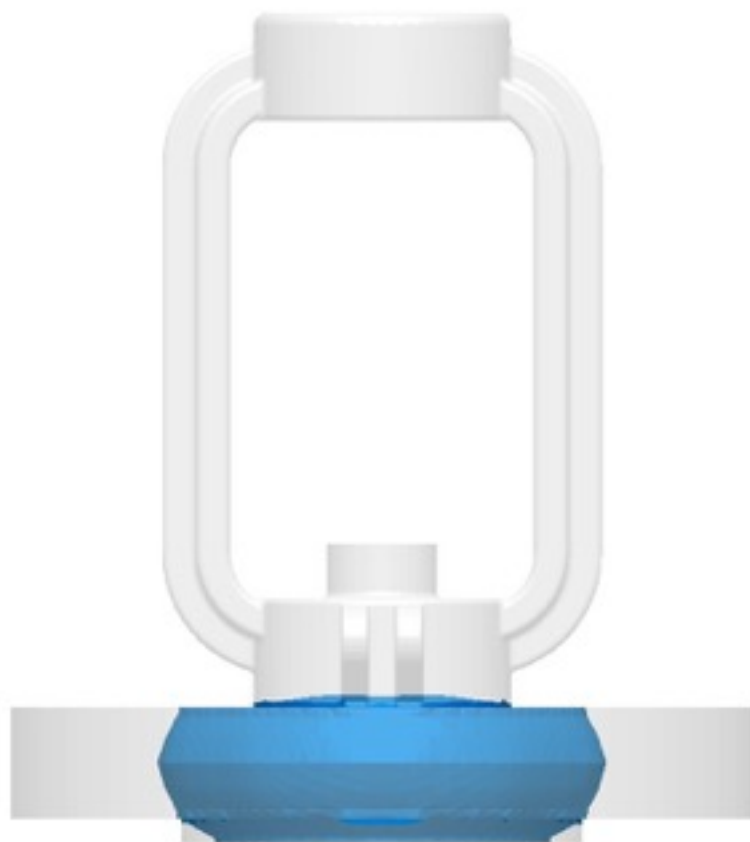


Fraction Liquid
%

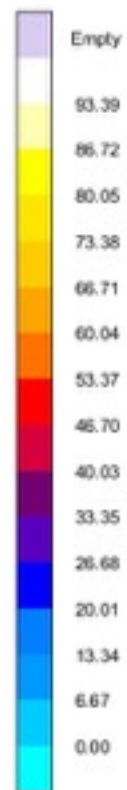


v04
Fraction Liquid
8.883e 11.60 %

MAGMA

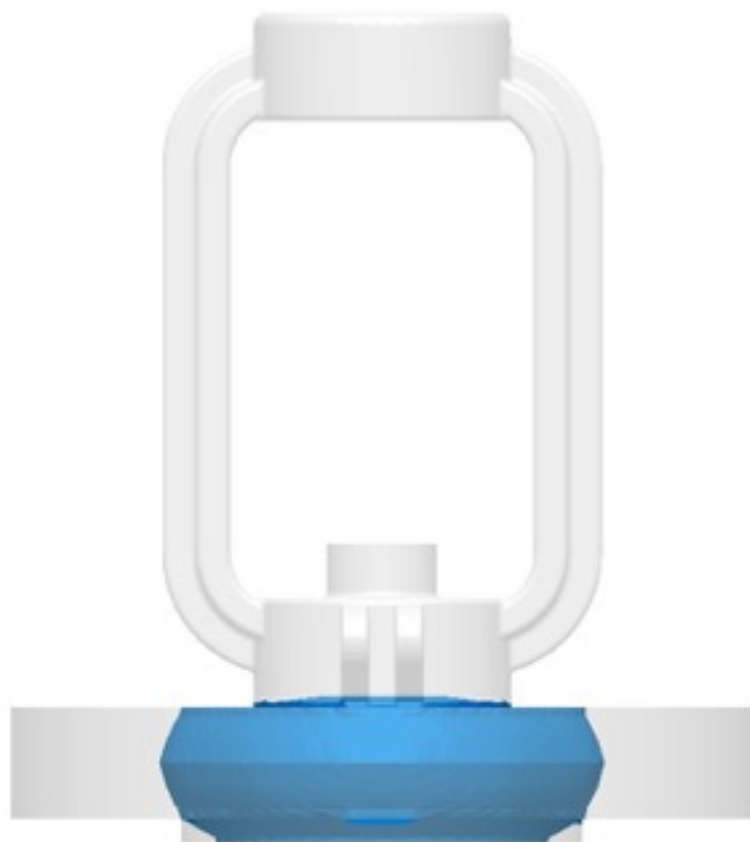


Fraction Liquid
%

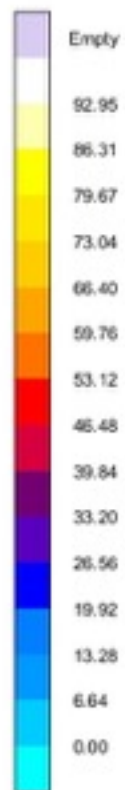


v04
Fraction Liquid
8.944s 11.38 %

MAGMA

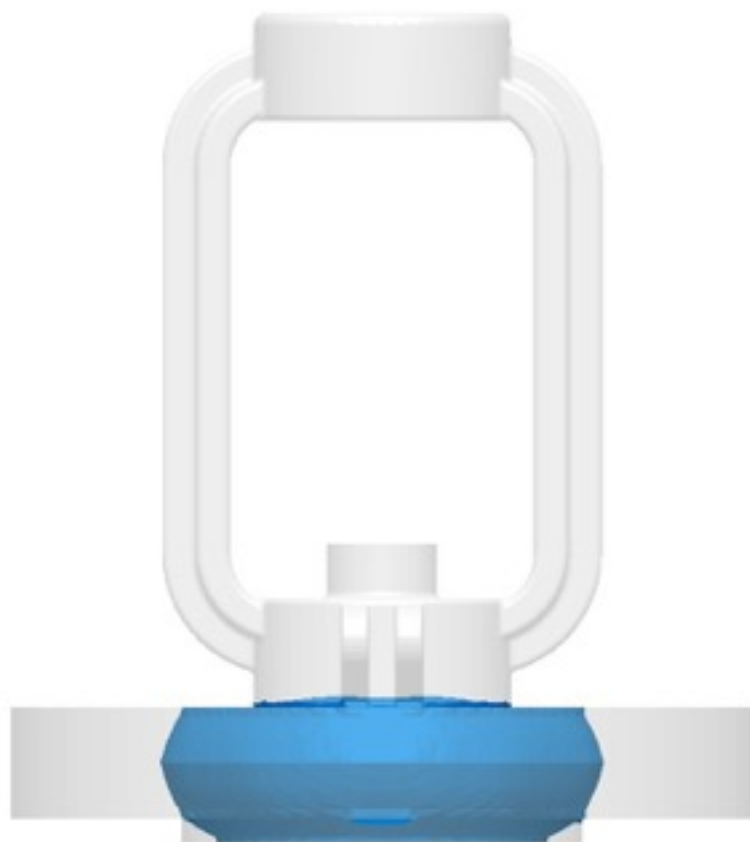


Fraction Liquid
%

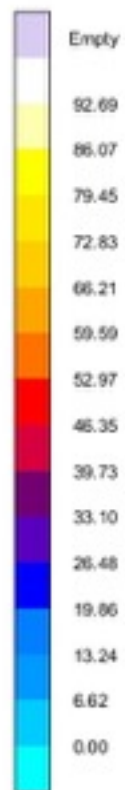


v04
Fraction Liquid
9.024s 11.09 %

MAGMA

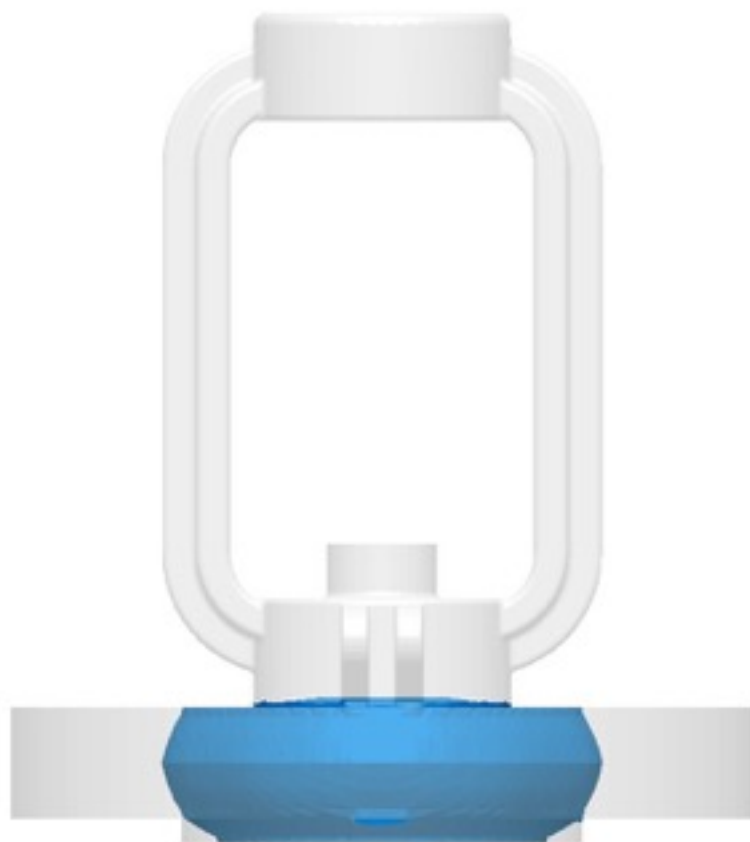


Fraction Liquid
%

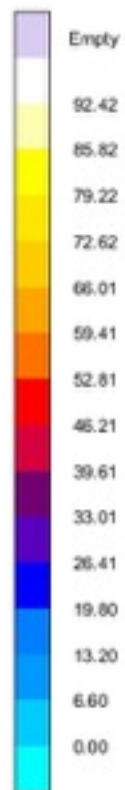


v04
Fraction Liquid
9.07 to 10.92 %

MAGMA

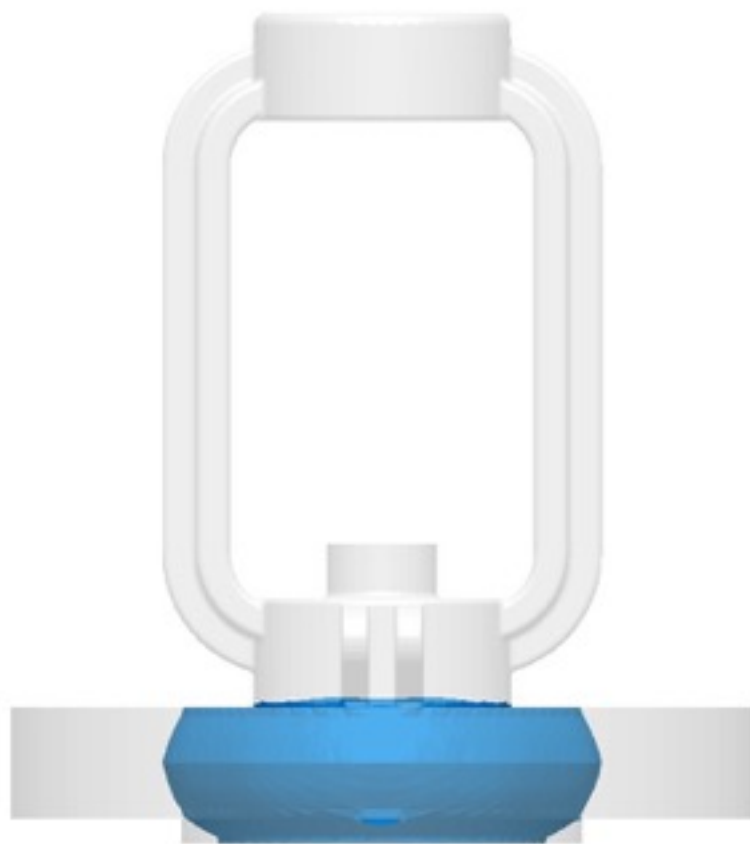


Fraction Liquid
%

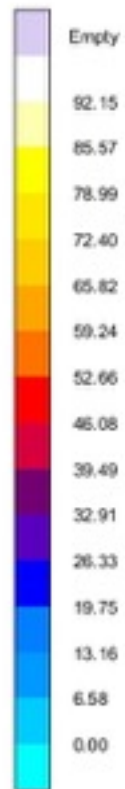


v04
Fraction Liquid
9.118e 10.75 %

MAGMA

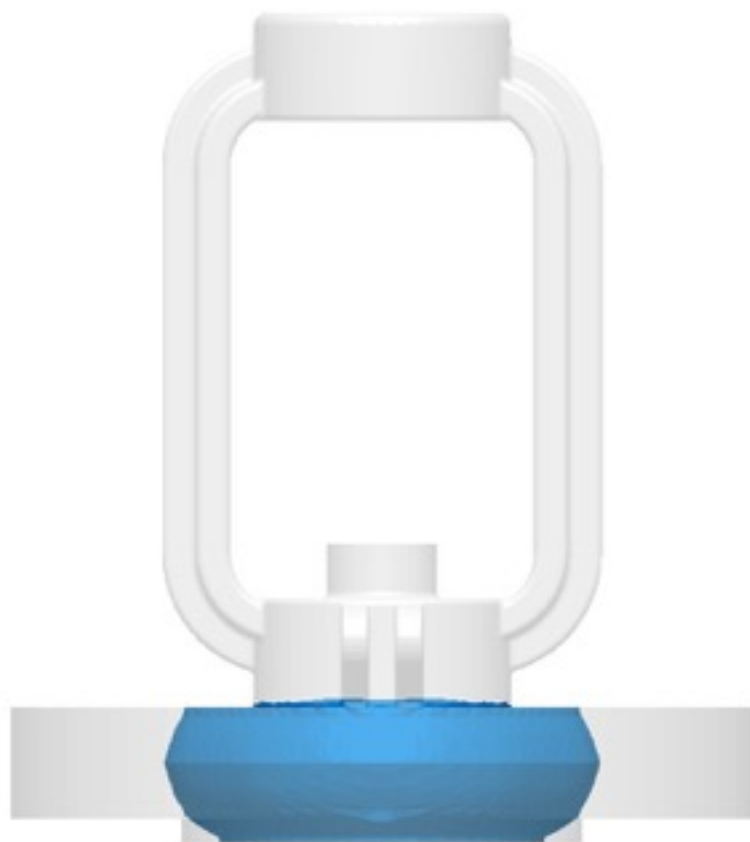


Fraction Liquid
%

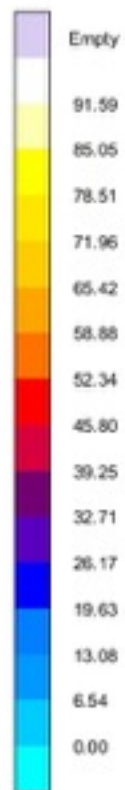


v04
Fraction Liquid
9.16% 10.59%

MAGMA

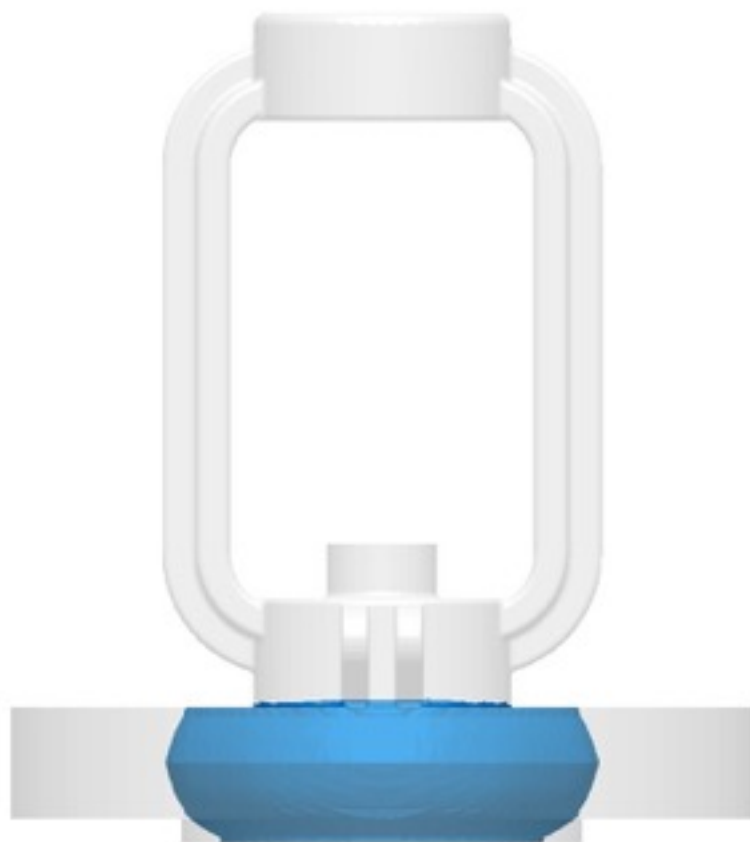


Fraction Liquid
%

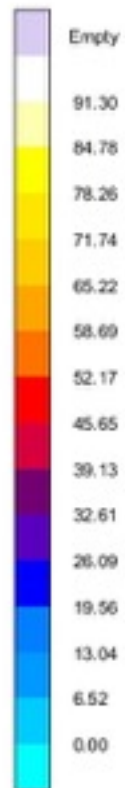


v04
Fraction Liquid
9.256e 10.26 %

MAGMA

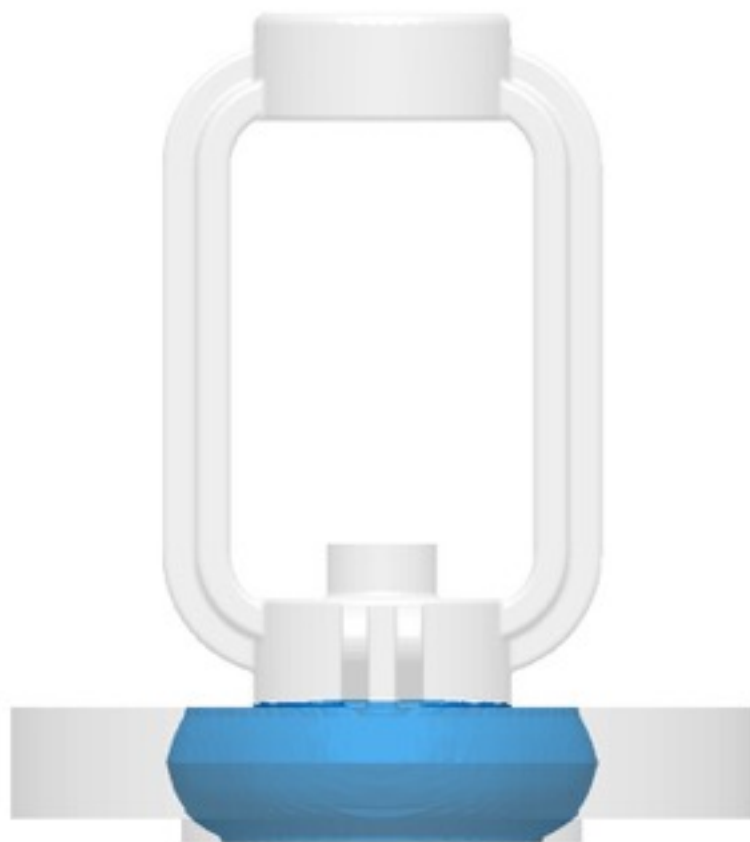


Fraction Liquid
%

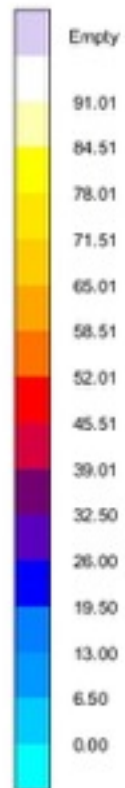


v04
Fraction Liquid
9.306s 10.10 %

MAGMA

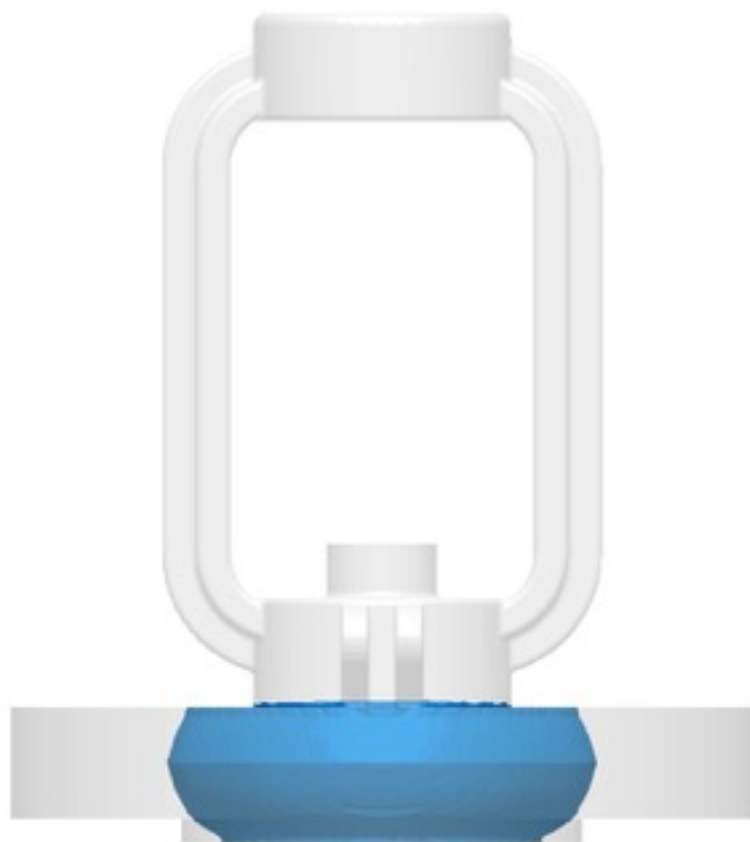


Fraction Liquid
%

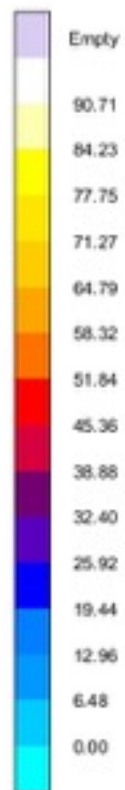


v04
Fraction Liquid
9.353e 9.94 %

MAGMA

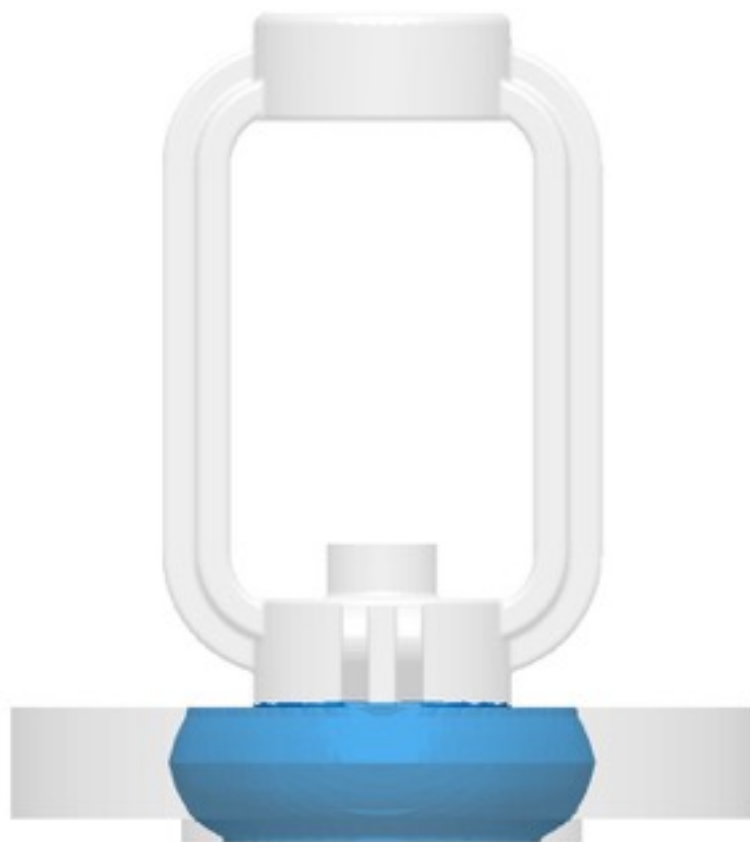


Fraction Liquid
%

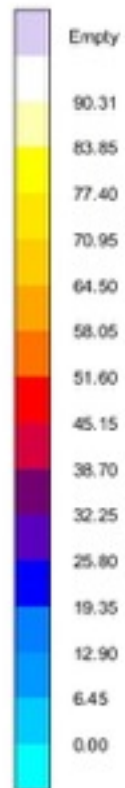


v04
Fraction Liquid
9.40ts 9.77 %

MAGMA

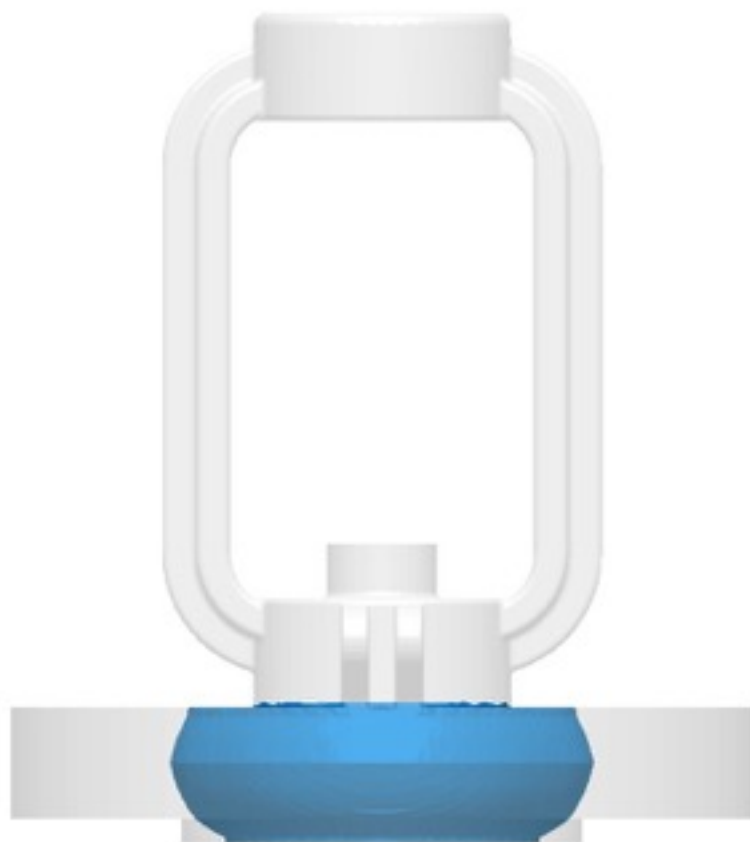


Fraction Liquid
%

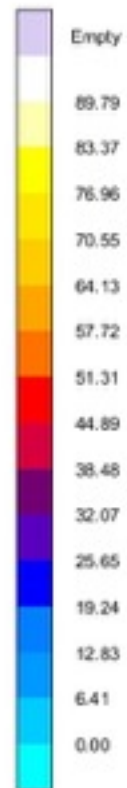


v04
Fraction Liquid
9.463s 9.56 %

MAGMA

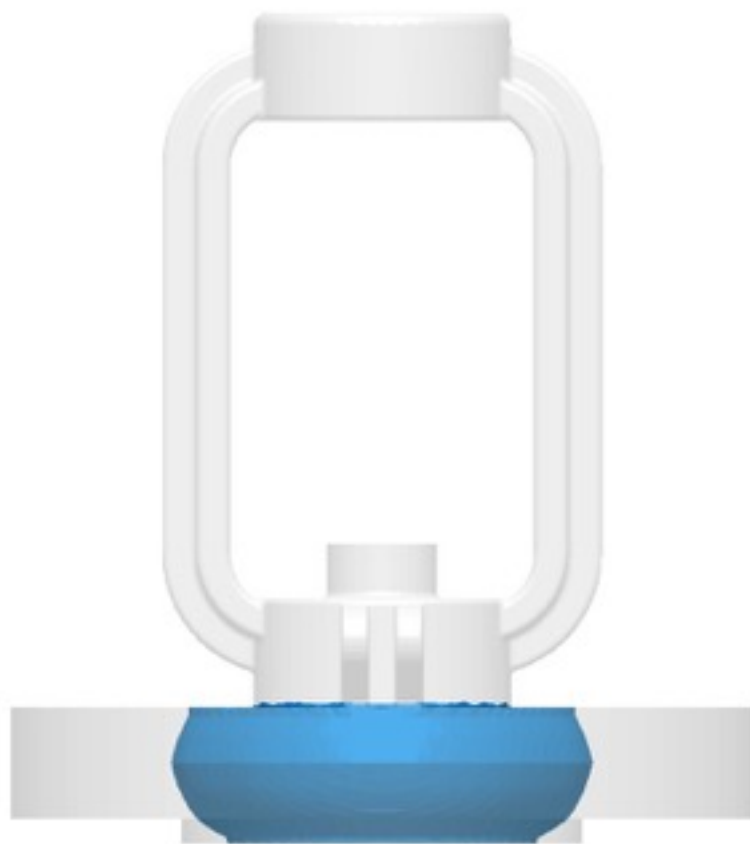


Fraction Liquid
%

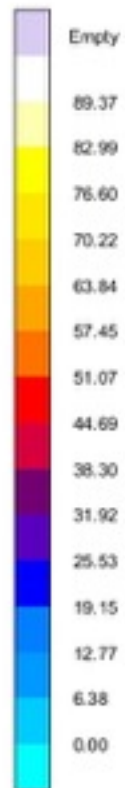


v04
Fraction Liquid
9.541s 9.30 %

MAGMA

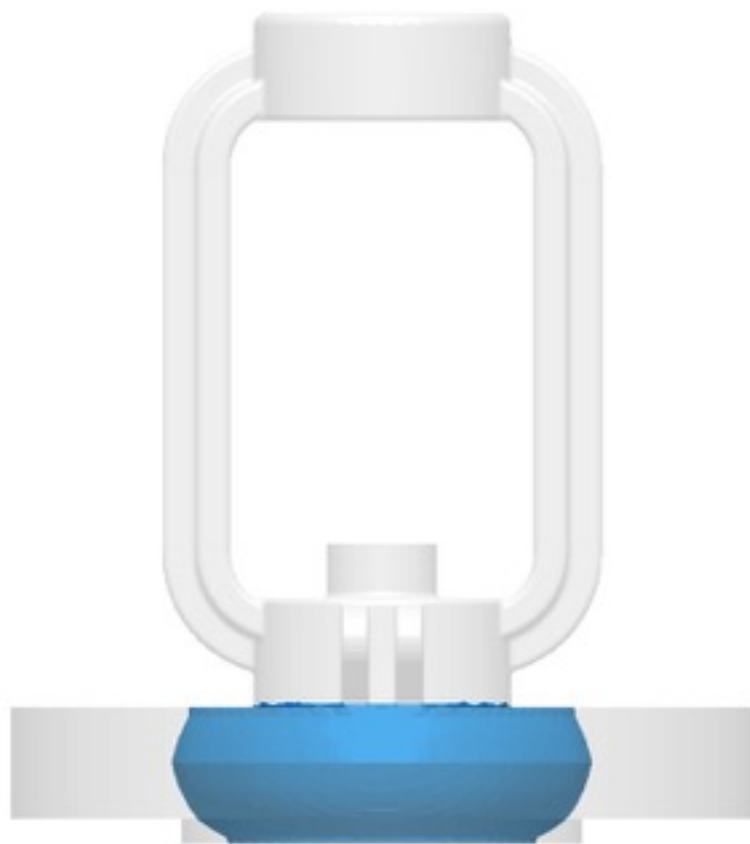


Fraction Liquid %

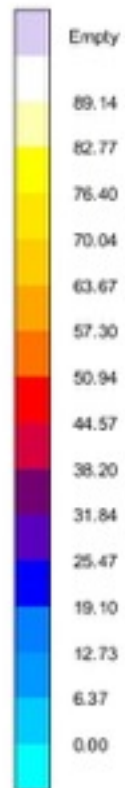


v04
Fraction Liquid
9.602s 9.10 %

MAGMA

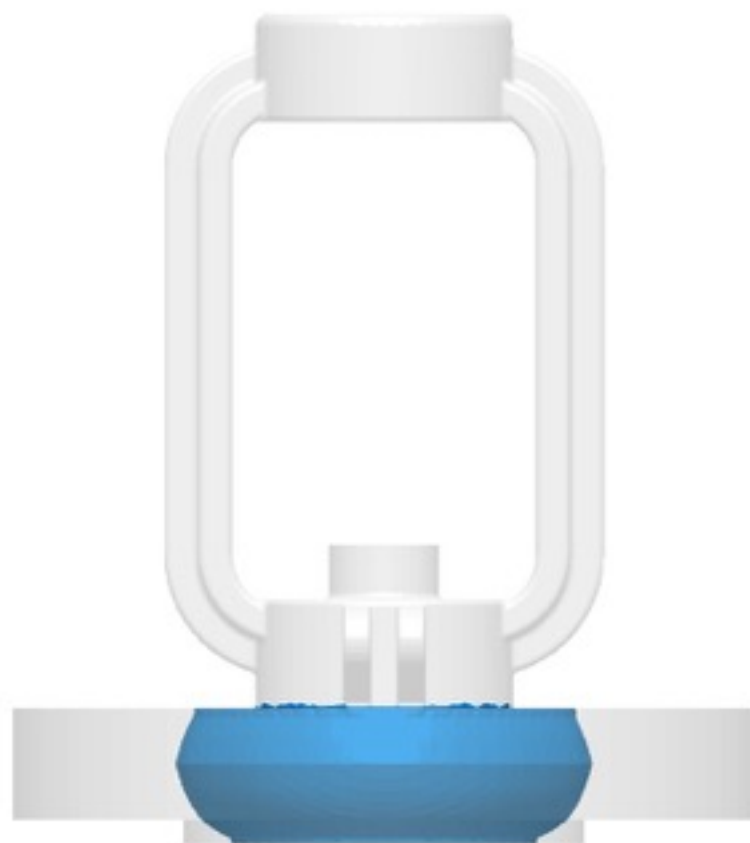


Fraction Liquid %

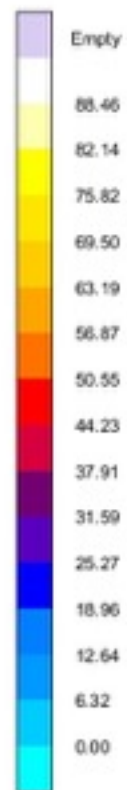


v04
Fraction Liquid
9.635e 8.99 %



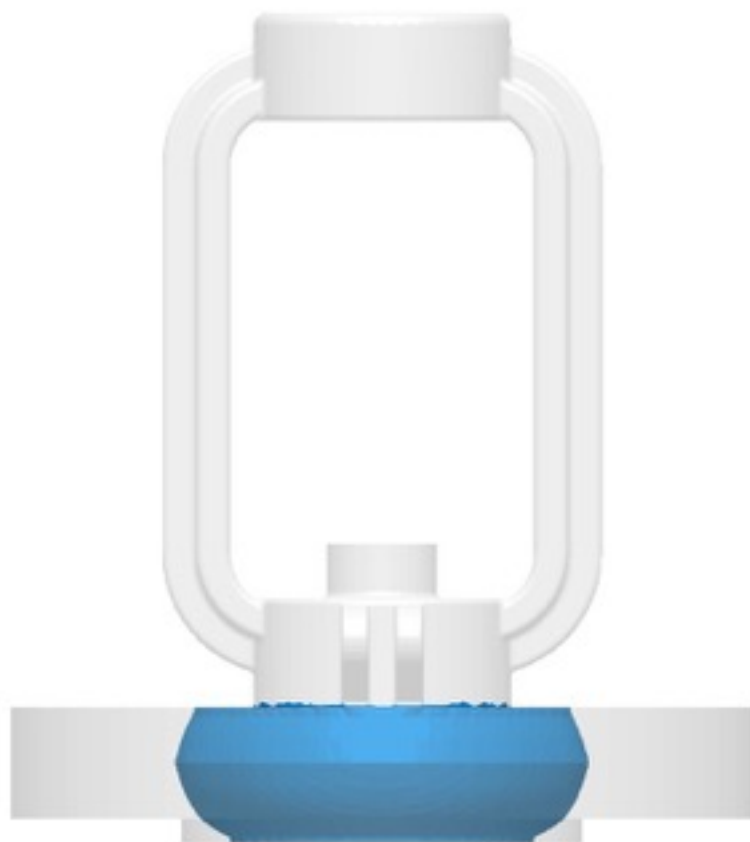


Fraction Liquid
%

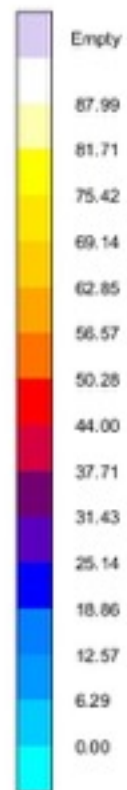


v04
Fraction Liquid
9.726s 8.69 %

MAGMA

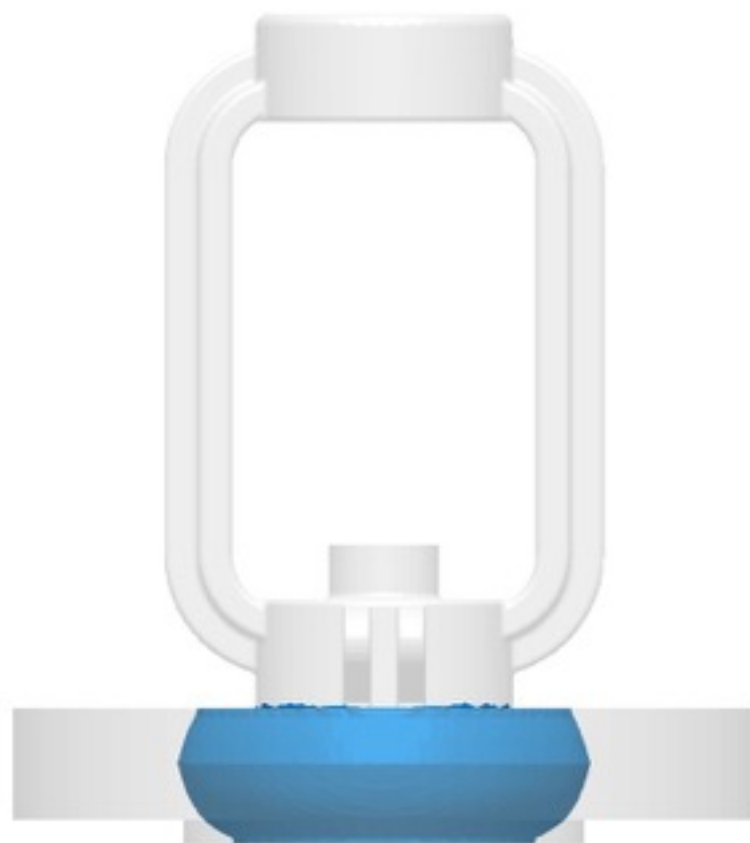


Fraction Liquid
%

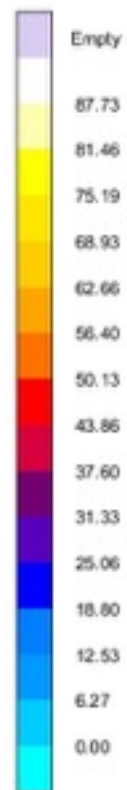


v04
Fraction Liquid
9.790s 8.50 %

MAGMA

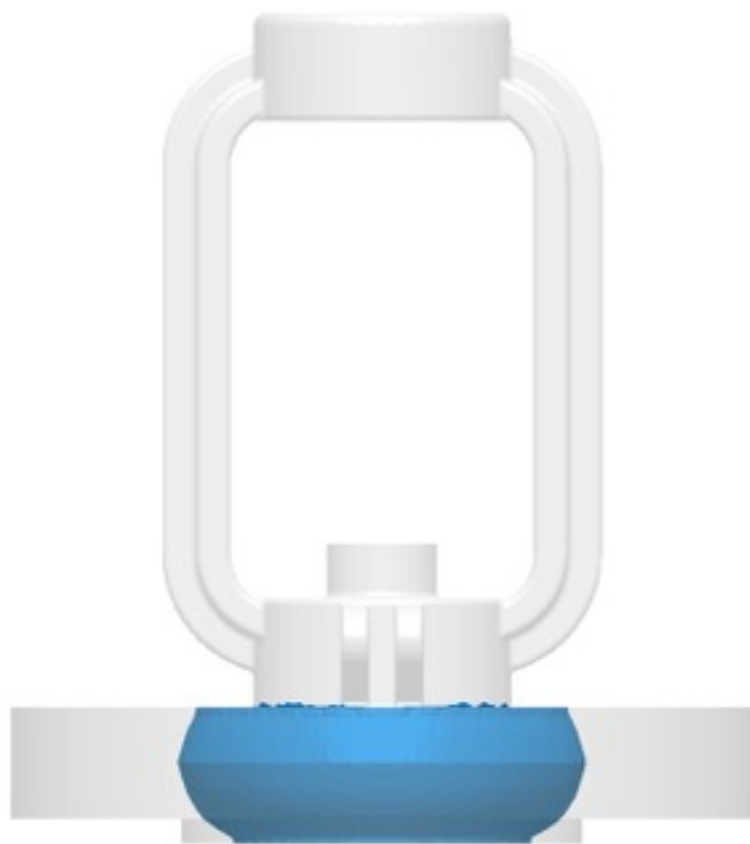


Fraction Liquid
%

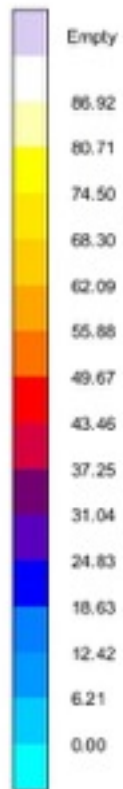


v04
Fraction Liquid
9.822s 8.39 %

MAGMA

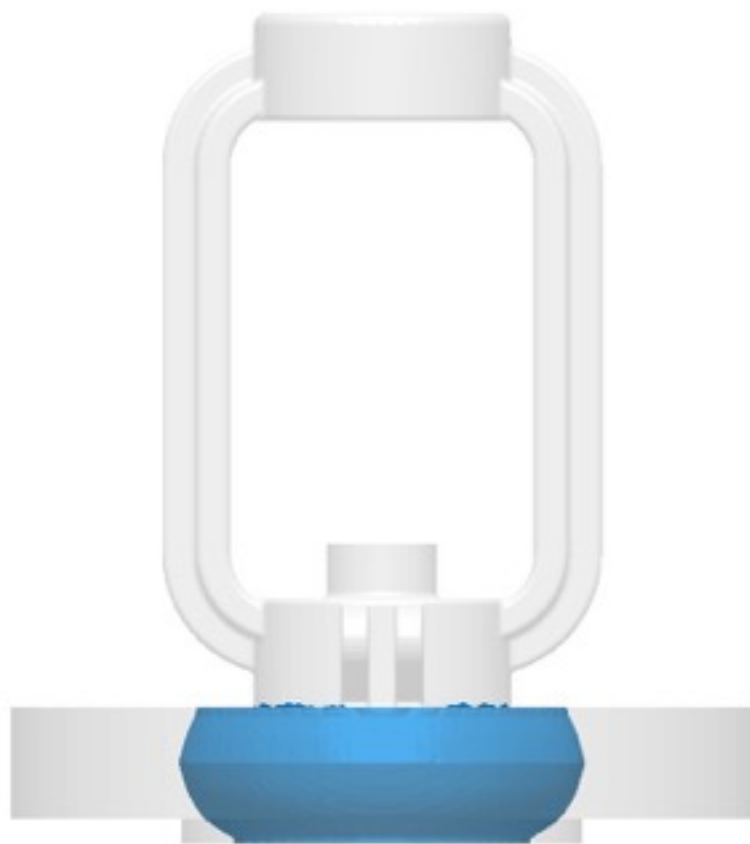


Fraction Liquid
%

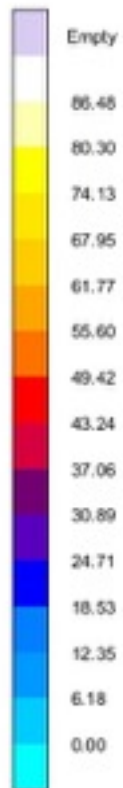


v04
Fraction Liquid
9.916s 8.10 %



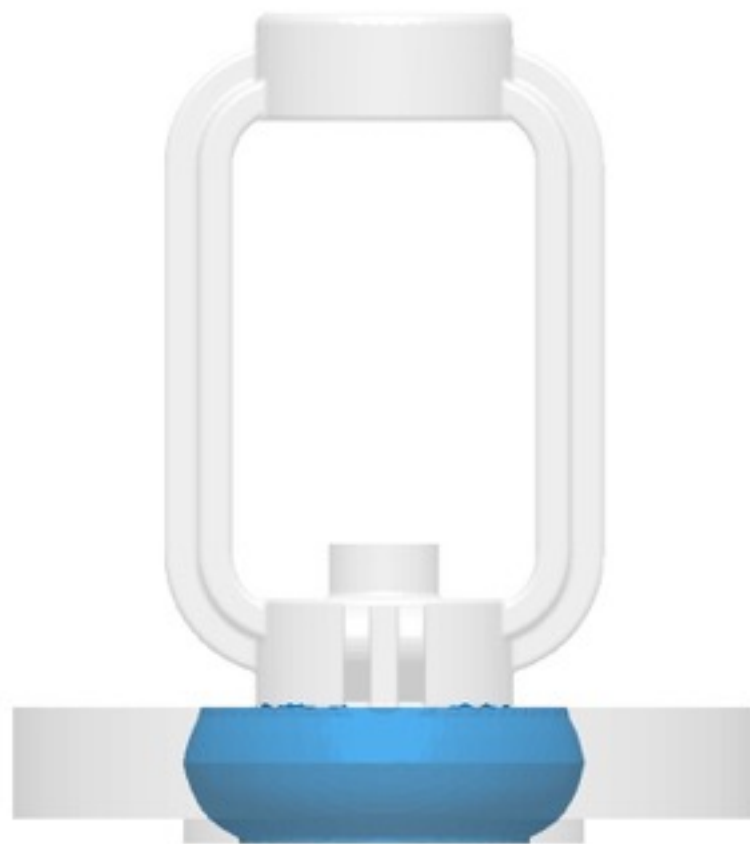


Fraction Liquid
%

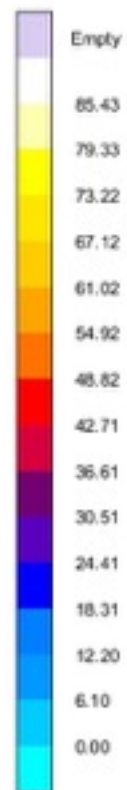


v04
Fraction Liquid
9.964s 7.95 %



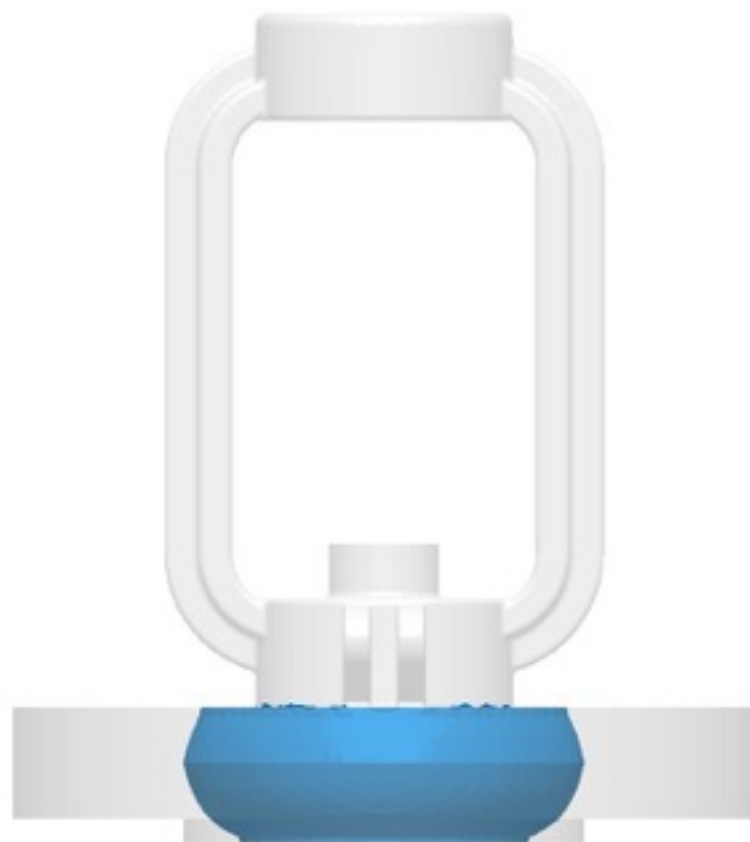


Fraction Liquid
%

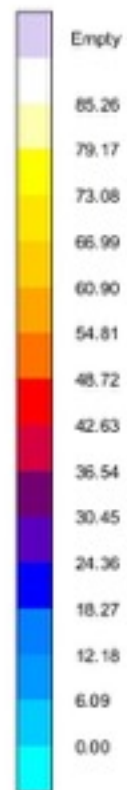


v04
Fraction Liquid
10.071s 7.63 %

MAGMA

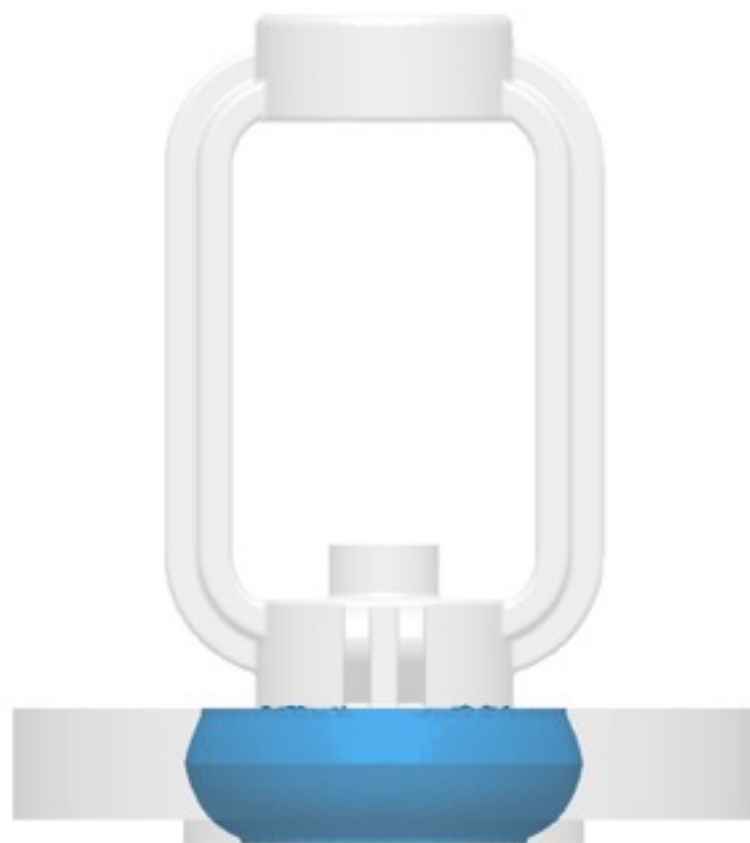


Fraction Liquid
%

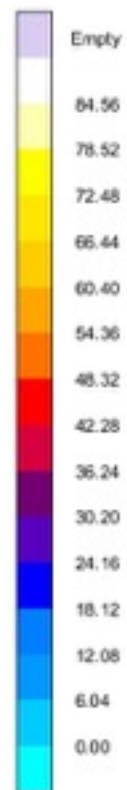


v04
Fraction Liquid
10.068s 7.58 %

MAGMA

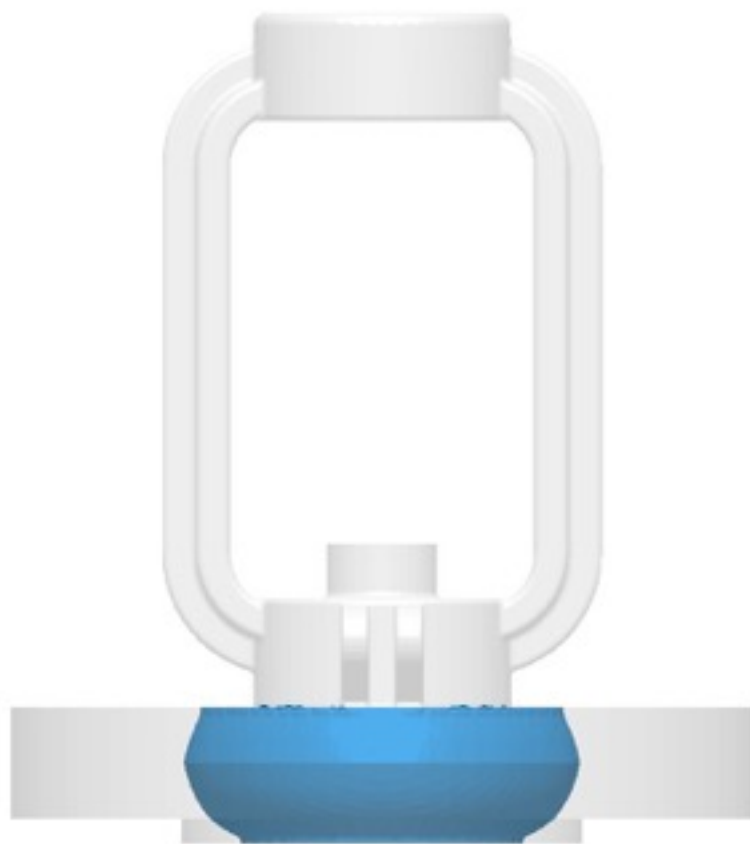


Fraction Liquid
%

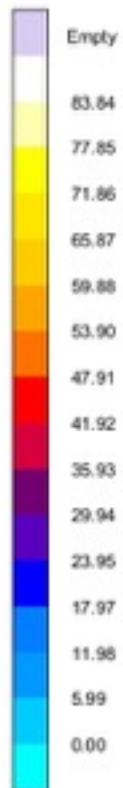


v04
Fraction Liquid
10.152s 7.39 %

MAGMA

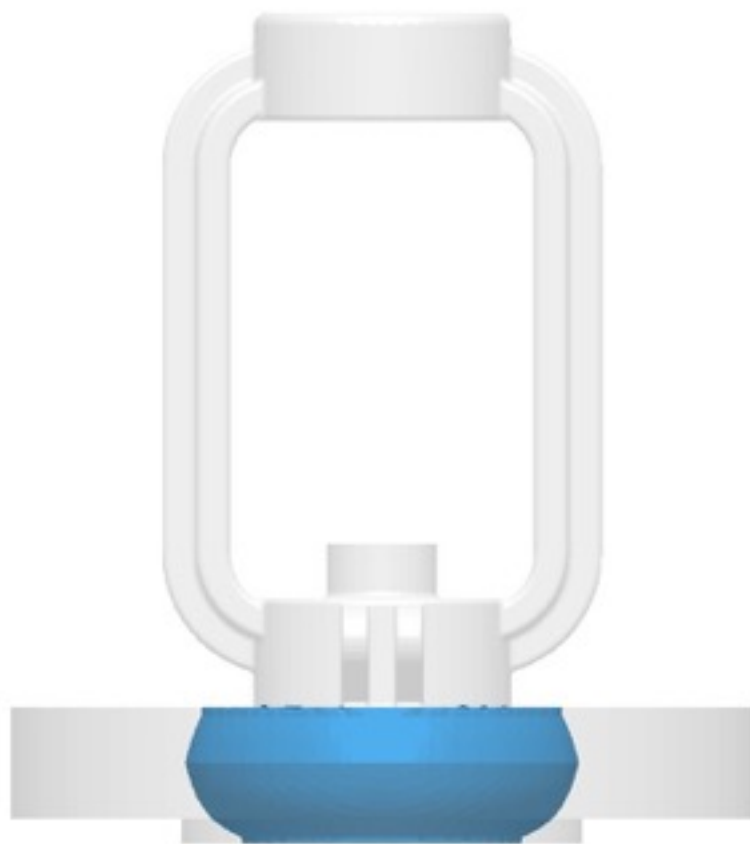


Fraction Liquid
%

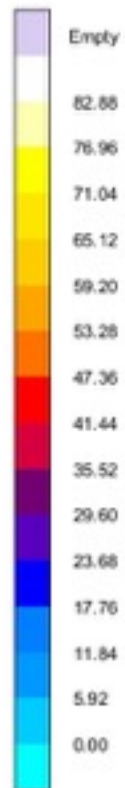


v04
Fraction Liquid
10.215s 7.20 %



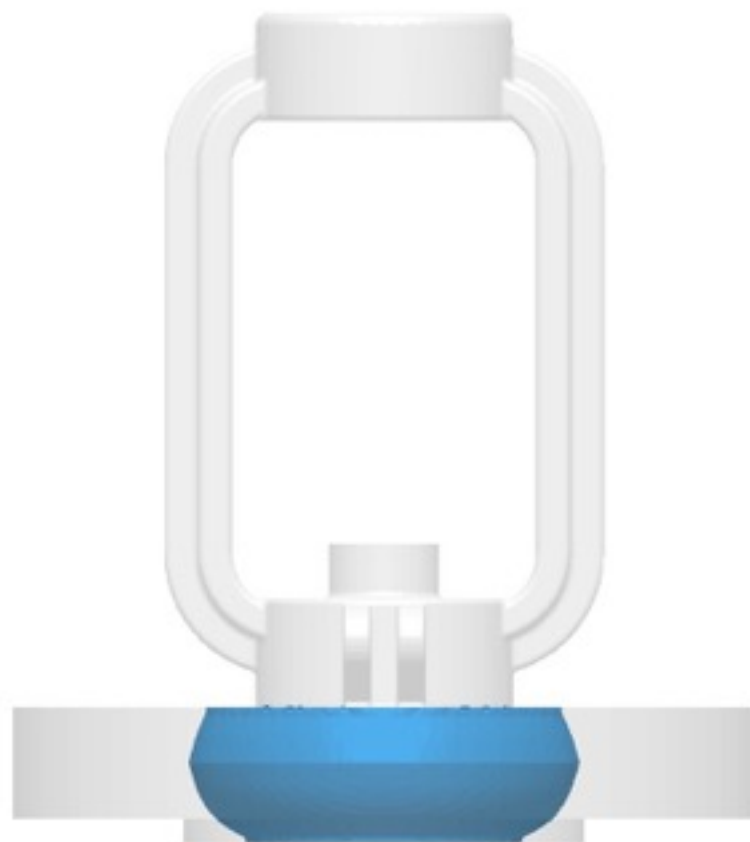


Fraction Liquid
%

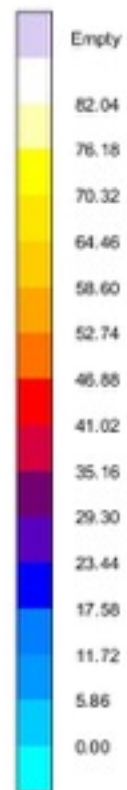


v04
Fraction Liquid
10.252s 6.97 %

MAGMA

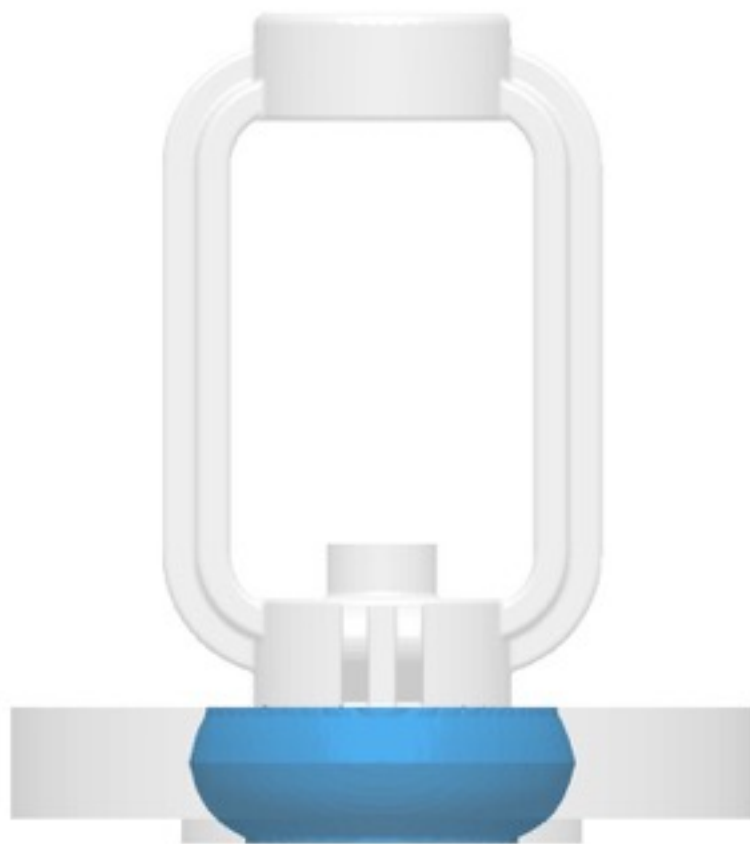


Fraction Liquid
%

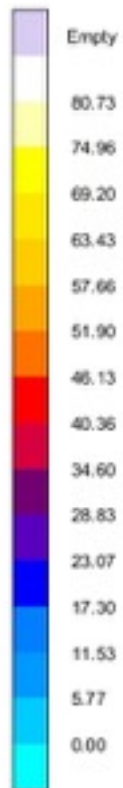


v04
Fraction Liquid
10.357s 6.78 %

MAGMA

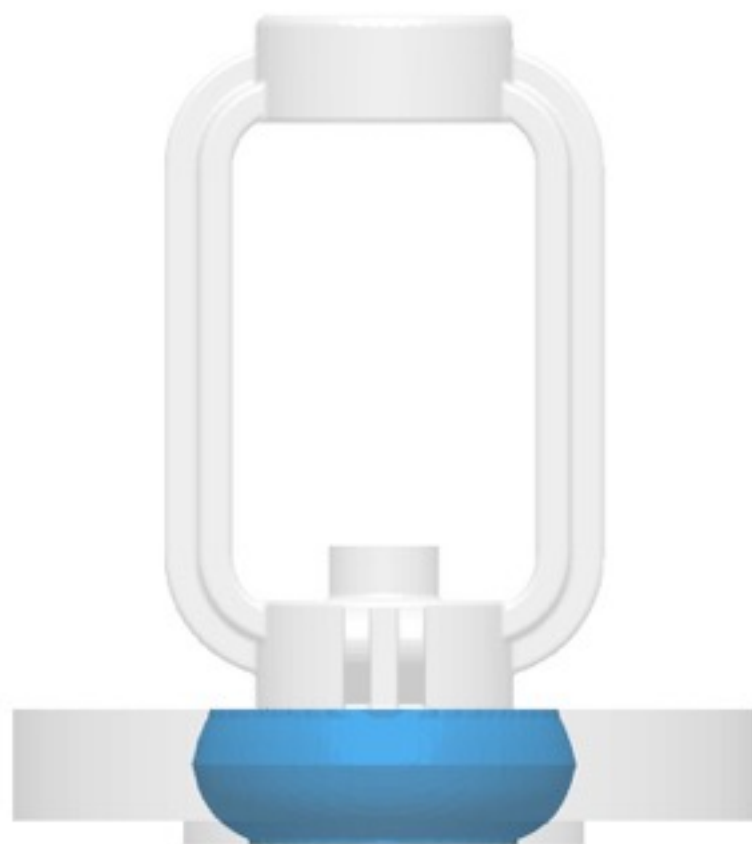


Fraction Liquid %

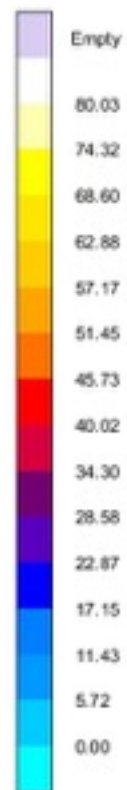


v04
Fraction Liquid
10.451s 6.51 %

MAGMA

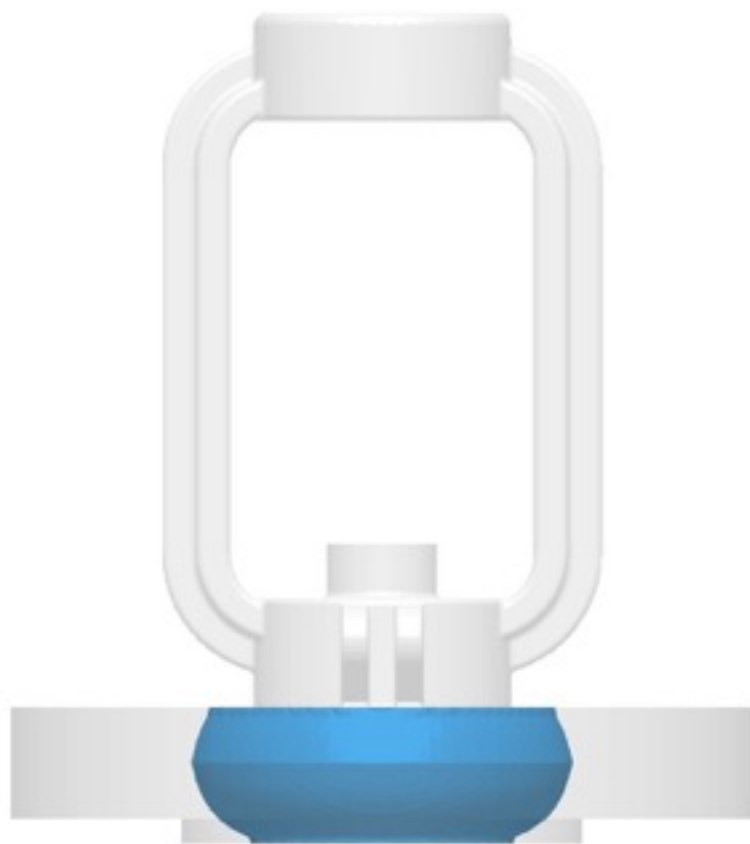


Fraction Liquid
%

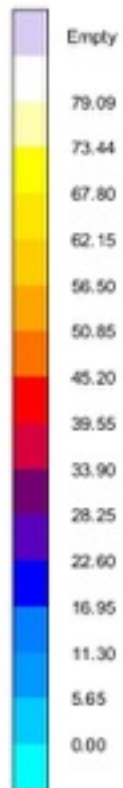


v04
Fraction Liquid
10.469s 6.37 %

MAGMA

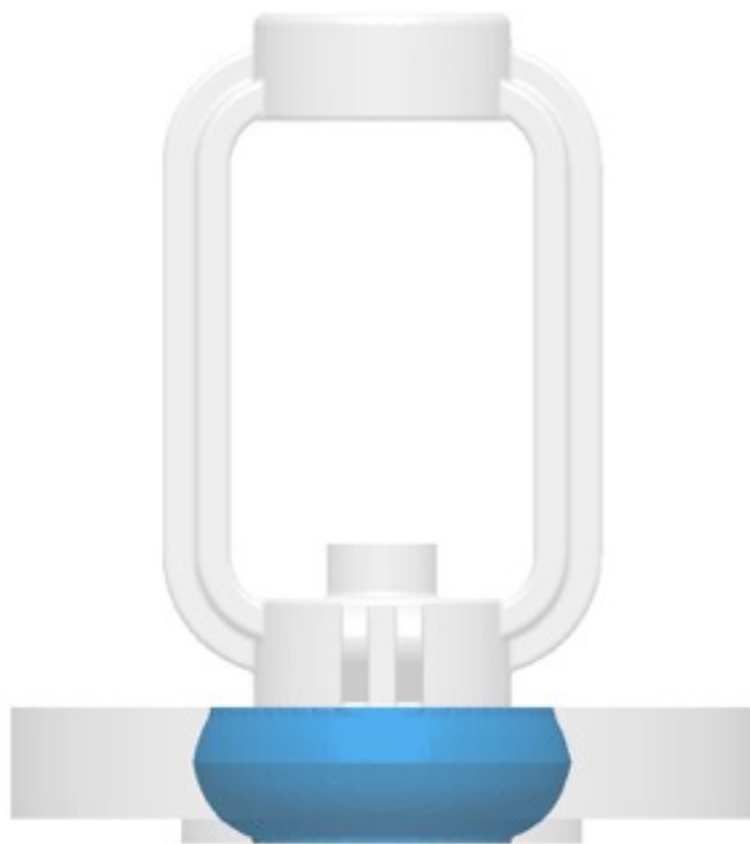


Fraction Liquid %

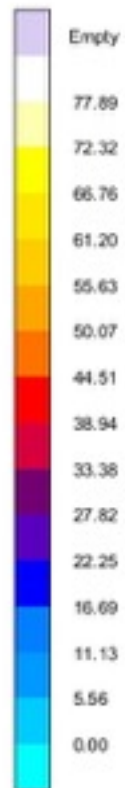


v04
Fraction Liquid
10.561s 6.19 %



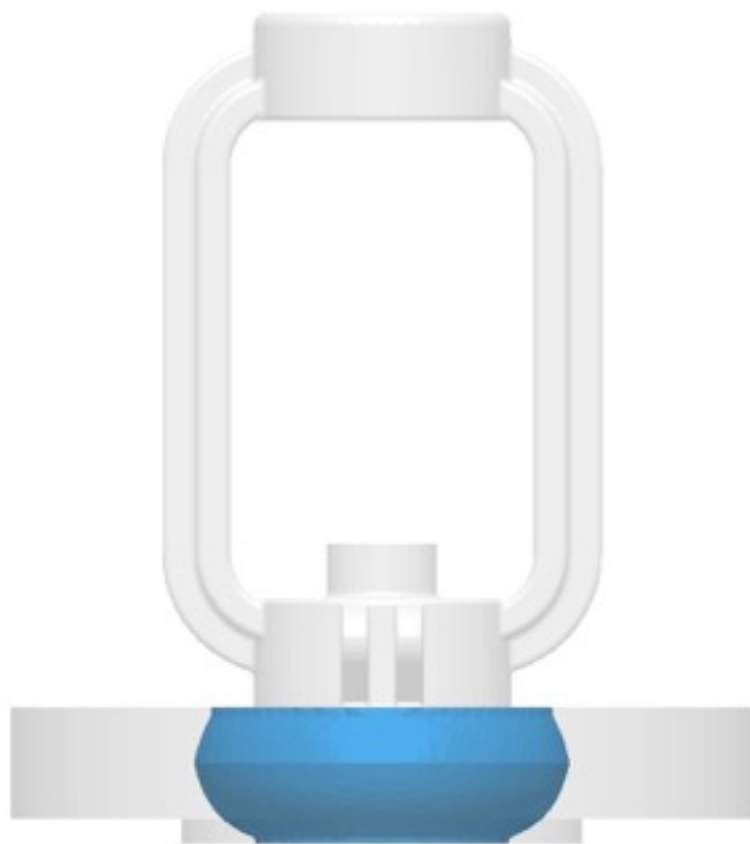


Fraction Liquid %

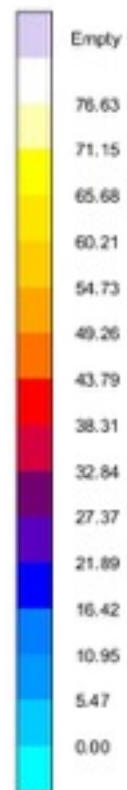


v04
Fraction Liquid
10.639s 5.98 %

MAGMA

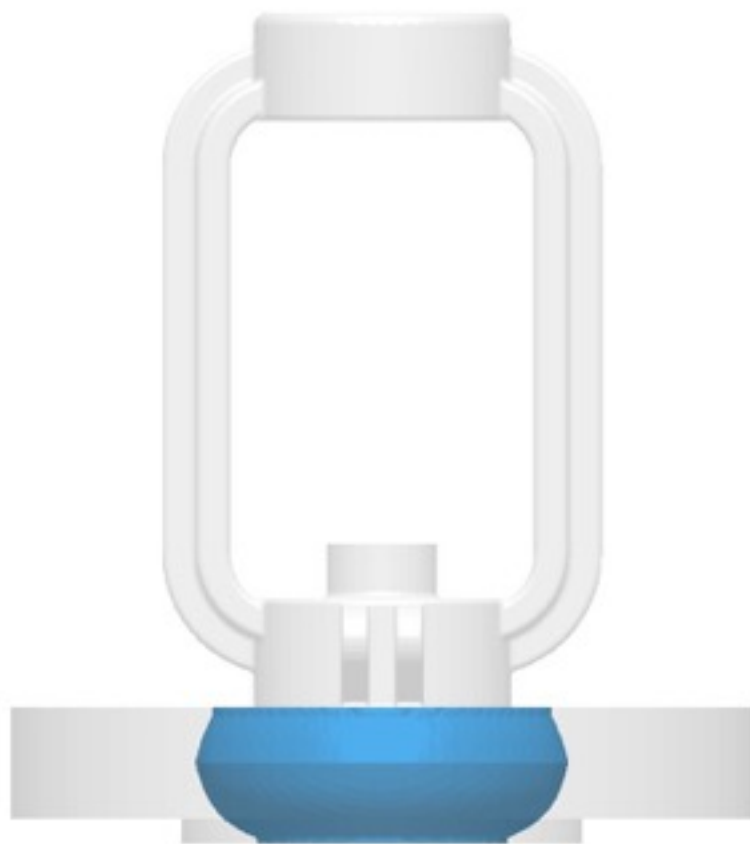


Fraction Liquid %

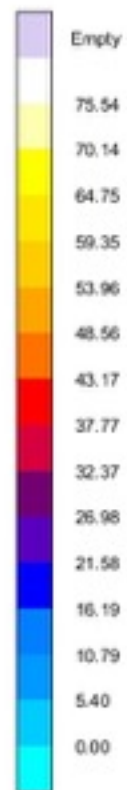


v04
Fraction Liquid
10.716s 5.77 %



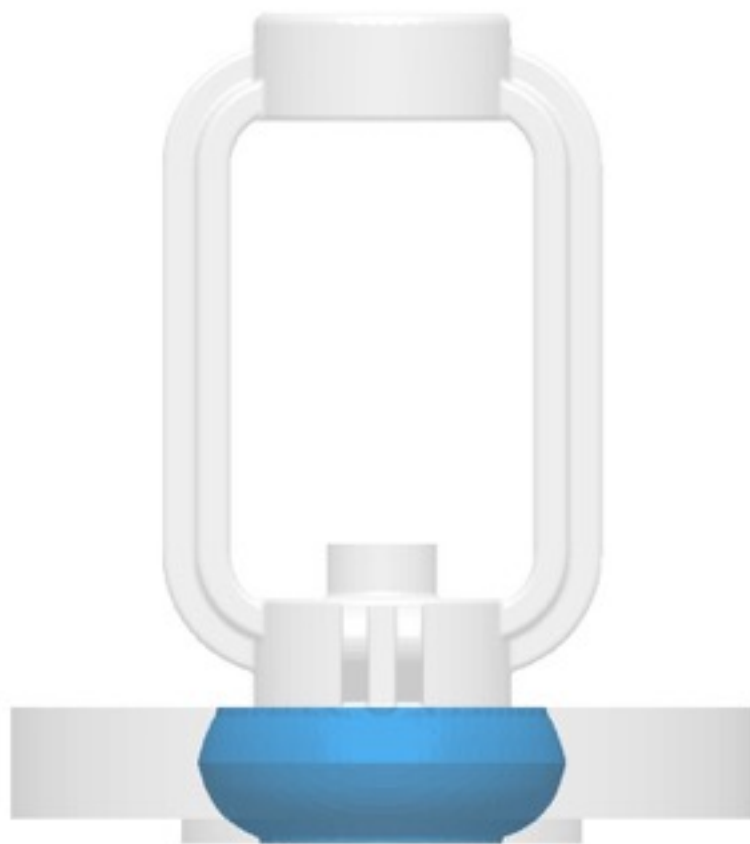


Fraction Liquid %

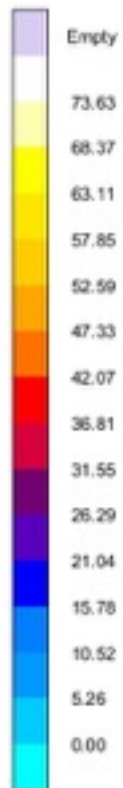


v04
Fraction Liquid
10.780s 5.59 %

MAGMA

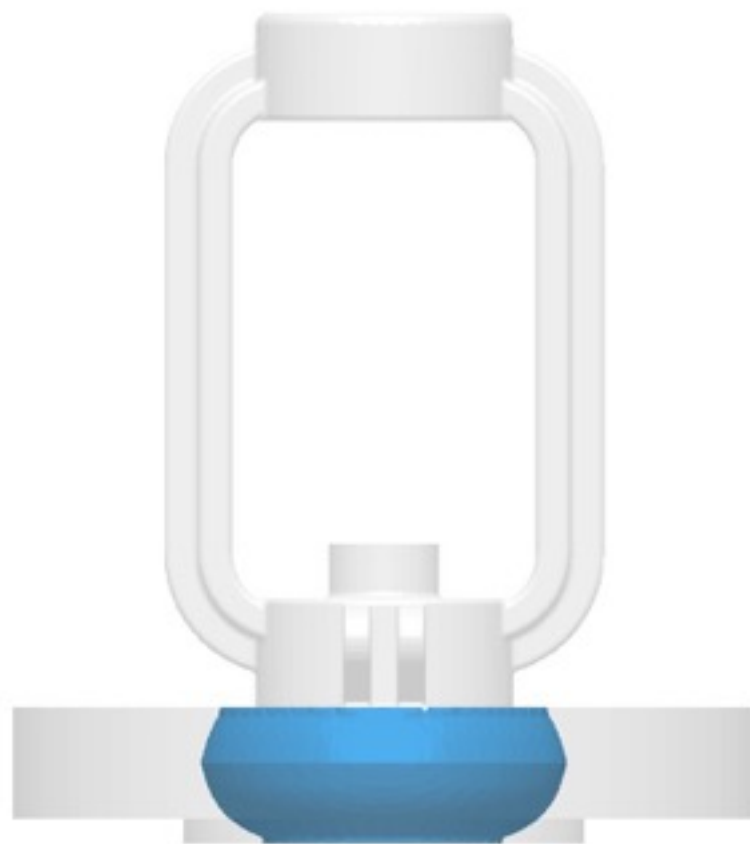


Fraction Liquid %

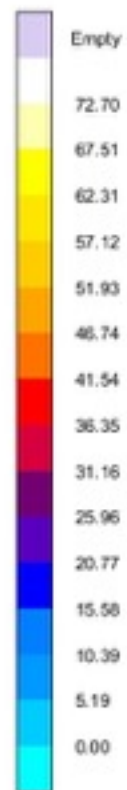


v04
Fraction Liquid
10.888s 5.31 %



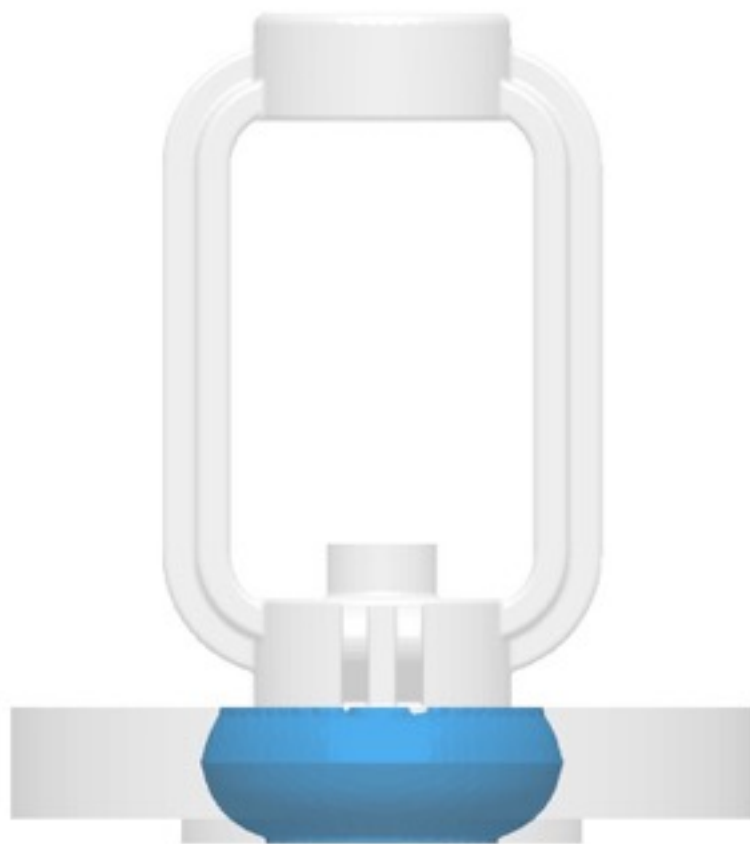


Fraction Liquid
%

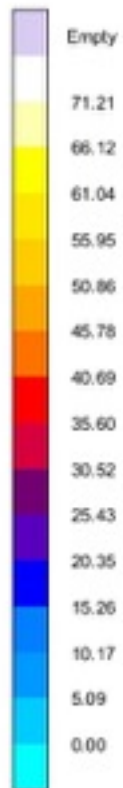


v04
Fraction Liquid
10.937s 5.18 %

MAGMA

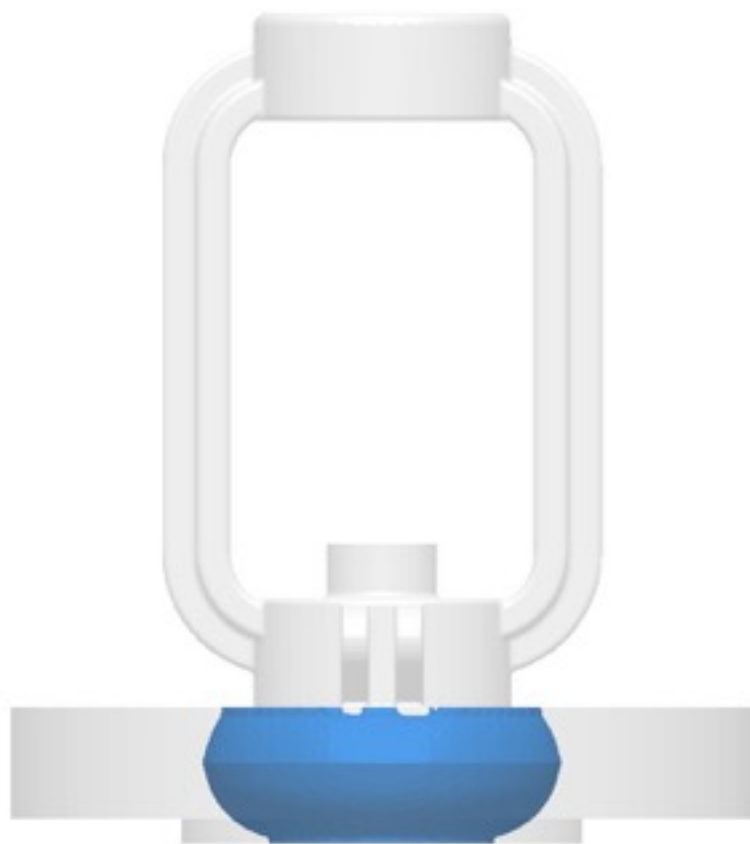


Fraction Liquid %

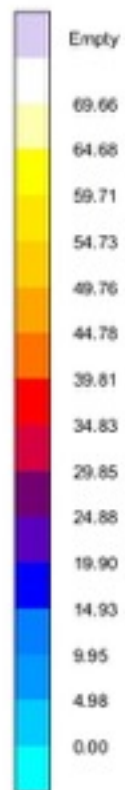


v04
Fraction Liquid
11.015s 4.97 %



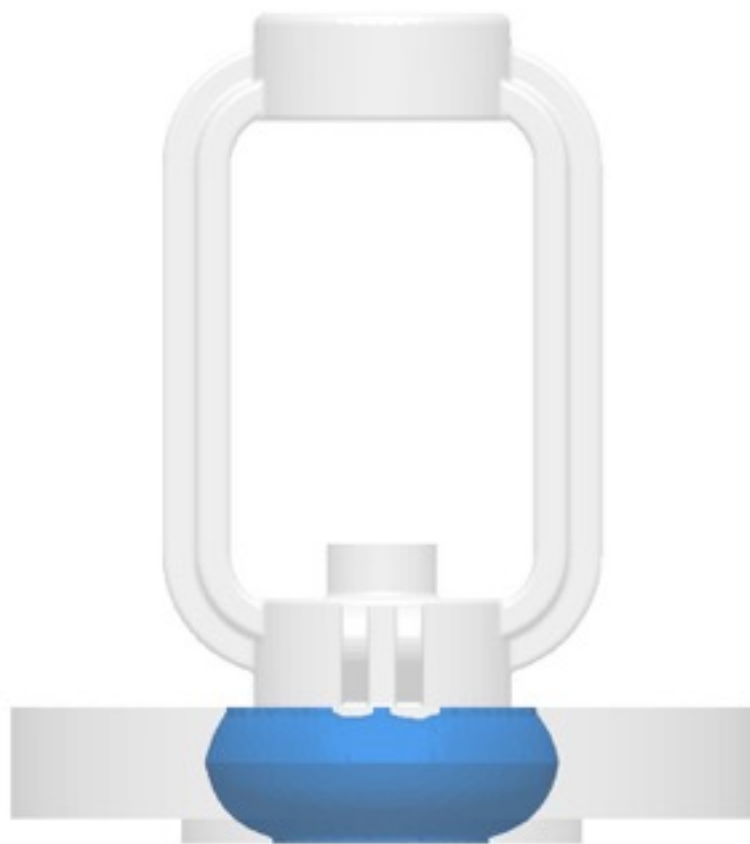


Fraction Liquid
%

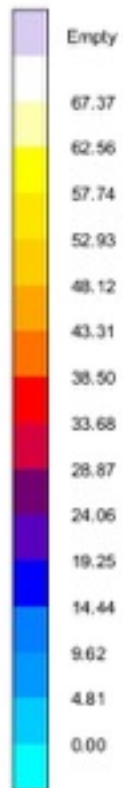


v04
Fraction Liquid
11.052s 4.77 %

MAGMA

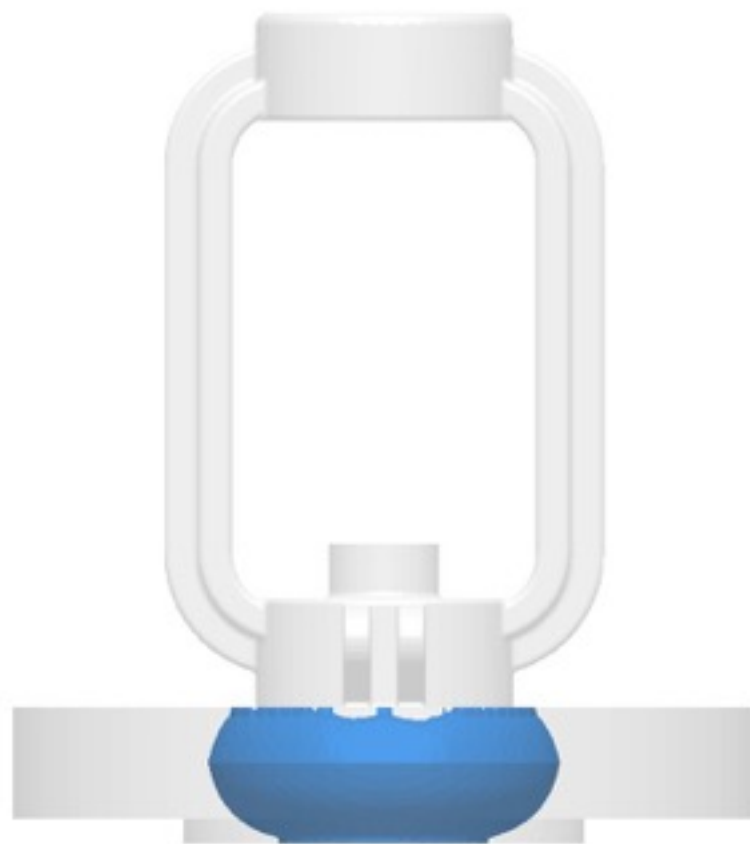


Fraction Liquid %

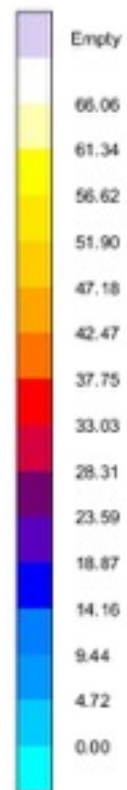


v04
Fraction Liquid
11.203s 4.49 %



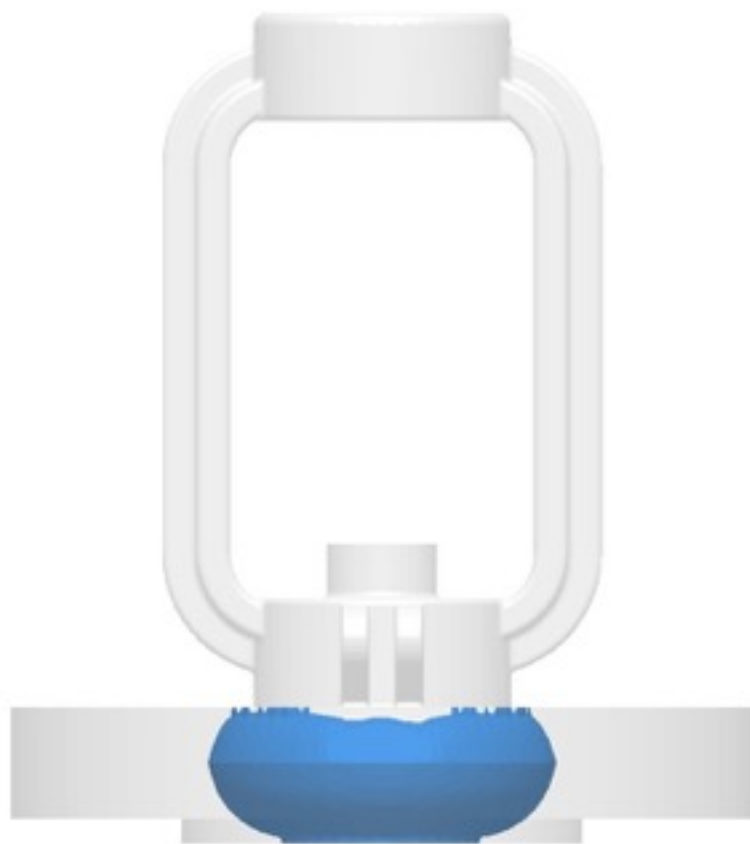


Fraction Liquid
%

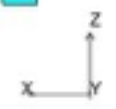
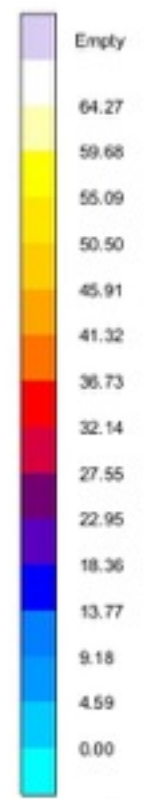


v04
Fraction Liquid
11.264s 4.34 %

MAGMA

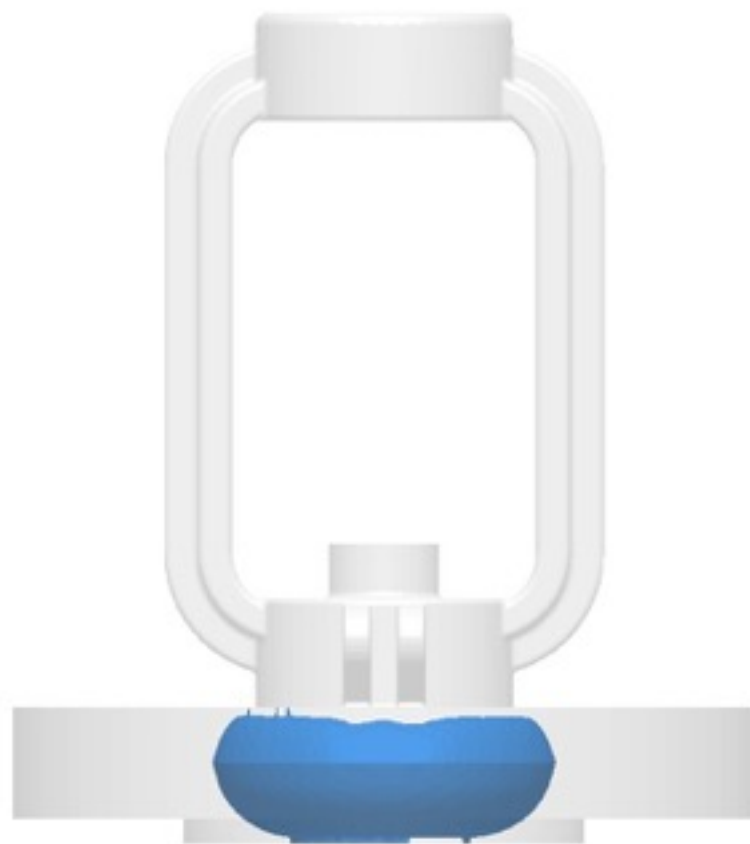


Fraction Liquid %

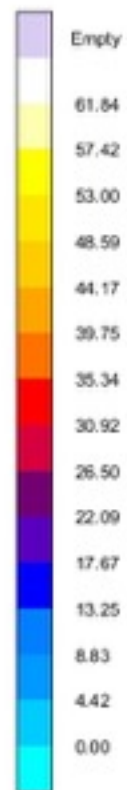


v04
Fraction Liquid
11.344s 4.14 %



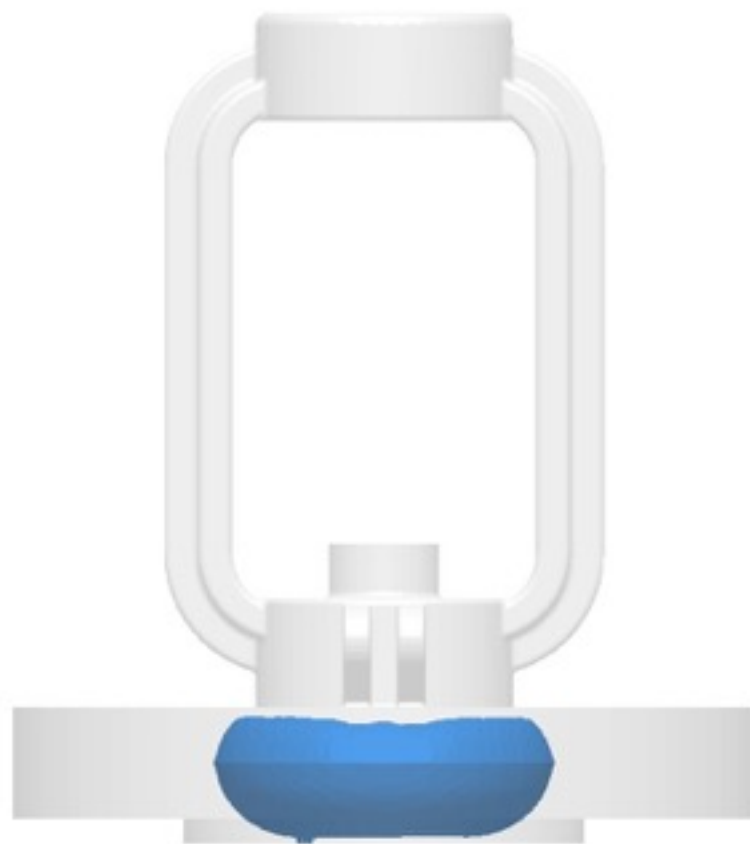


Fraction Liquid
%

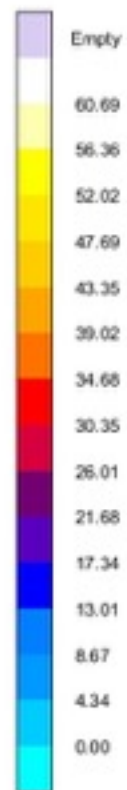


v04
Fraction Liquid
11.452s 3.88 %

MAGMA

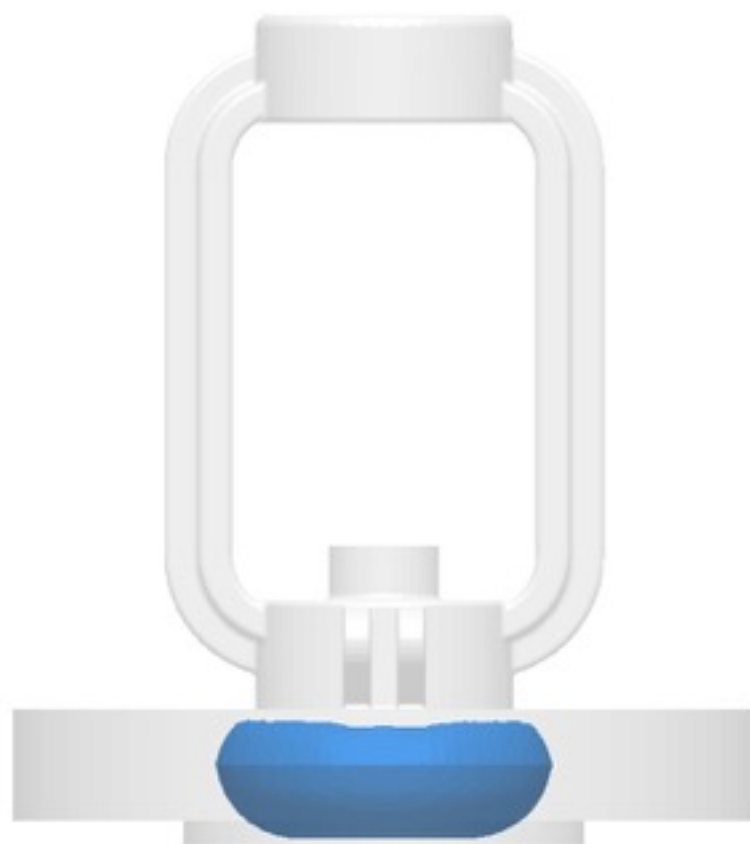


Fraction Liquid
%

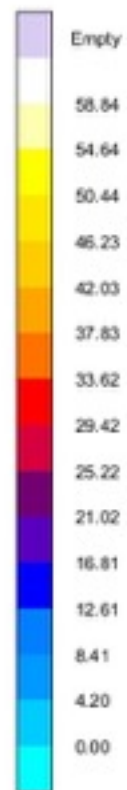


v04
Fraction Liquid
11.561s 3.77 %

MAGMA

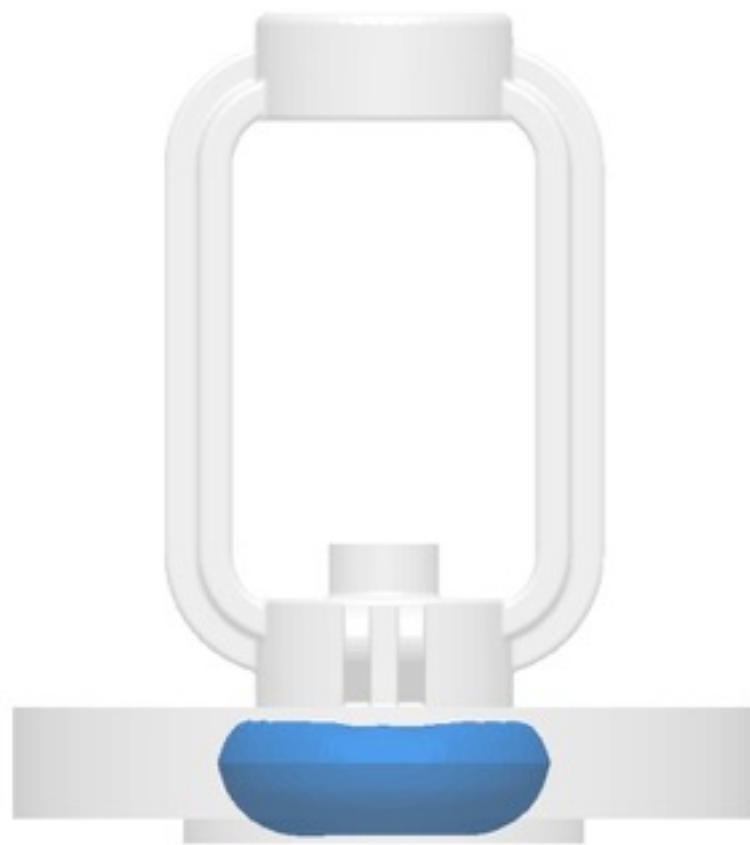


Fraction Liquid
%

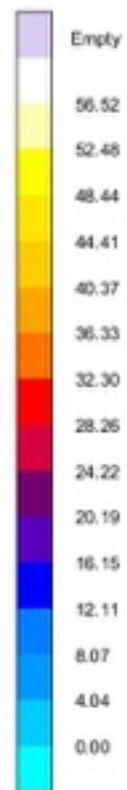


v04
Fraction Liquid
11.579s 3.58 %

MAGMA

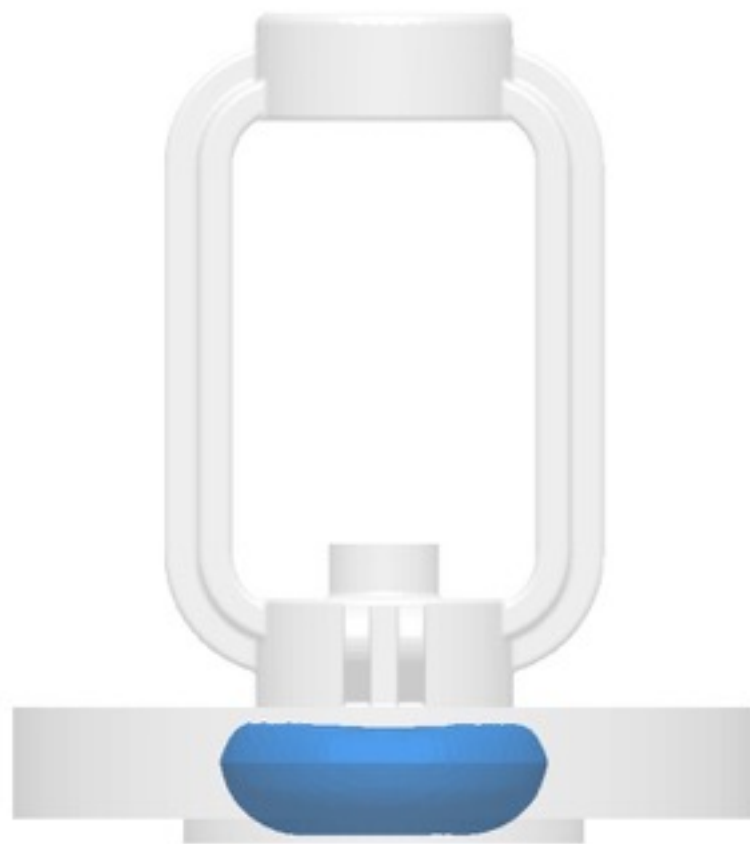


Fraction Liquid
%

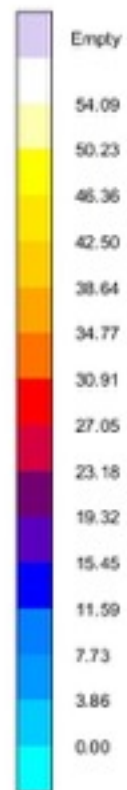


v04
Fraction Liquid
11.673s 3.37 %

MAGMA

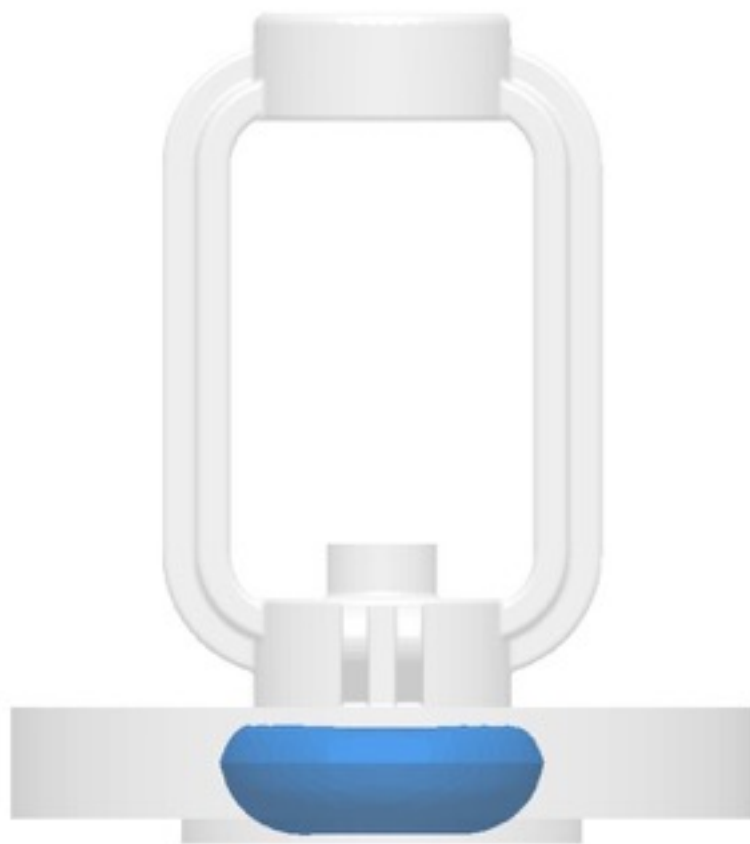


Fraction Liquid
%



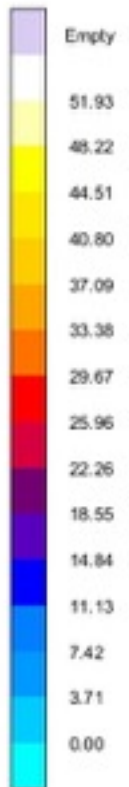
v04
Fraction Liquid
11.767s 3.16 %

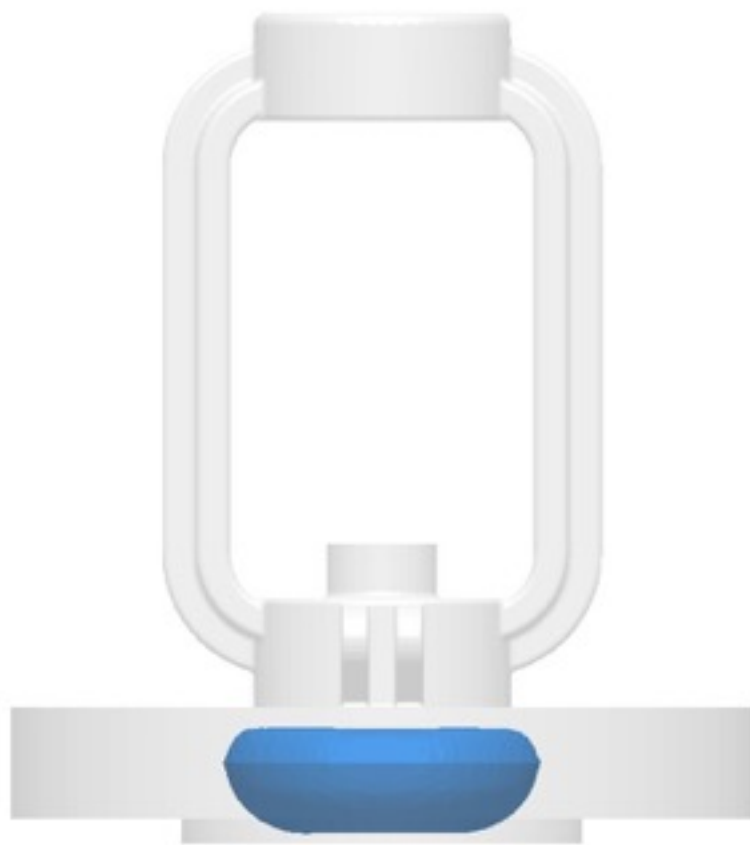
MAGMA



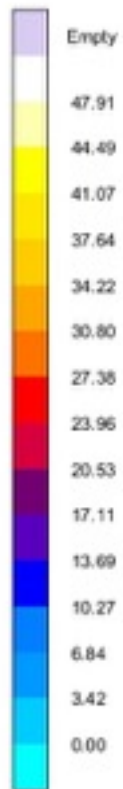
v04
Fraction Liquid
11.847s 2.98 %

Fraction Liquid
%



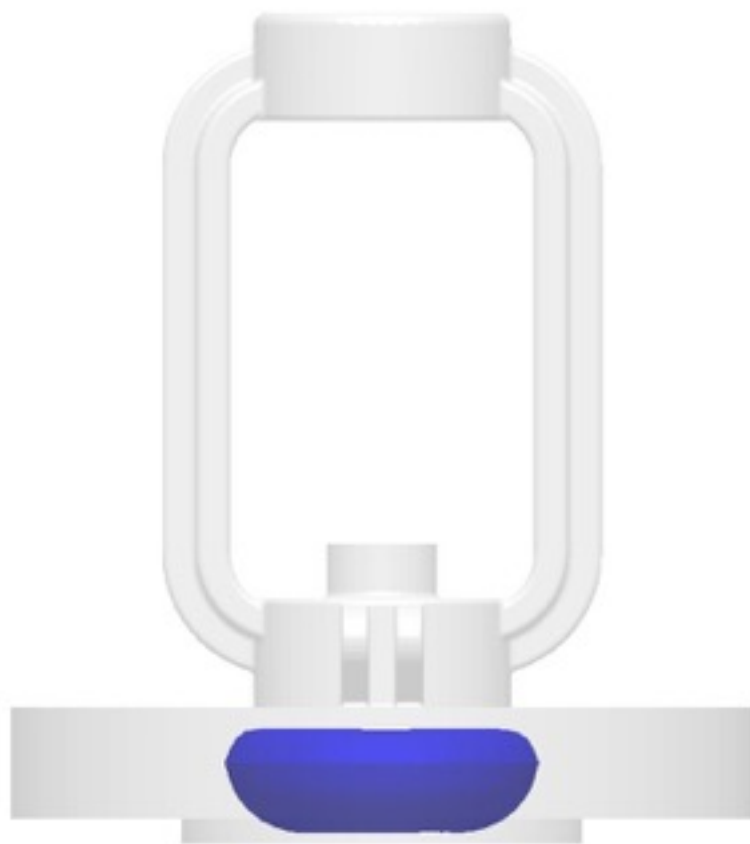


Fraction Liquid
%

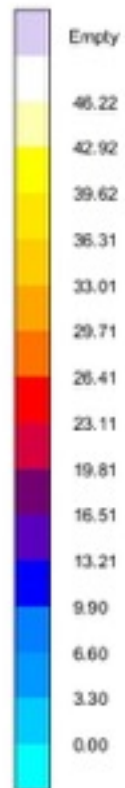


v04
Fraction Liquid
11.966s 2.69 %



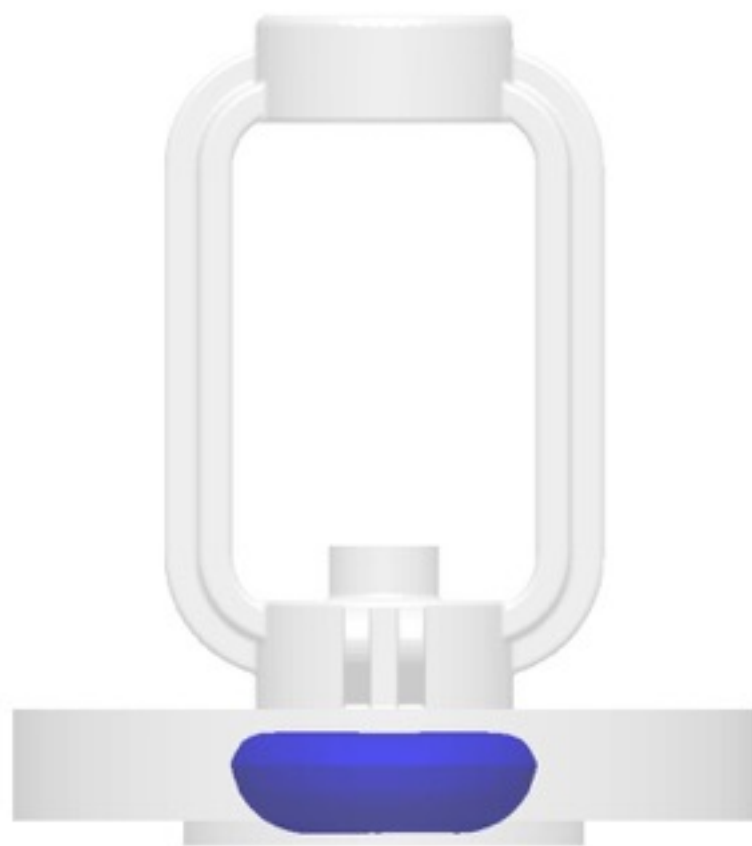


Fraction Liquid %

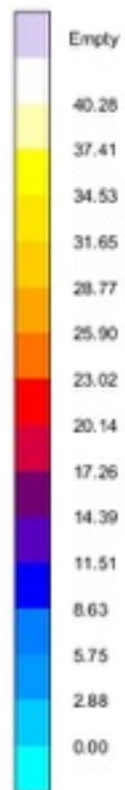


v04
Fraction Liquid
12.036s 2.59 %

MAGMA

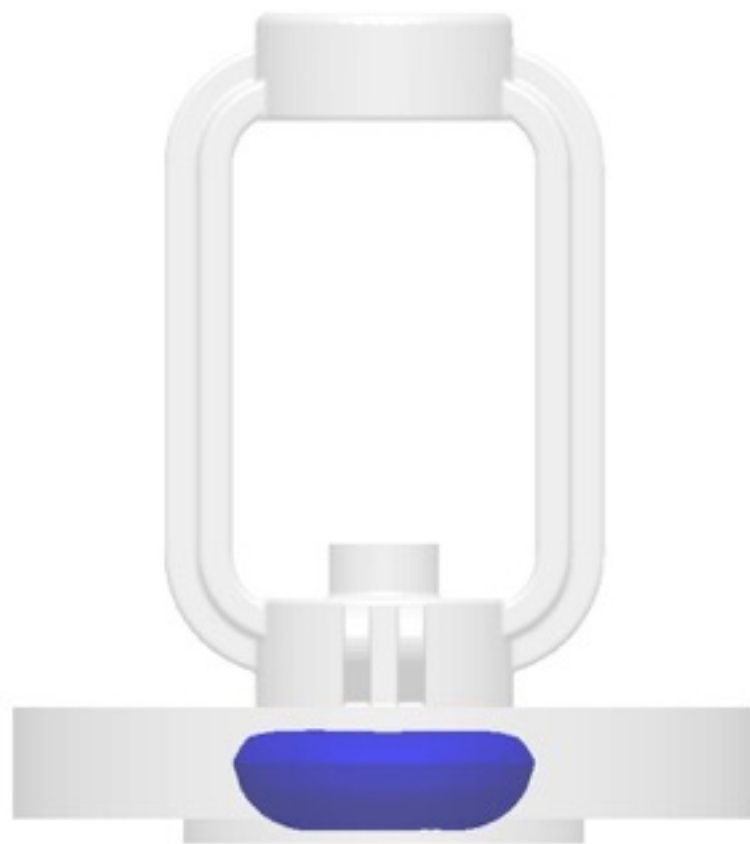


Fraction Liquid
%

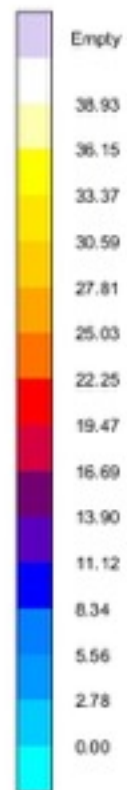


v04
Fraction Liquid
12.174s 2.33 %

MAGMA

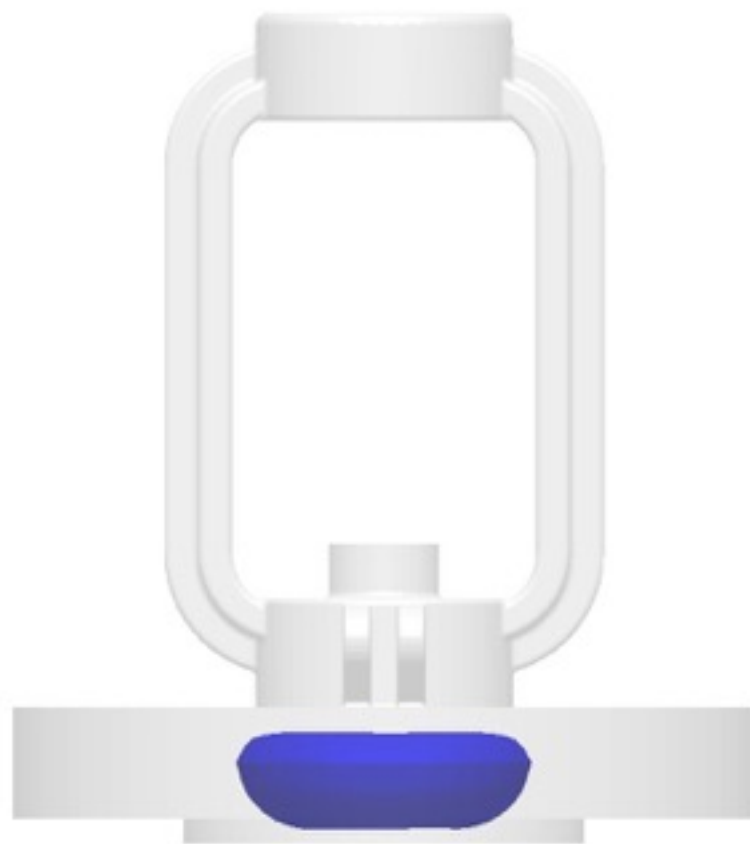


Fraction Liquid
%

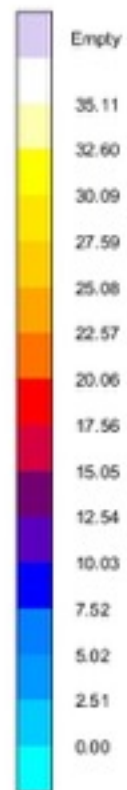


v04
Fraction Liquid
12.256s 2.18 %

MAGMA

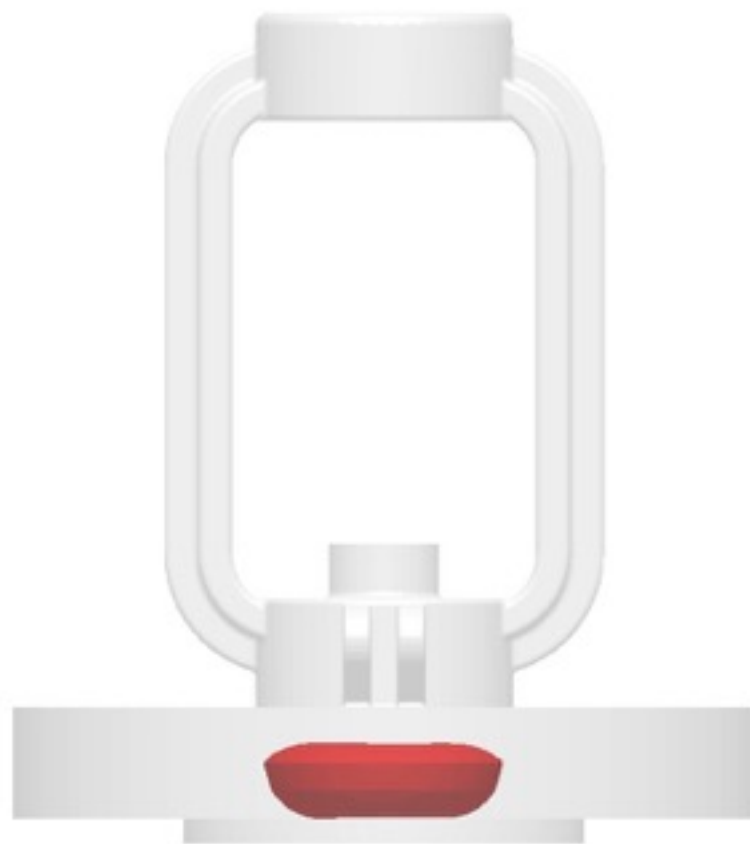


Fraction Liquid
%

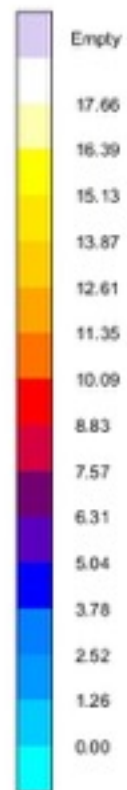


v04
Fraction Liquid
12.366s 1.98 %

MAGMA



Fraction Liquid
%

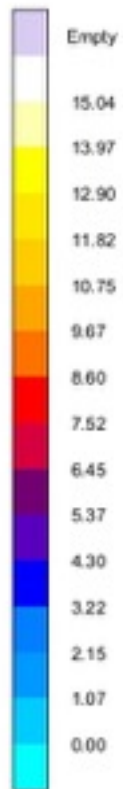


v04
Fraction Liquid
13.049s 0.96 %

MAGMA

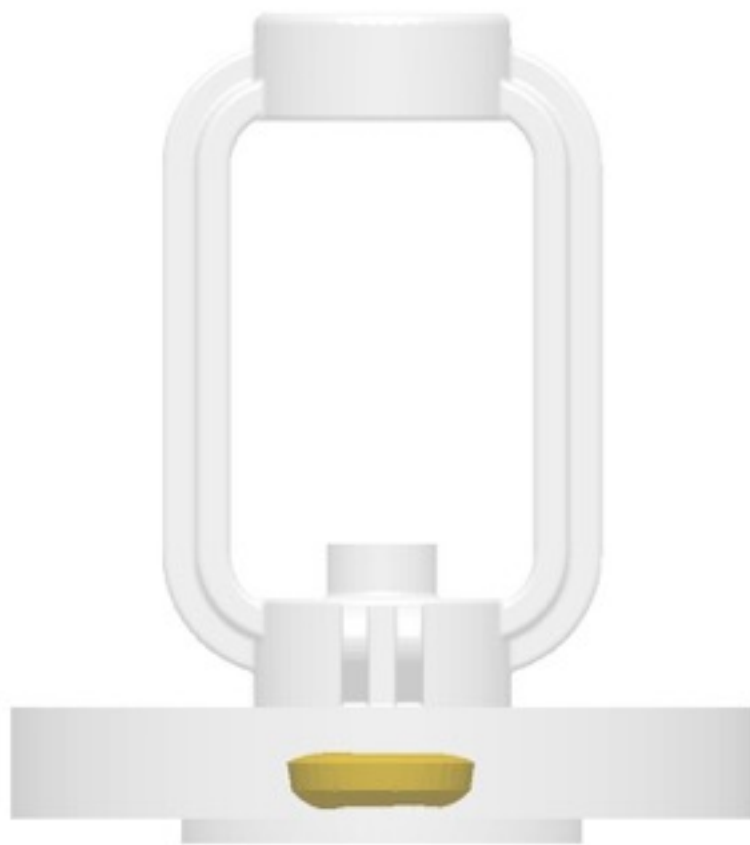


Fraction Liquid %

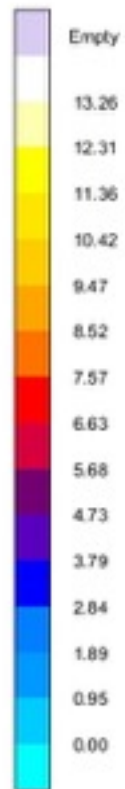


v04
Fraction Liquid
13.236s 0.75 %

MAGMA



Fraction Liquid
%

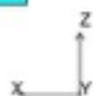
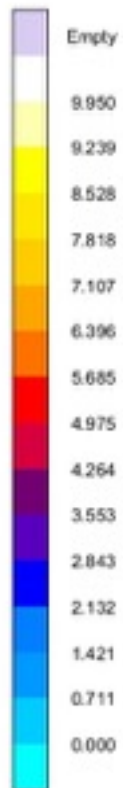


v04
Fraction Liquid
13.406s 0.59 %

MAGMA



Fraction Liquid %

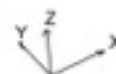
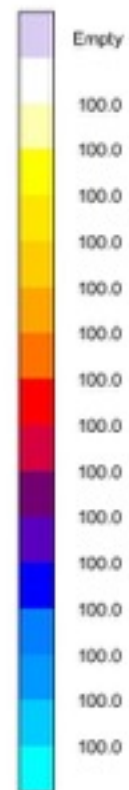


v04
Fraction Liquid
13.711s 0.34 %

MAGMA

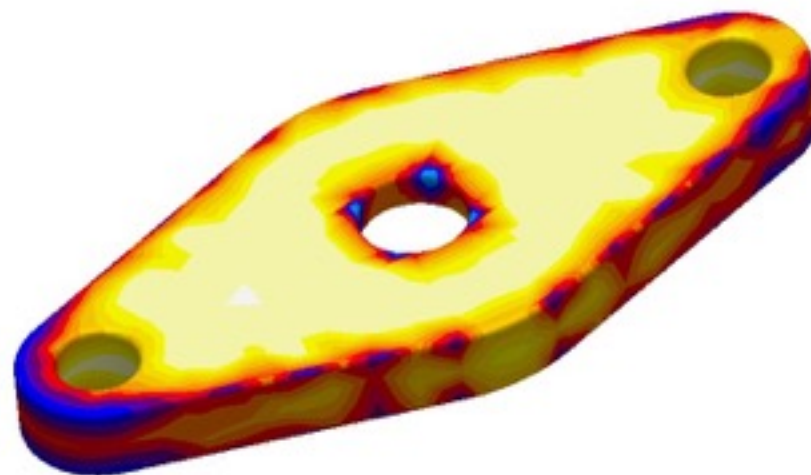


Fraction Liquid %

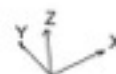
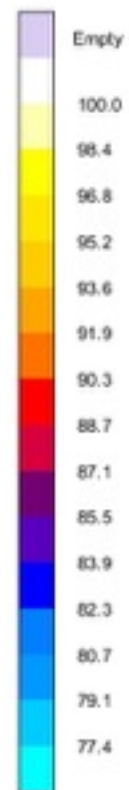


v05
Fraction Liquid
0.0ms 100.00 %

MAGMA

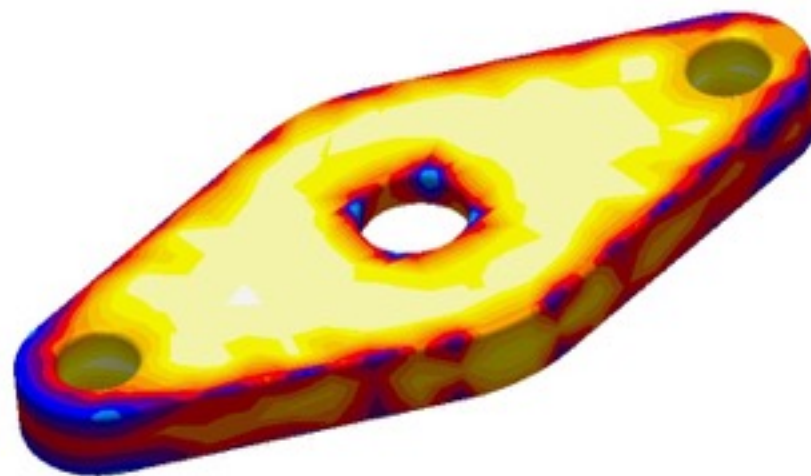


Fraction Liquid %

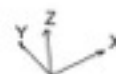
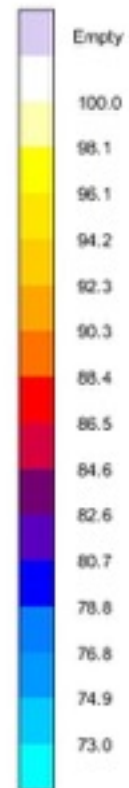


v05
Fraction Liquid
133.7ms 97.00 %

MAGMA

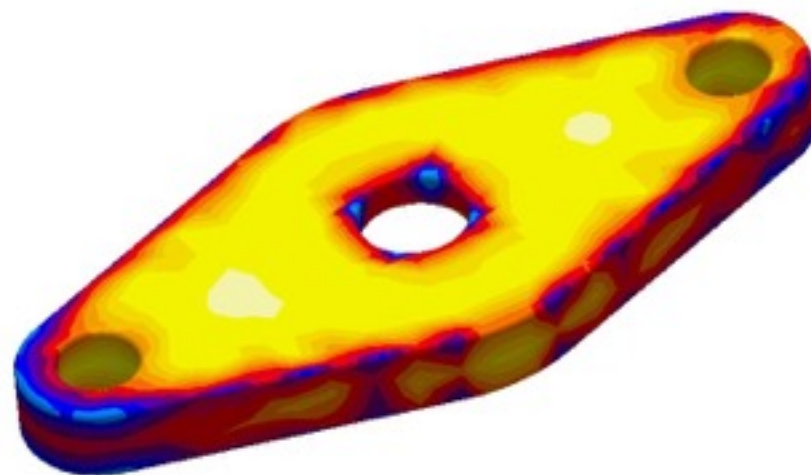


Fraction Liquid
%

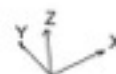
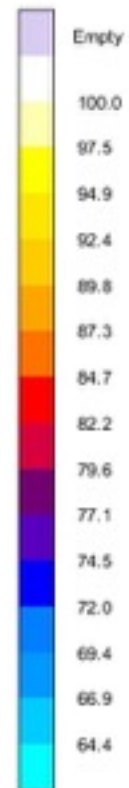


v05
Fraction Liquid
152.8ms 95.64 %

MAGMA

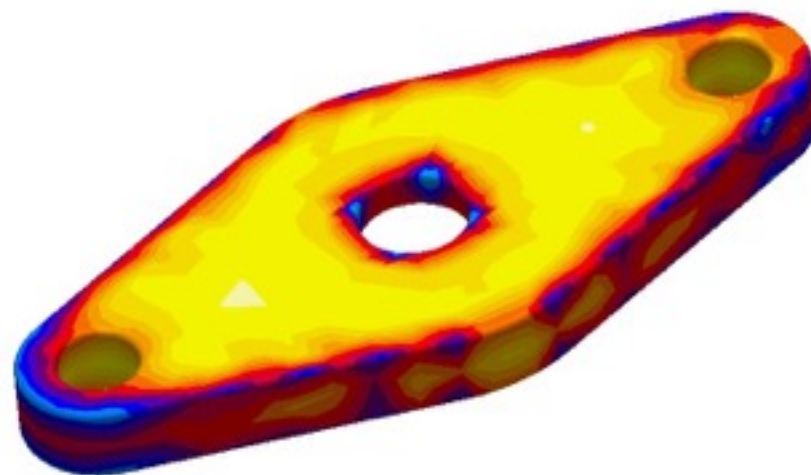


Fraction Liquid
%

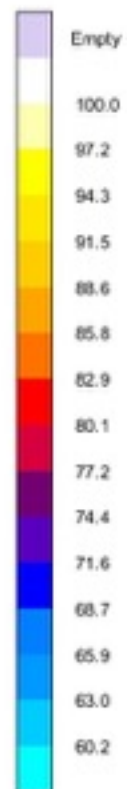


v05
Fraction Liquid
191.0ms 92.77 %

MAGMA

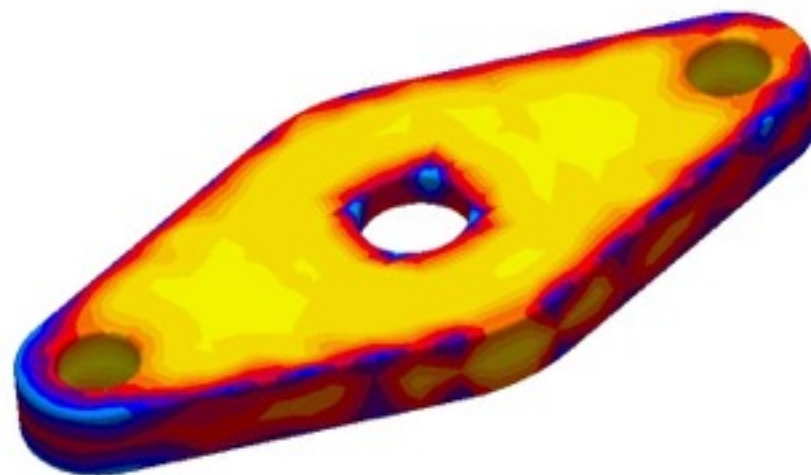


Fraction Liquid
%

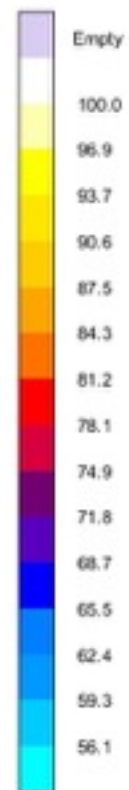


v05
Fraction Liquid
210.1ms 91.35 %

MAGMA

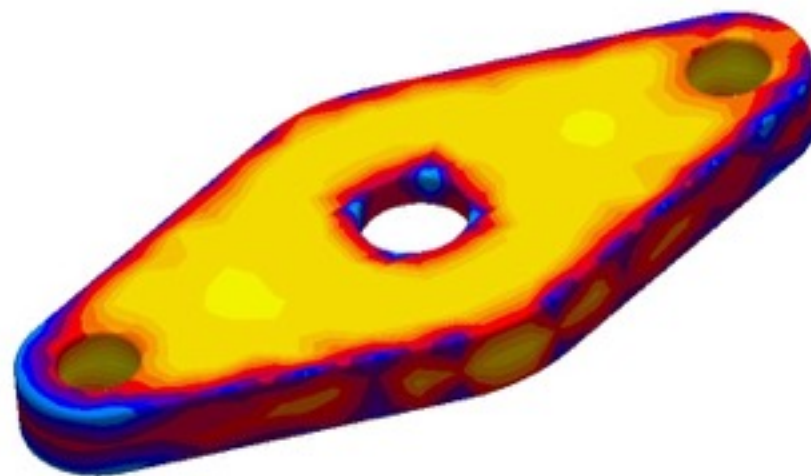


Fraction Liquid
%

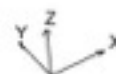
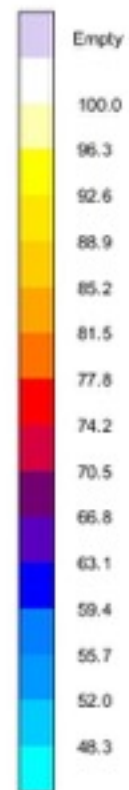


v05
Fraction Liquid
229.2ms 89.95 %

MAGMA

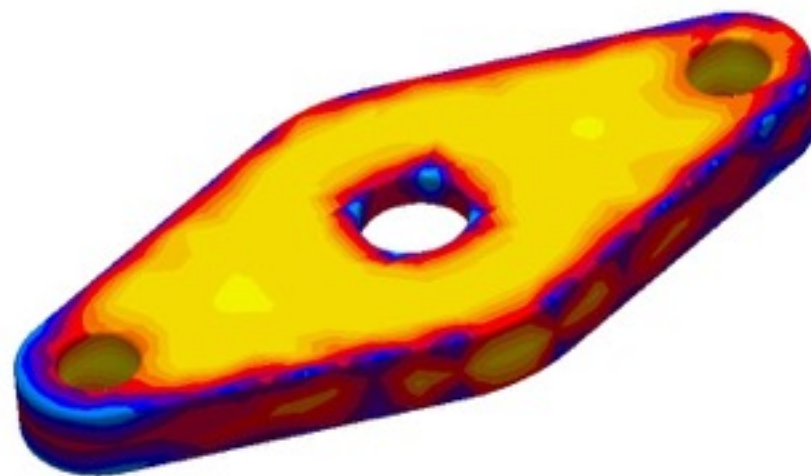


Fraction Liquid %

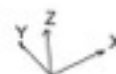
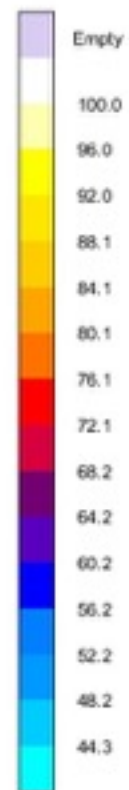


v05
Fraction Liquid
267.4ms 87.21 %

MAGMA

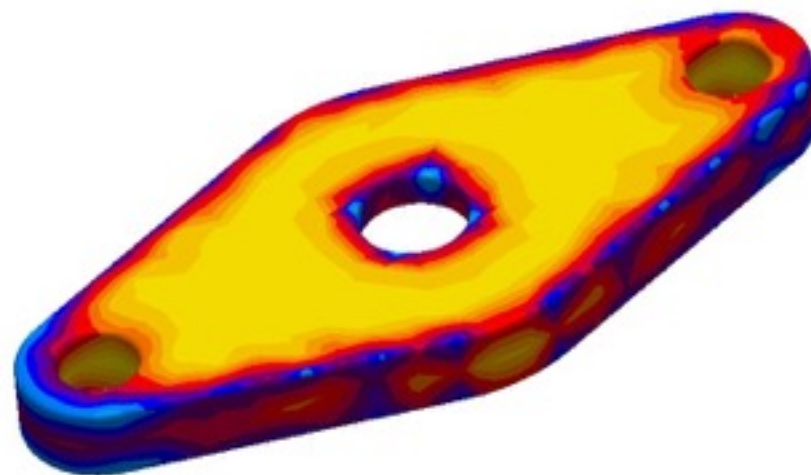


Fraction Liquid %

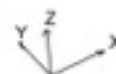
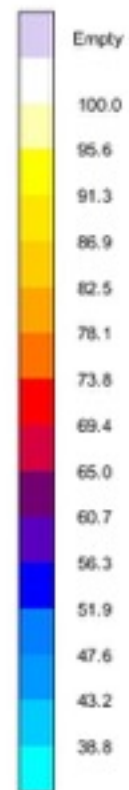


v05
Fraction Liquid
286.5ms 85.87 %

MAGMA

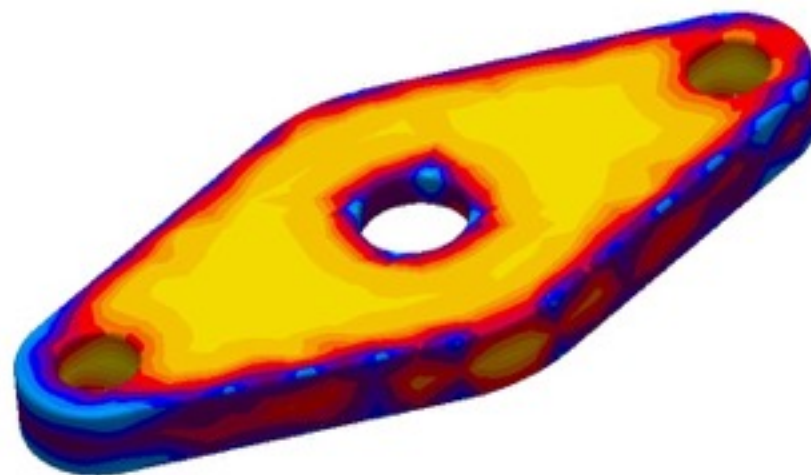


Fraction Liquid
%

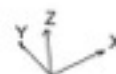
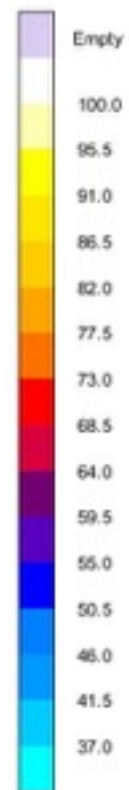


v05
Fraction Liquid
324.7ms 83.24 %

MAGMA

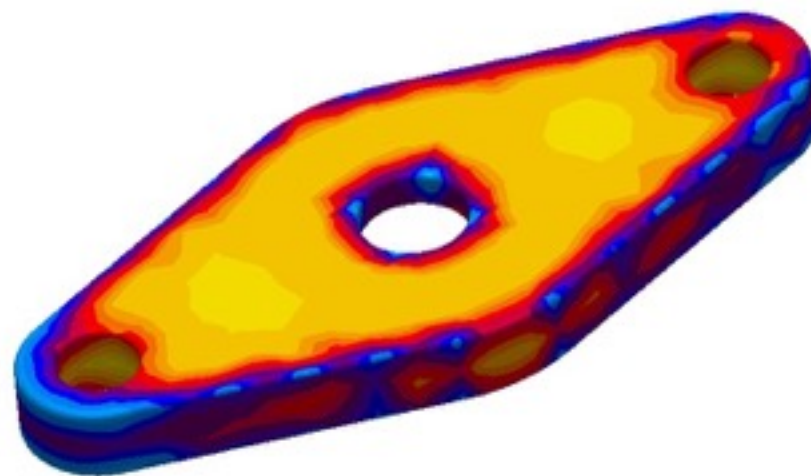


Fraction Liquid
%

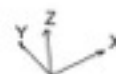
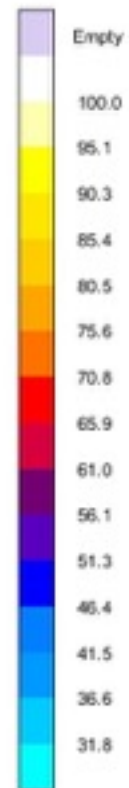


v05
Fraction Liquid
343.6ms 81.94 %

MAGMA

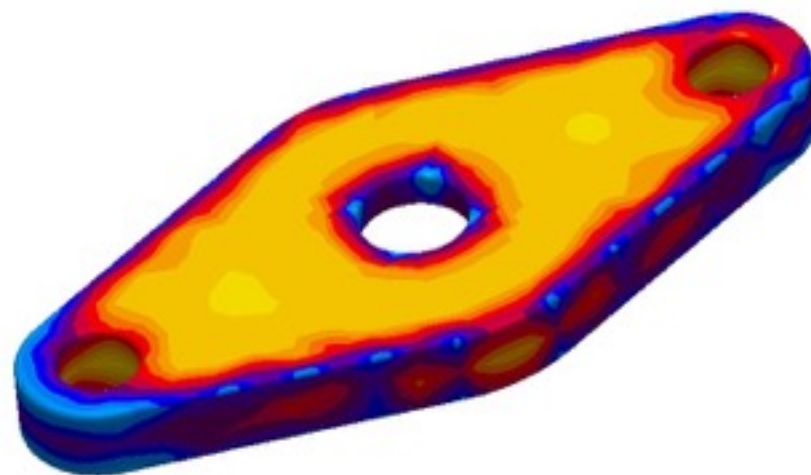


Fraction Liquid
%

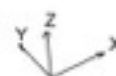
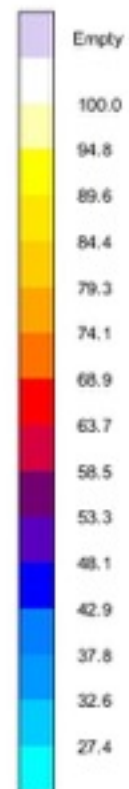


v05
Fraction Liquid
352.0ms 79.38 %

MAGMA

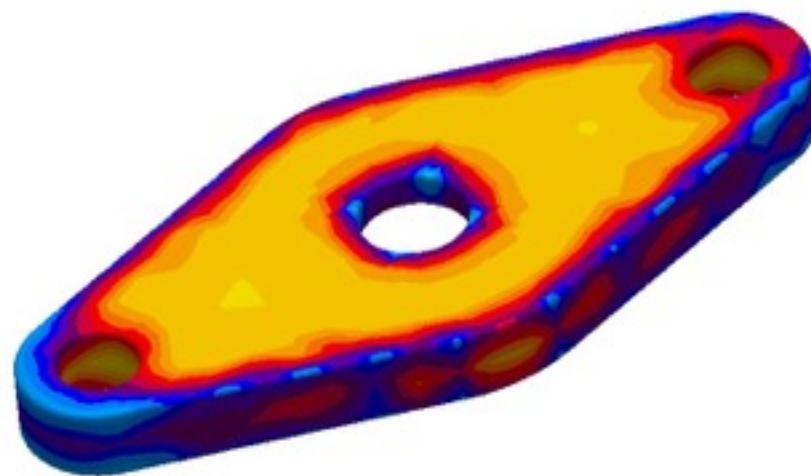


Fraction Liquid
%

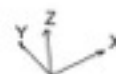
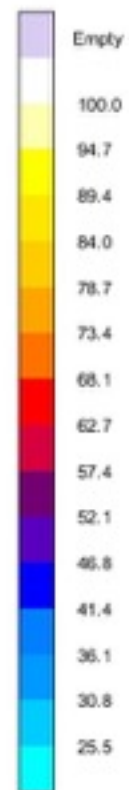


v05
Fraction Liquid
420.2ms 76.98 %

MAGMA

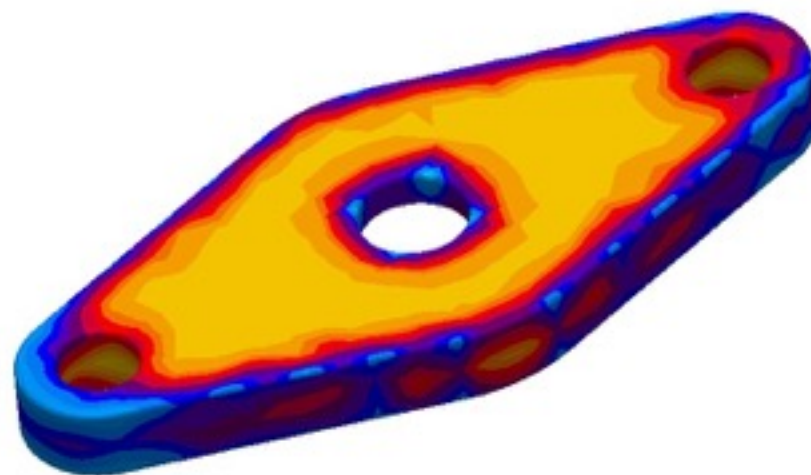


Fraction Liquid %

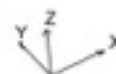
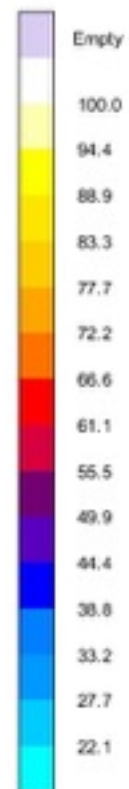


v05
Fraction Liquid
439.3ms 75.76 %

MAGMA

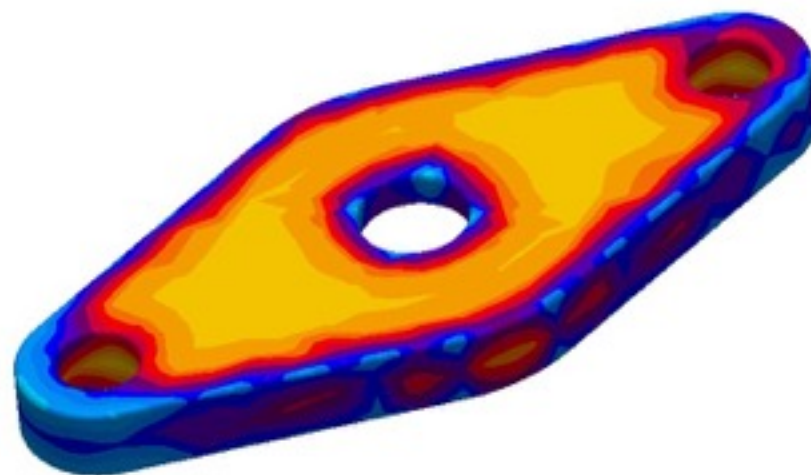


Fraction Liquid %

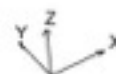
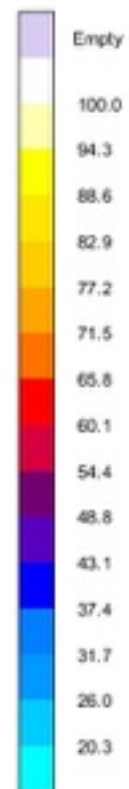


v05
Fraction Liquid
477.5ms 73.33 %

MAGMA

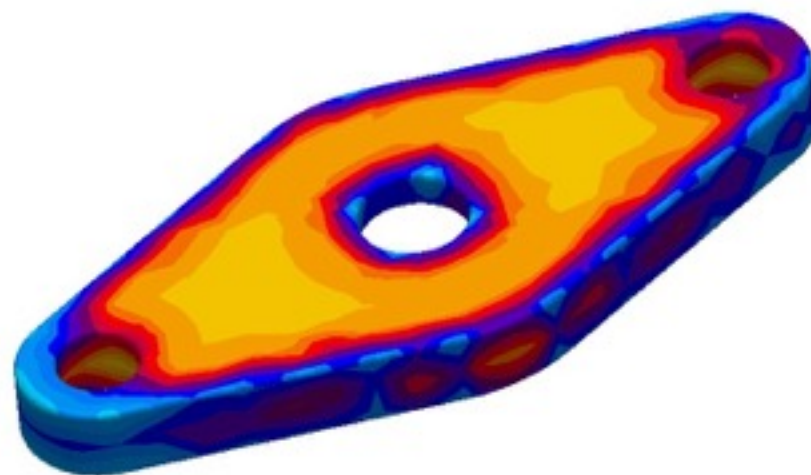


Fraction Liquid %

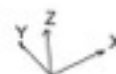
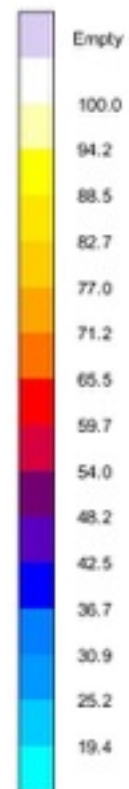


v05
Fraction Liquid
515.7ms 70.90 %

MAGMA

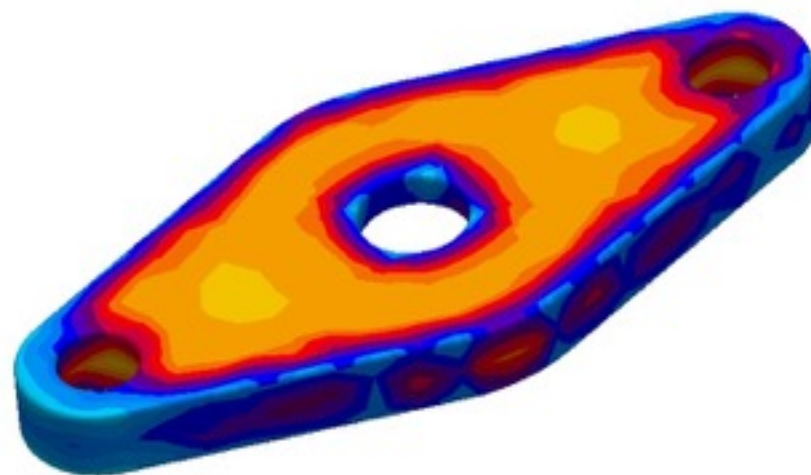


Fraction Liquid %

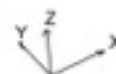
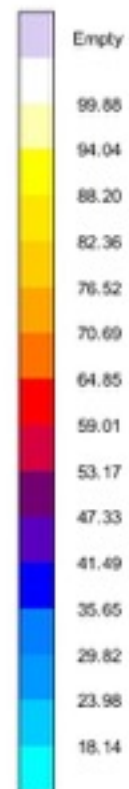


v05
Fraction Liquid
534.8ms 69.72 %

MAGMA

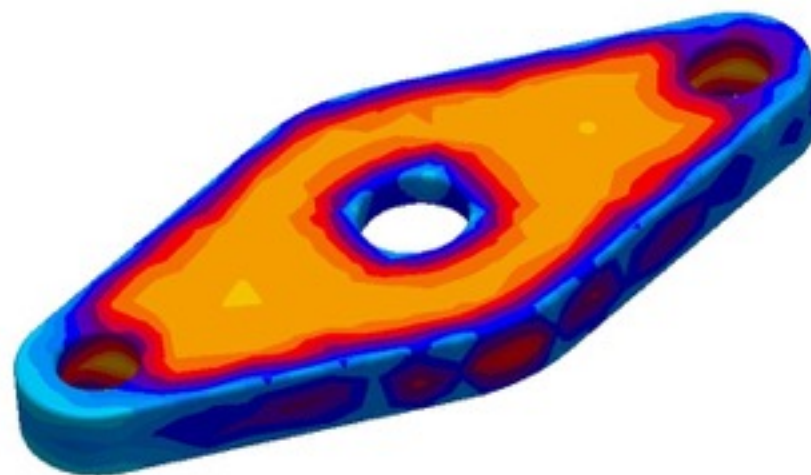


Fraction Liquid %

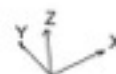
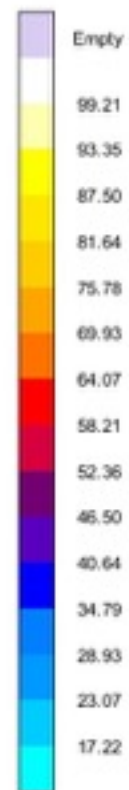


v05
Fraction Liquid
573.0ms 67.44 %

MAGMA

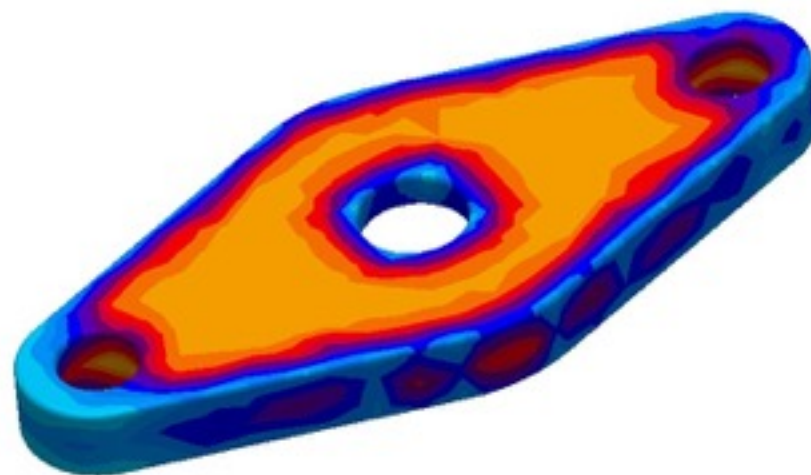


Fraction Liquid %

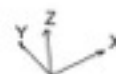
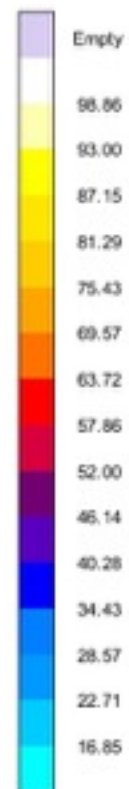


v05
Fraction Liquid
611.1ms 65.14 %

MAGMA

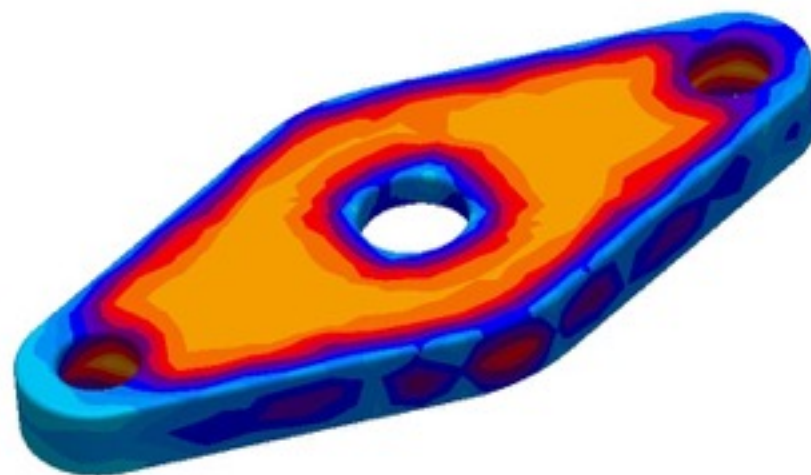


Fraction Liquid %

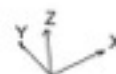
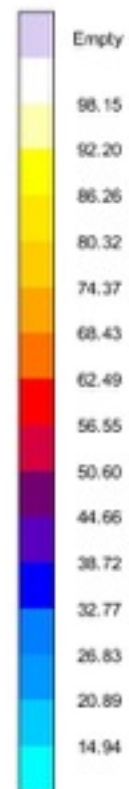


v05
Fraction Liquid
630.2ms 63.99 %

MAGMA

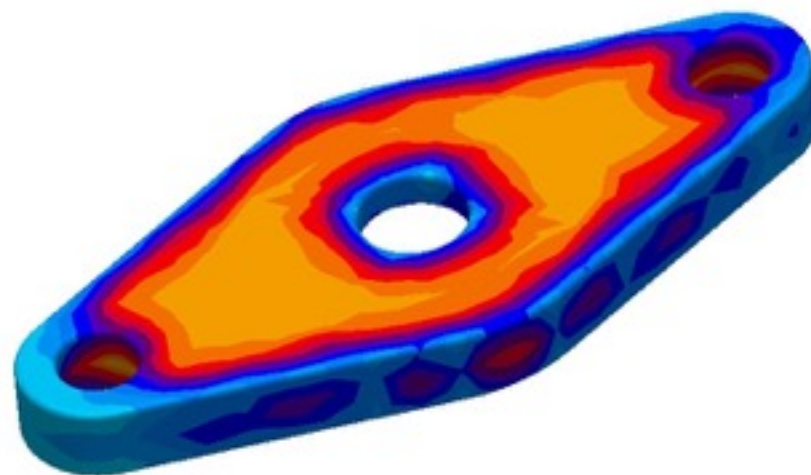


Fraction Liquid
%

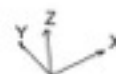
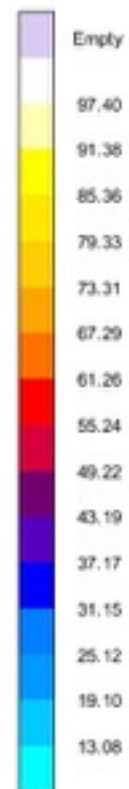


v05
Fraction Liquid
668.4ms 61.77 %

MAGMA

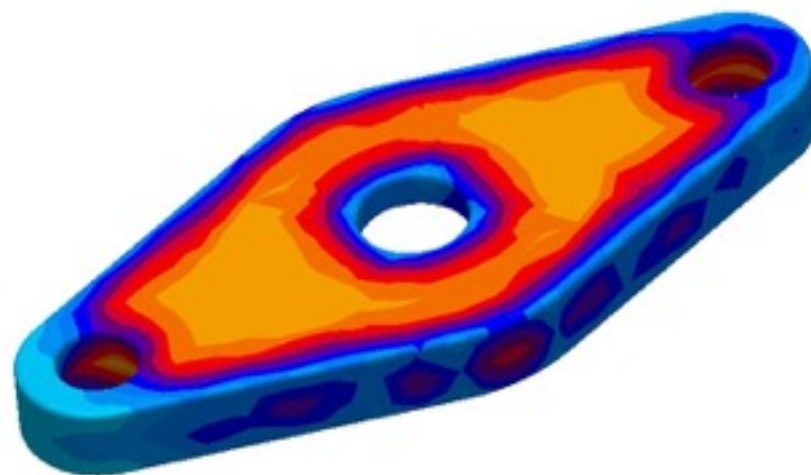


Fraction Liquid %

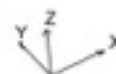
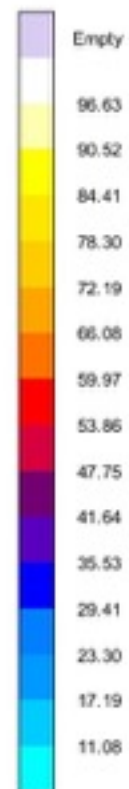


v05
Fraction Liquid
706.6ms 59.59 %

MAGMA

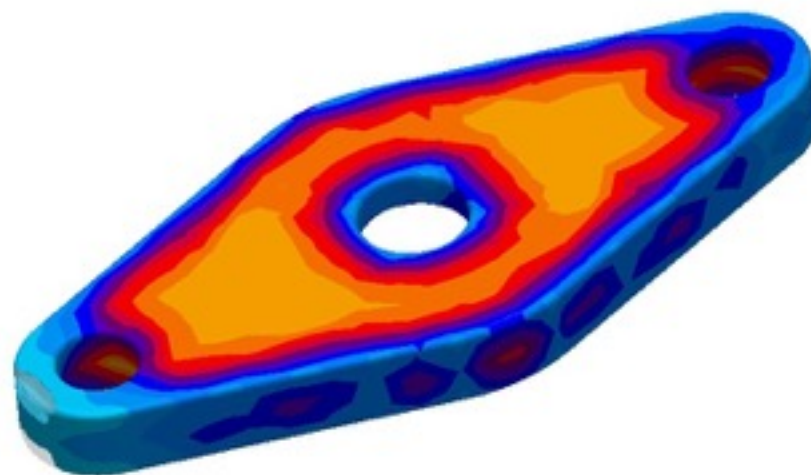


Fraction Liquid %

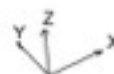
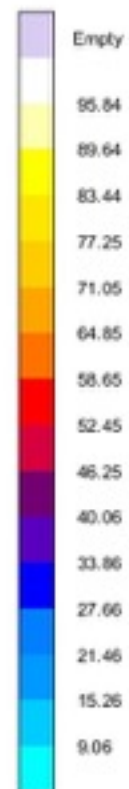


v05
Fraction Liquid
744.8ms 67.45 %

MAGMA

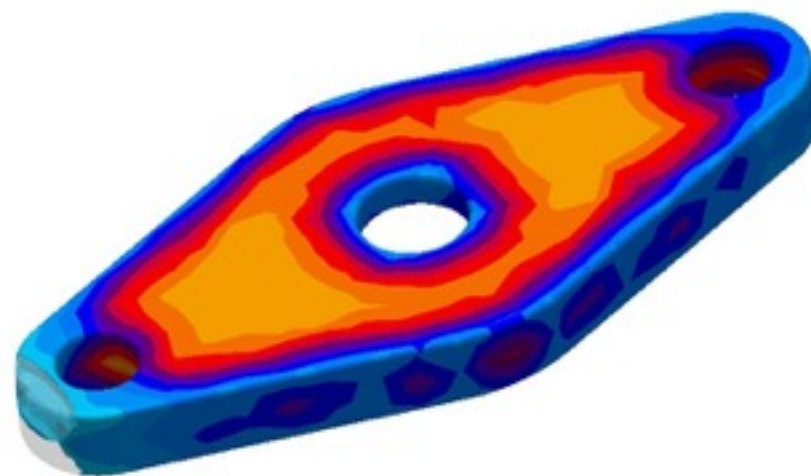


Fraction Liquid %

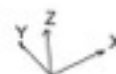
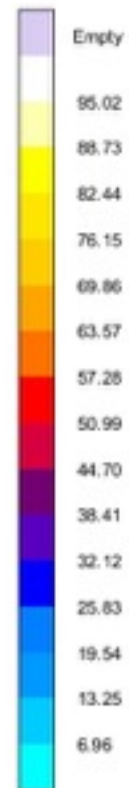


v05
Fraction Liquid
783.0ms 55.37 %

MAGMA

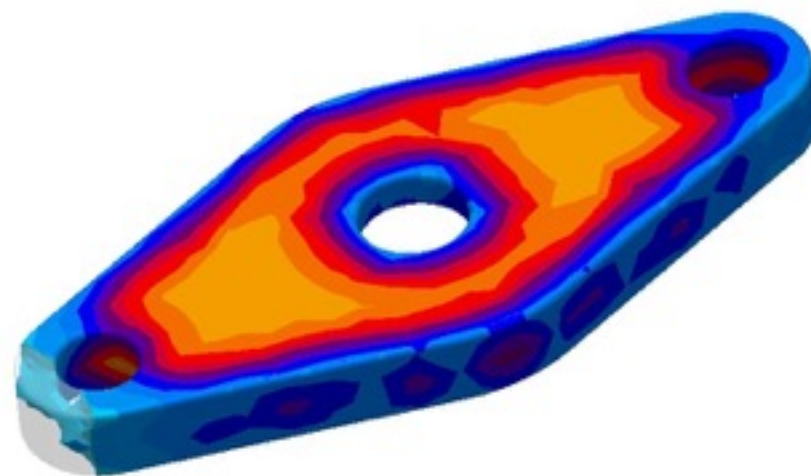


Fraction Liquid %

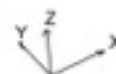
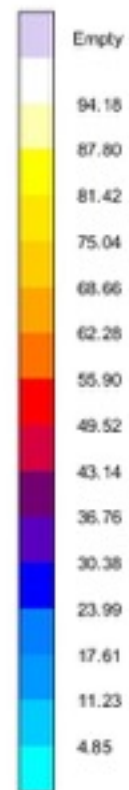


v05
Fraction Liquid
821.2ms 53.32 %

MAGMA

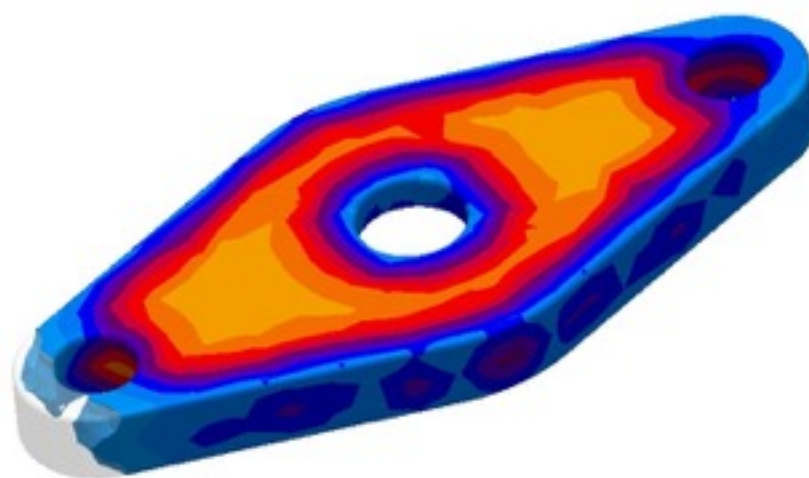


Fraction Liquid %

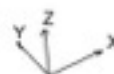
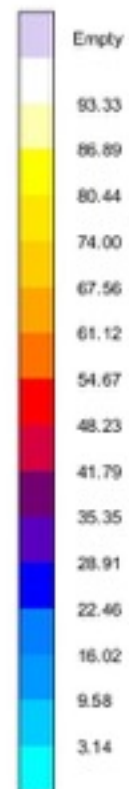


v05
Fraction Liquid
859.4ms 51.27 %

MAGMA

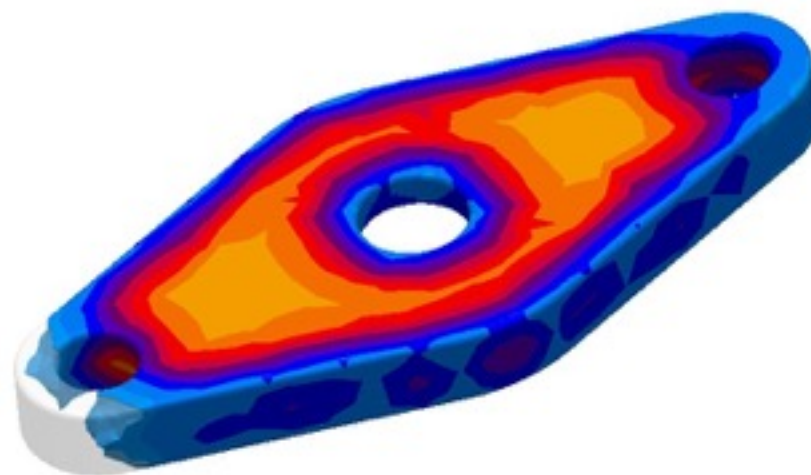


Fraction Liquid
%

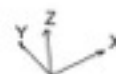
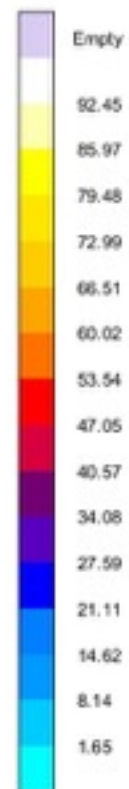


v05
Fraction Liquid
897.6ms 49.21 %

MAGMA

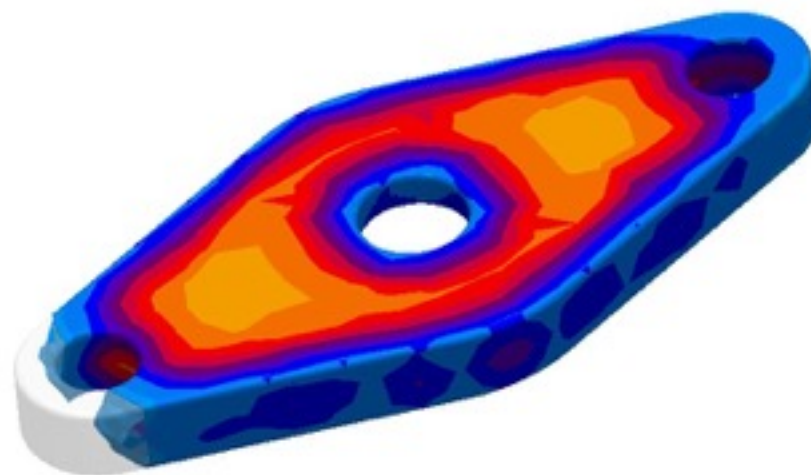


Fraction Liquid %

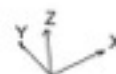
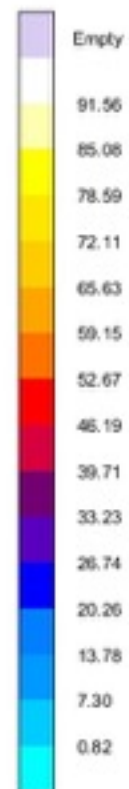


v05
Fraction Liquid
935.6ms 47.28 %

MAGMA

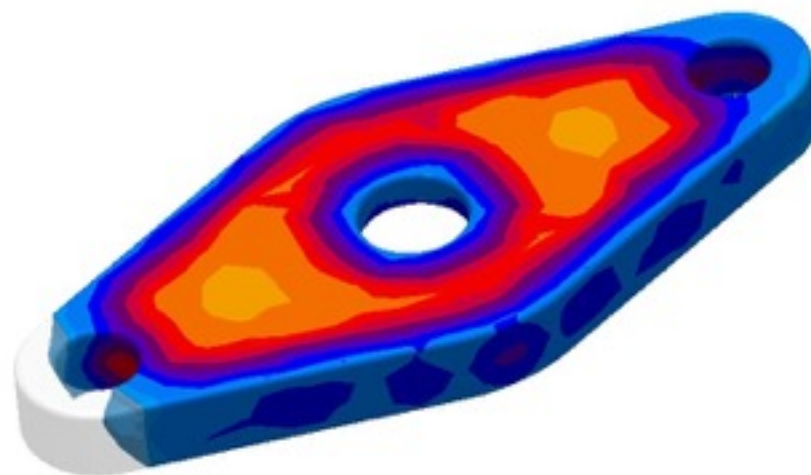


Fraction Liquid %

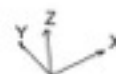
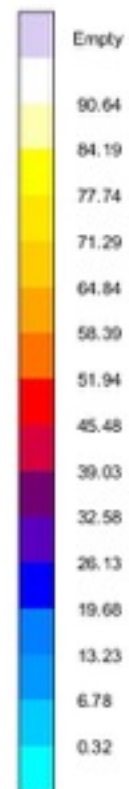


v05
Fraction Liquid
974.0ms 45.39 %

MAGMA

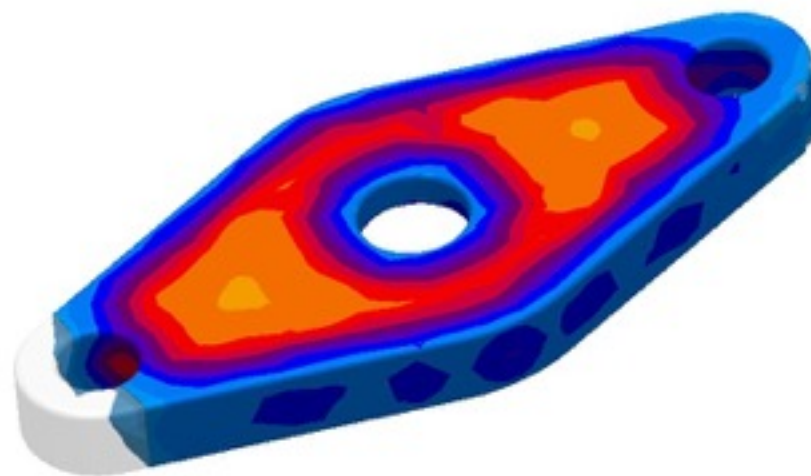


Fraction Liquid %

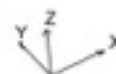
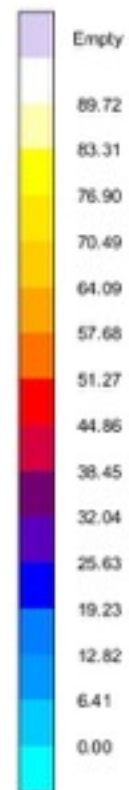


v05
Fraction Liquid
1.012s 43.53 %

MAGMA

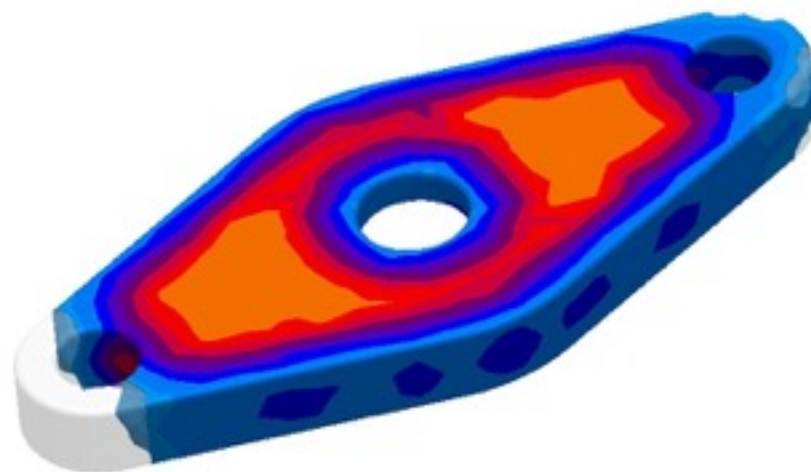


Fraction Liquid %

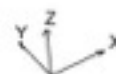
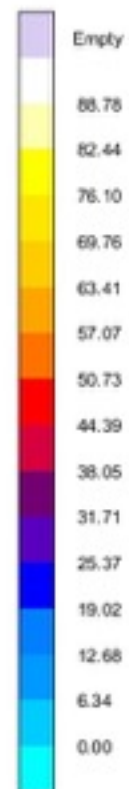


v05
Fraction Liquid
1.050s 41.69 %

MAGMA

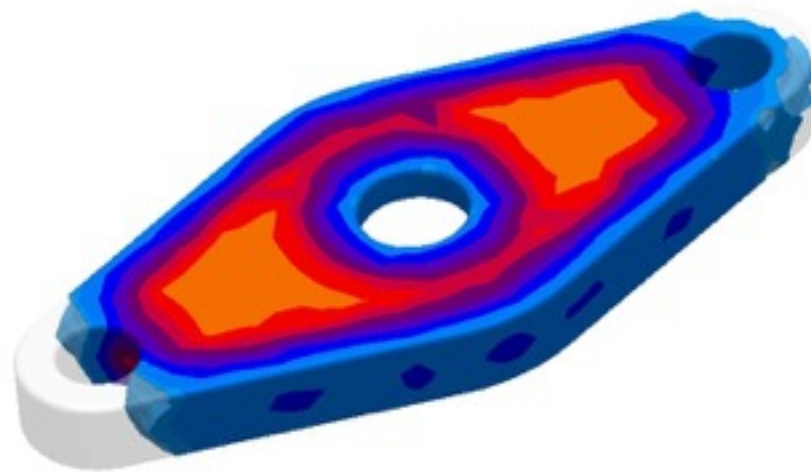


Fraction Liquid %

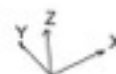
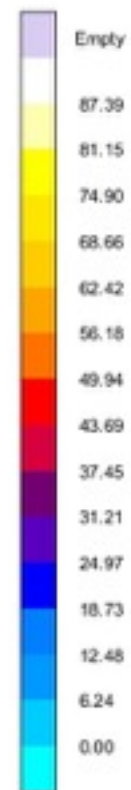


v05
Fraction Liquid
1.086s 39.90 %

MAGMA

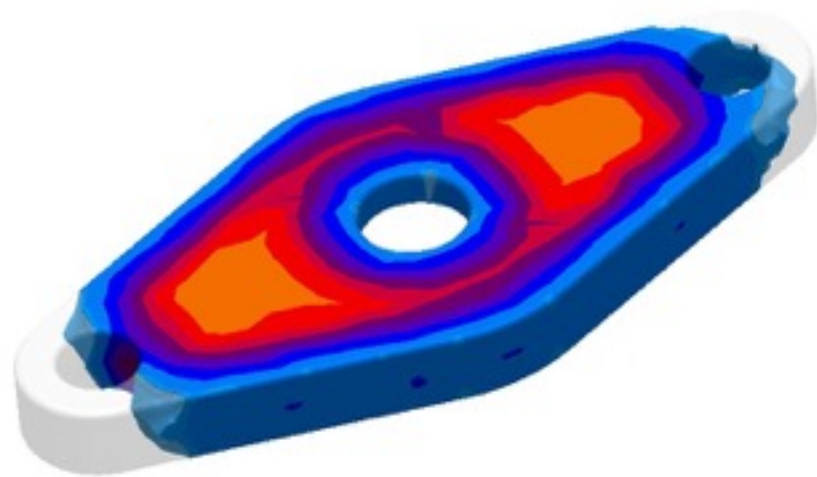


Fraction Liquid %

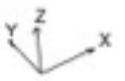
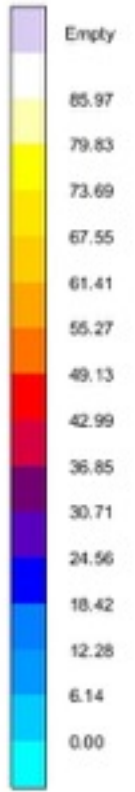


v05
Fraction Liquid
1.144s 37.39 %

MAGMA

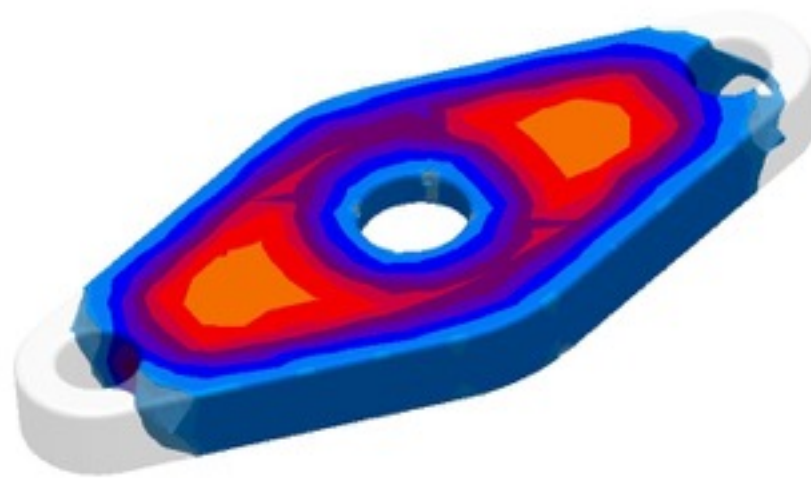


Fraction Liquid %

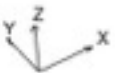
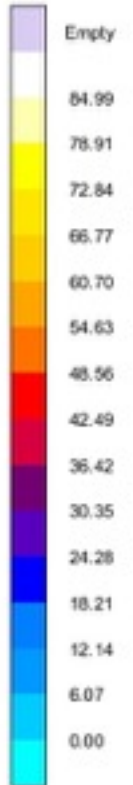


v05
Fraction Liquid
1.198s 34.93 %



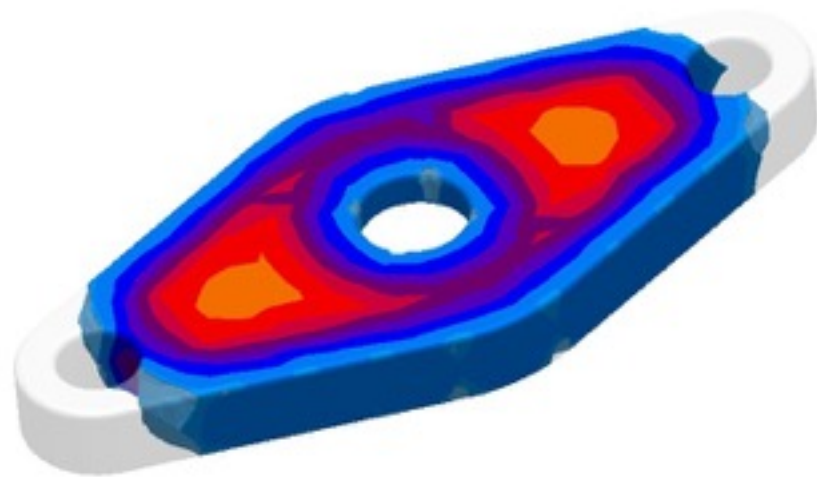


Fraction Liquid %

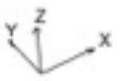
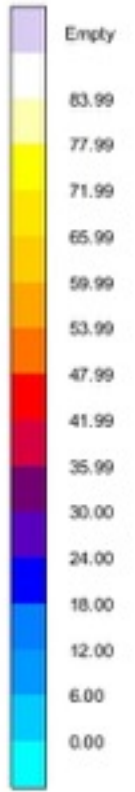


v05
Fraction Liquid
1.238s 33.29 %

MAGMA

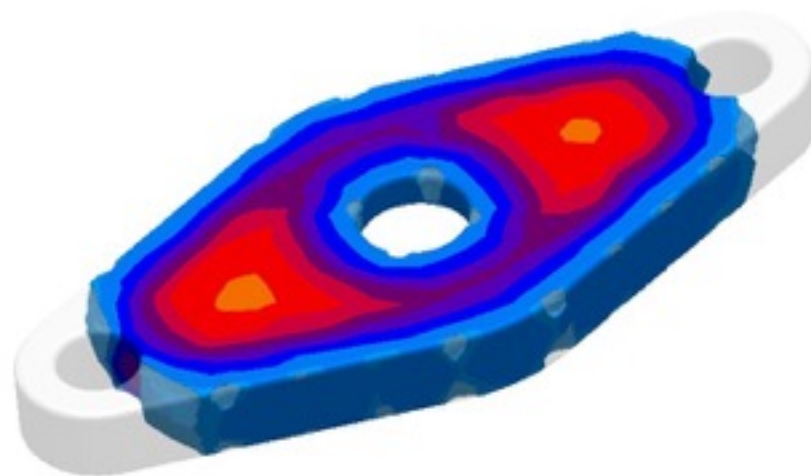


Fraction Liquid %

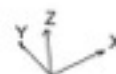
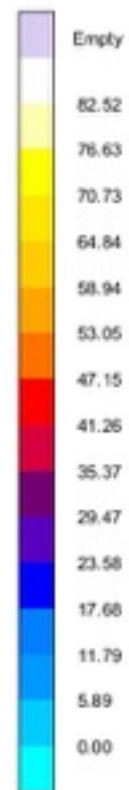


v05
Fraction Liquid
1.276s 31.69 %



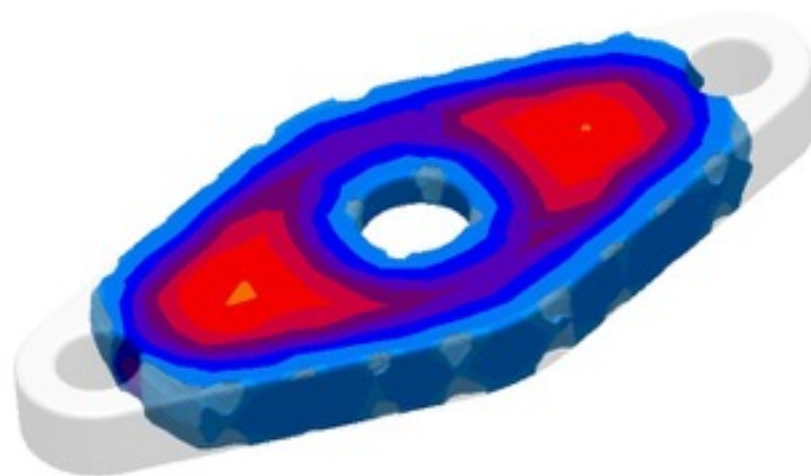


Fraction Liquid %

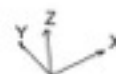
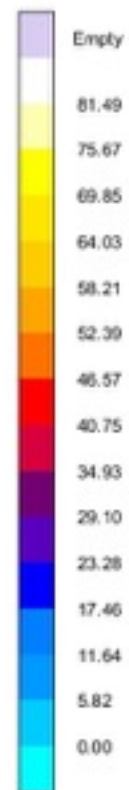


v05
Fraction Liquid
1.331s 29.41 %

MAGMA

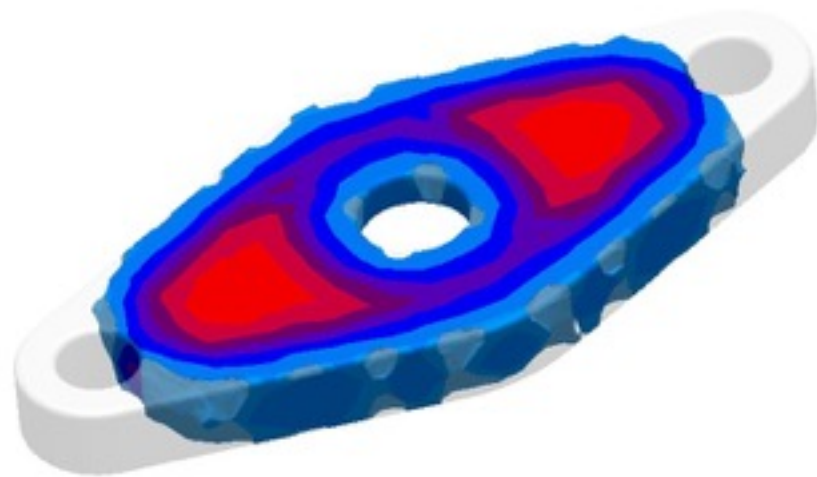


Fraction Liquid %

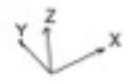
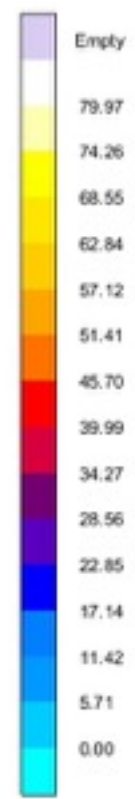


v05
Fraction Liquid
1.369s 27.88 %

MAGMA

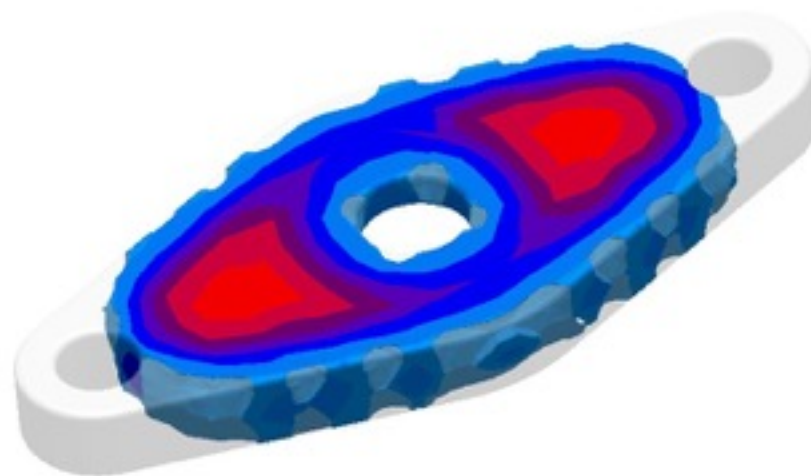


Fraction Liquid %

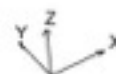
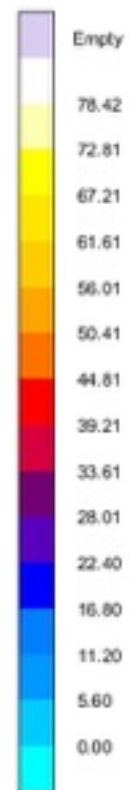


v05
Fraction Liquid
1.42ts 25.80 %



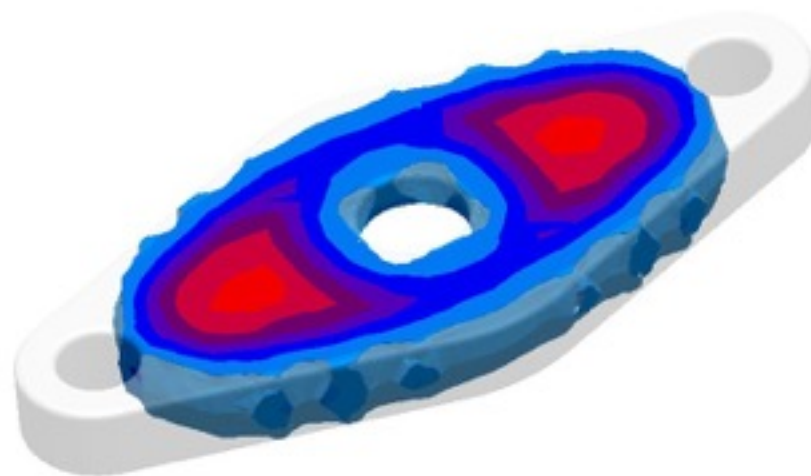


Fraction Liquid %

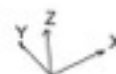
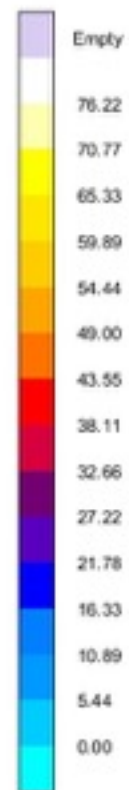


v05
Fraction Liquid
1.480s 23.79 %

MAGMA

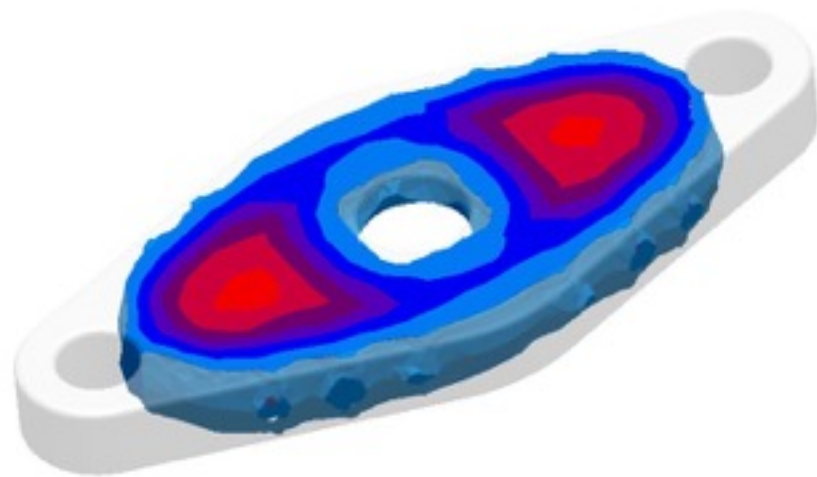


Fraction Liquid %

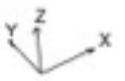


v05
Fraction Liquid
1.556e 21.23 %

MAGMA

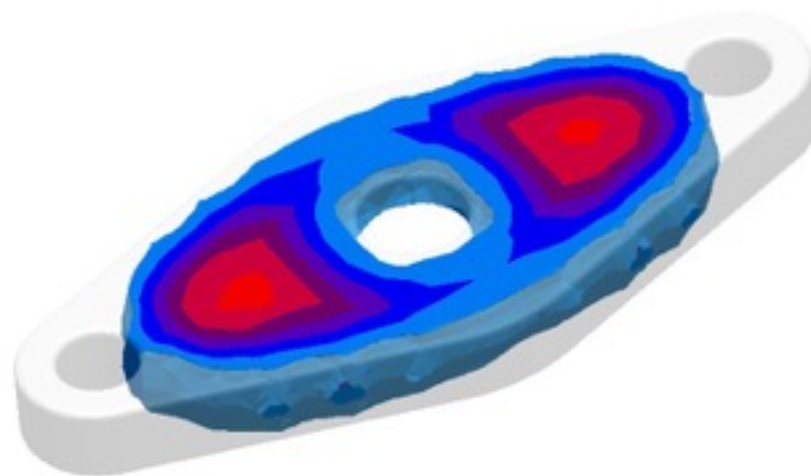


Fraction Liquid %

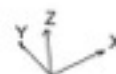
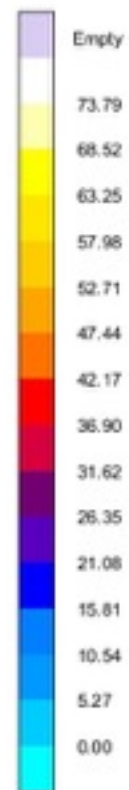


v05
Fraction Liquid
1.593s 19.95 %



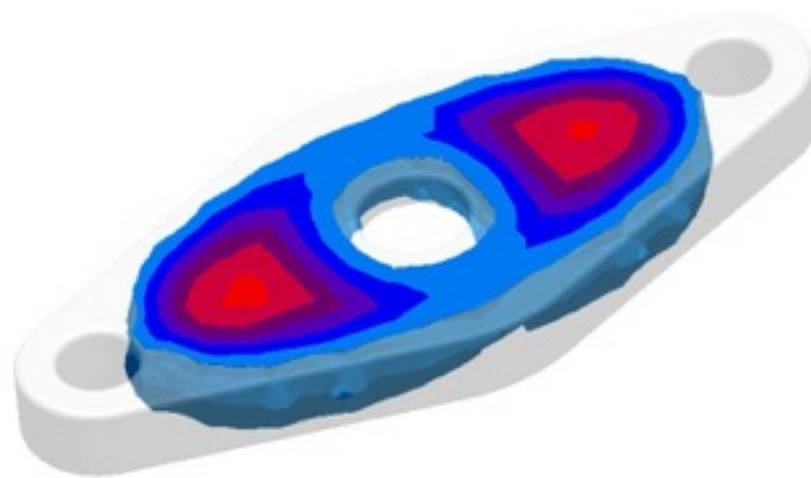


Fraction Liquid %

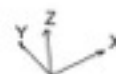
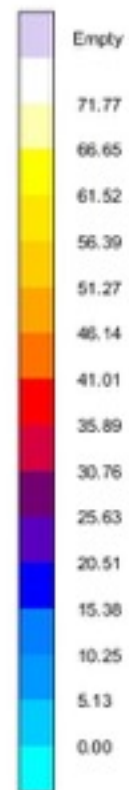


v05
Fraction Liquid
1.625e 18.77 %

MAGMA

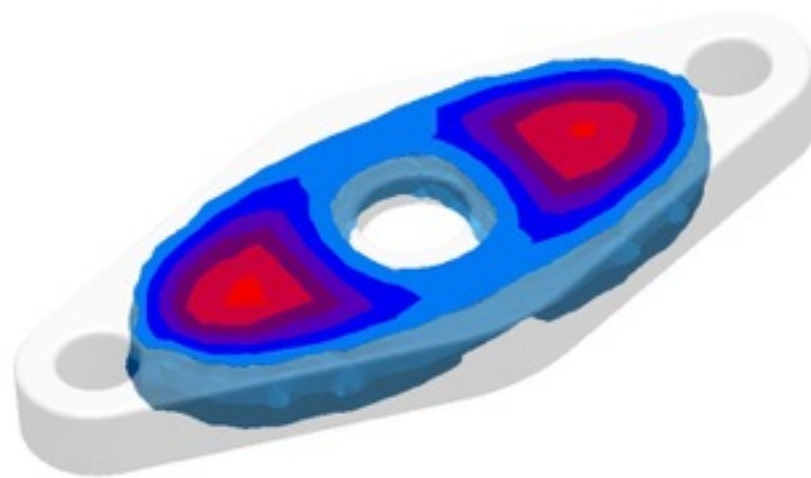


Fraction Liquid %

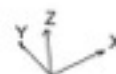
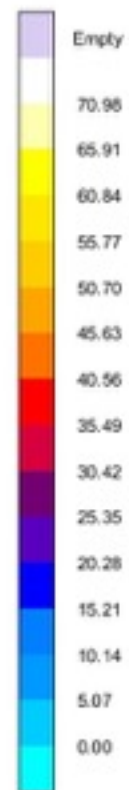


v05
Fraction Liquid
1.683s 17.10 %

MAGMA

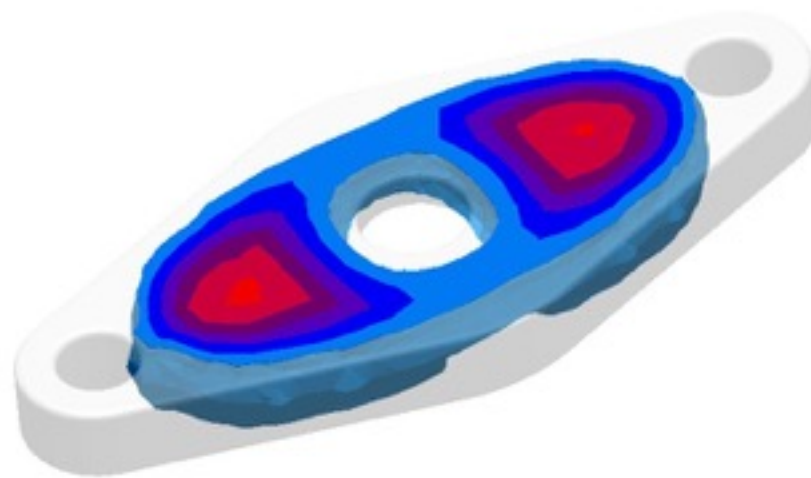


Fraction Liquid %

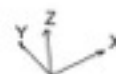
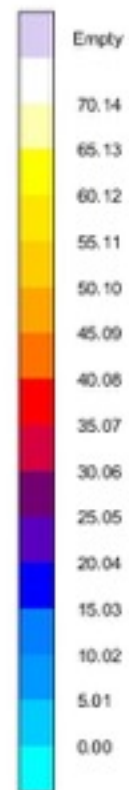


v05
Fraction Liquid
1.702s 16.51 %

MAGMA

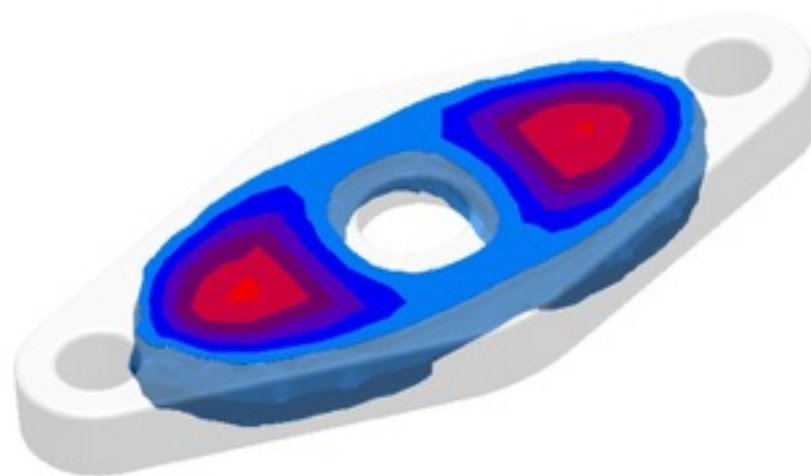


Fraction Liquid %

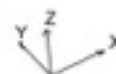
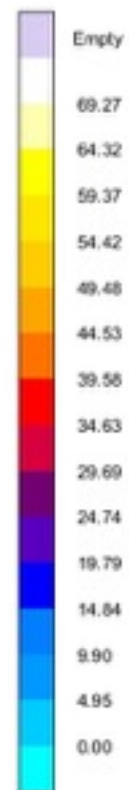


v05
Fraction Liquid
1.721s 15.93 %

MAGMA

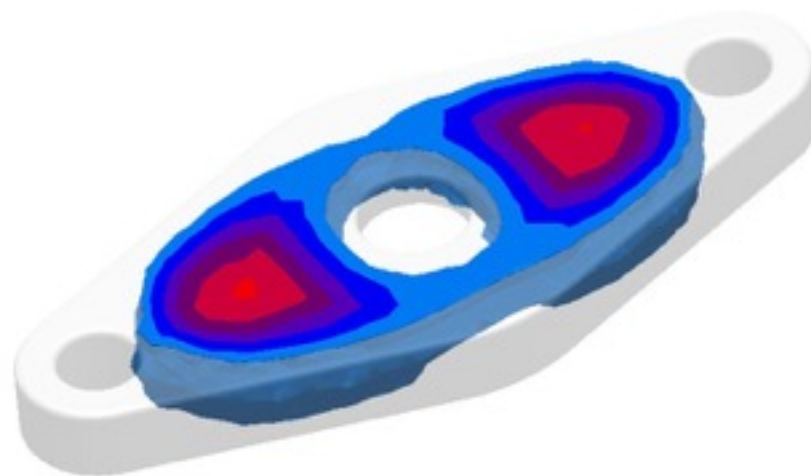


Fraction Liquid %

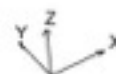
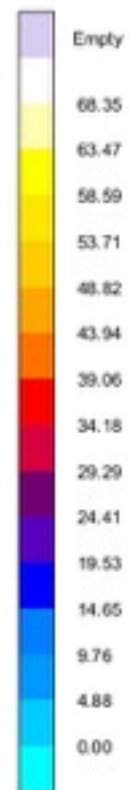


v05
Fraction Liquid
1.740s 15.34 %

MAGMA

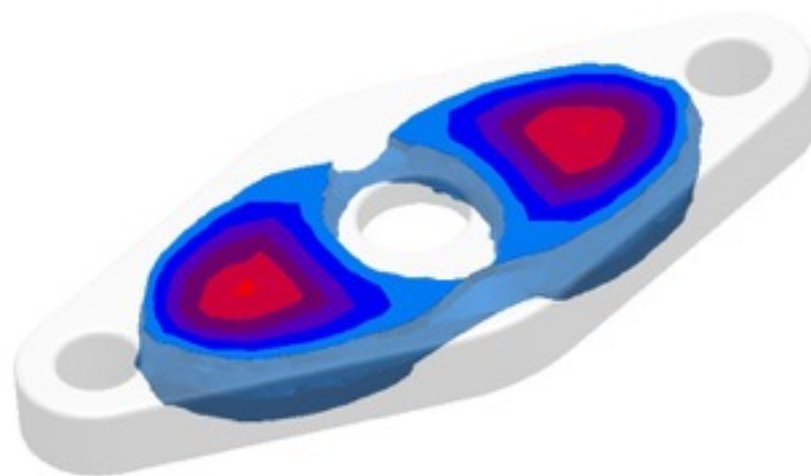


Fraction Liquid %

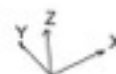
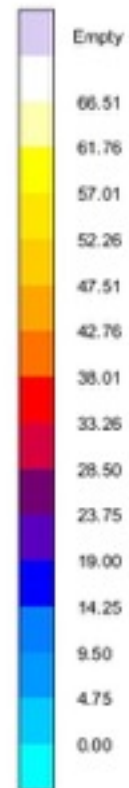


v05
Fraction Liquid
1.756s 14.76 %

MAGMA

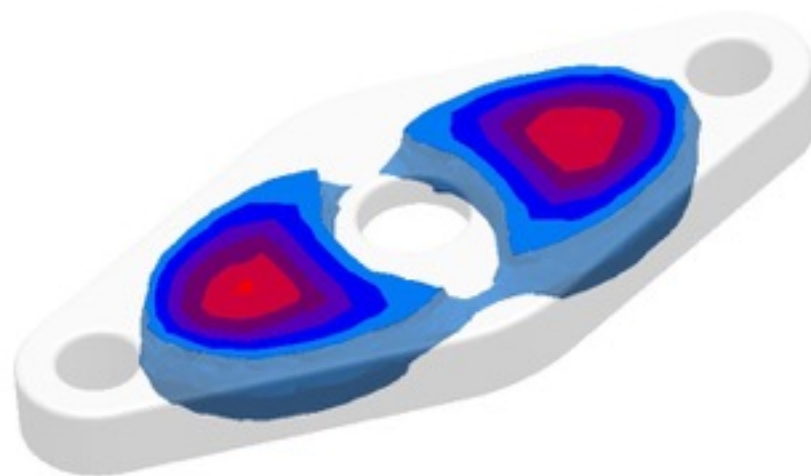


Fraction Liquid %

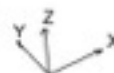
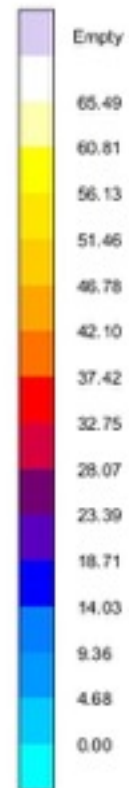


v05
Fraction Liquid
1.795e 13.71 %

MAGMA

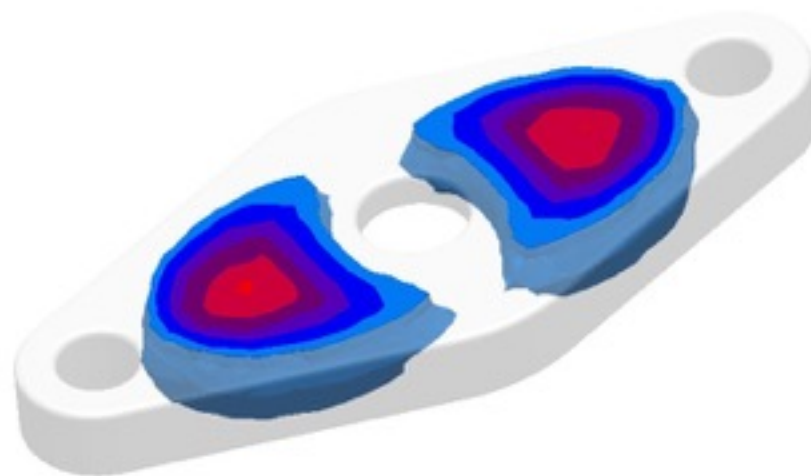


Fraction Liquid
%

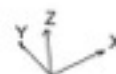
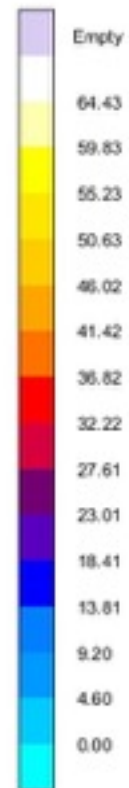


v05
Fraction Liquid
1.814s 13.15 %

MAGMA

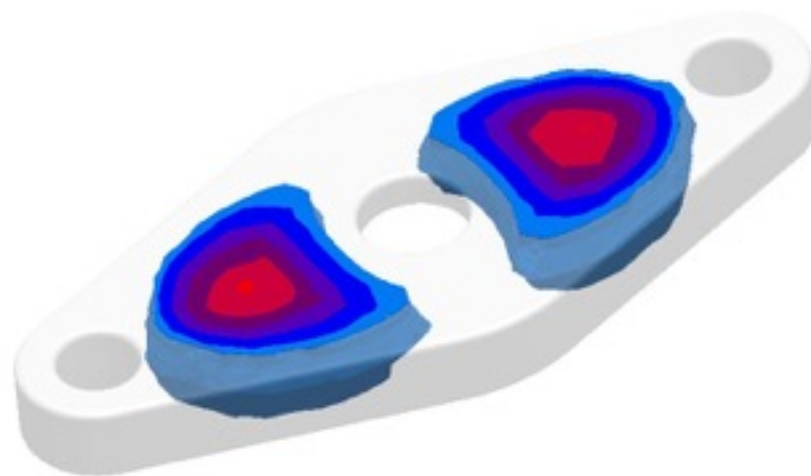


Fraction Liquid %

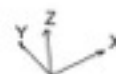
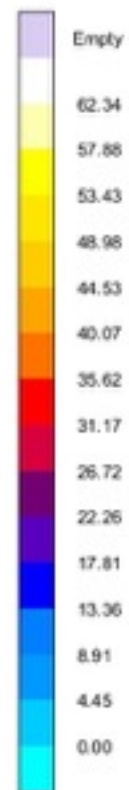


v05
Fraction Liquid
1.83s 12.60 %

MAGMA

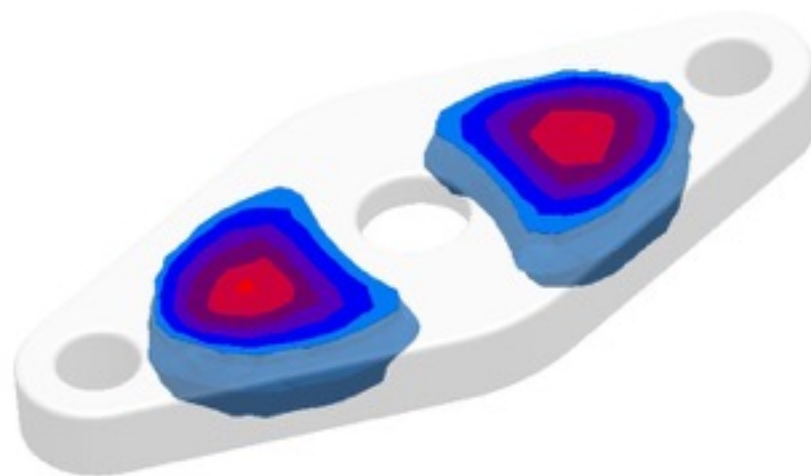


Fraction Liquid %

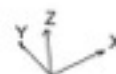
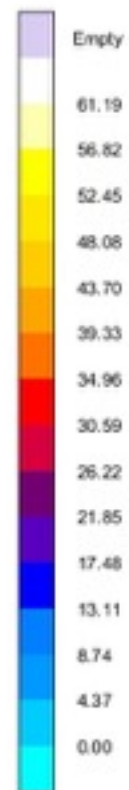


v05
Fraction Liquid
1.870s 11.60 %

MAGMA

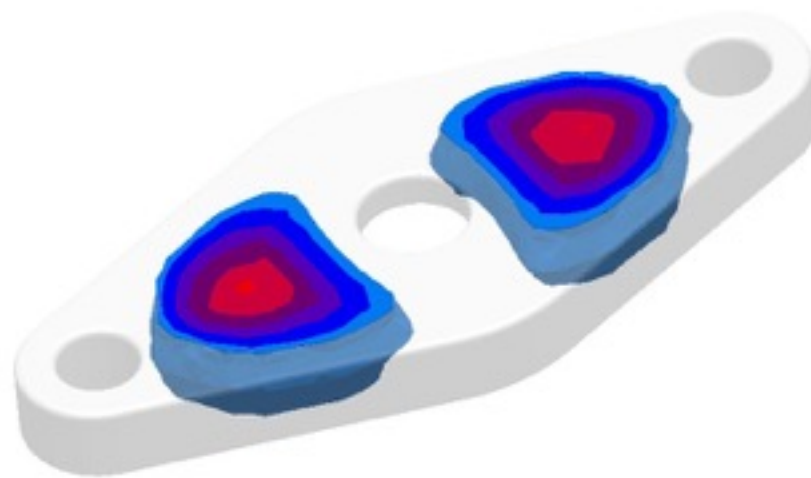


Fraction Liquid %

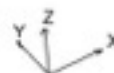
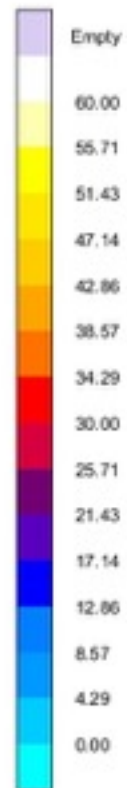


v05
Fraction Liquid
1.889s 11.07 %

MAGMA

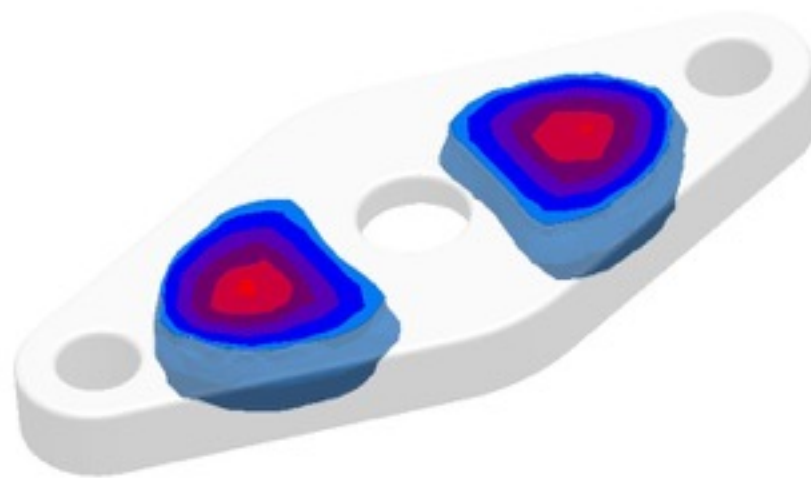


Fraction Liquid %

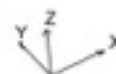
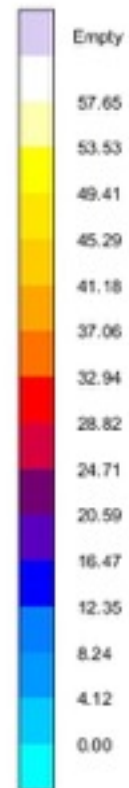


v05
Fraction Liquid
1.908s 10.57 %

MAGMA

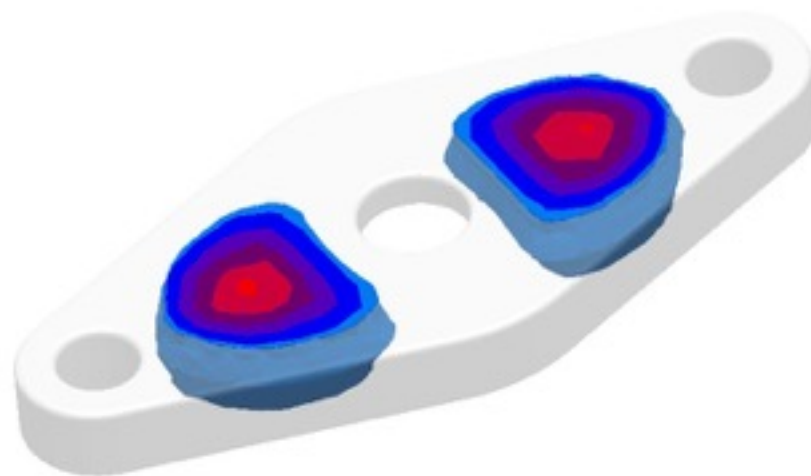


Fraction Liquid %

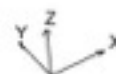
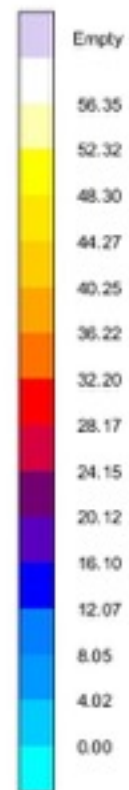


v05
Fraction Liquid
1.944s 9.63 %

MAGMA

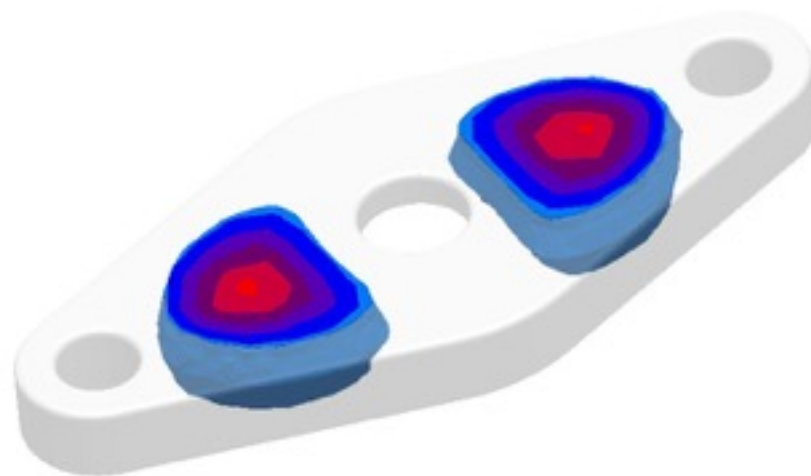


Fraction Liquid %

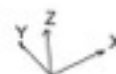
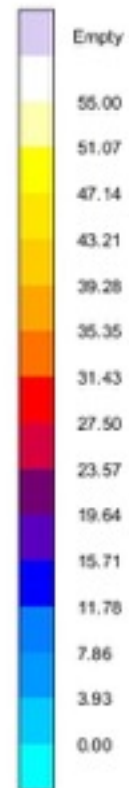


v05
Fraction Liquid
1.963s 9.15 %



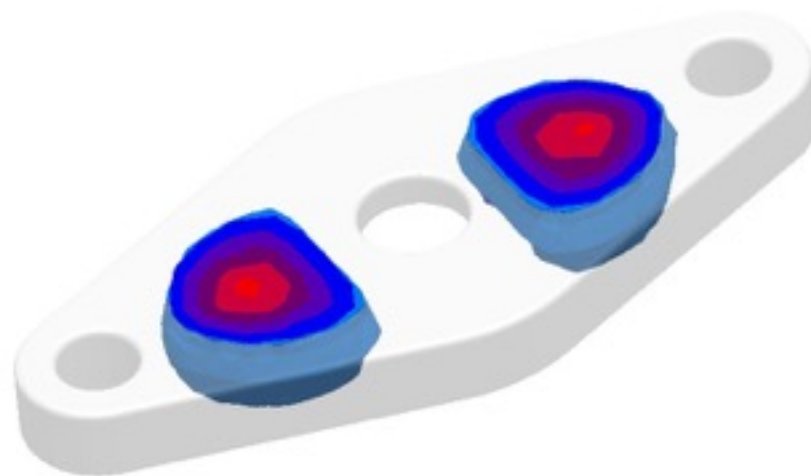


Fraction Liquid %

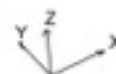
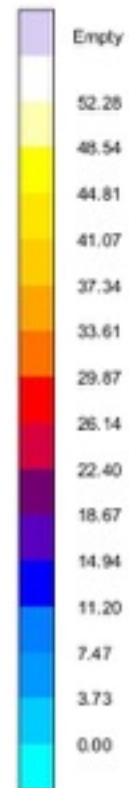


v05
Fraction Liquid
1.982s 8.67 %



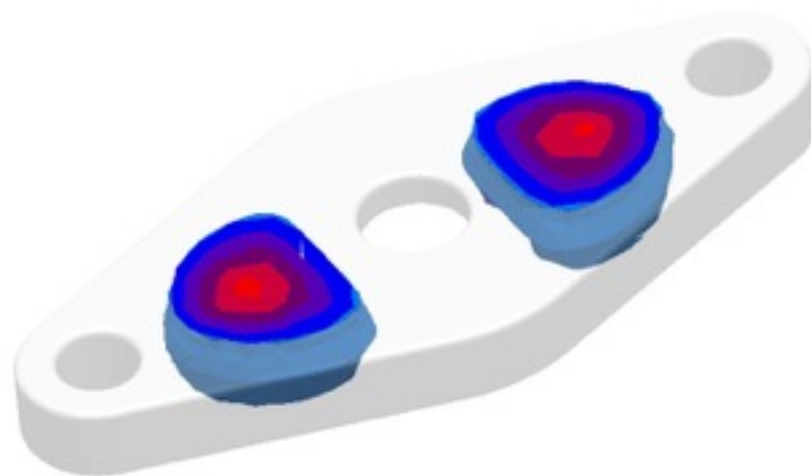


Fraction Liquid %

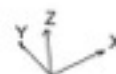
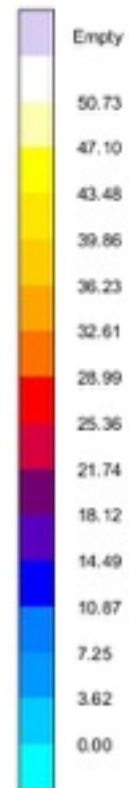


v05
Fraction Liquid
2.016s 7.81 %



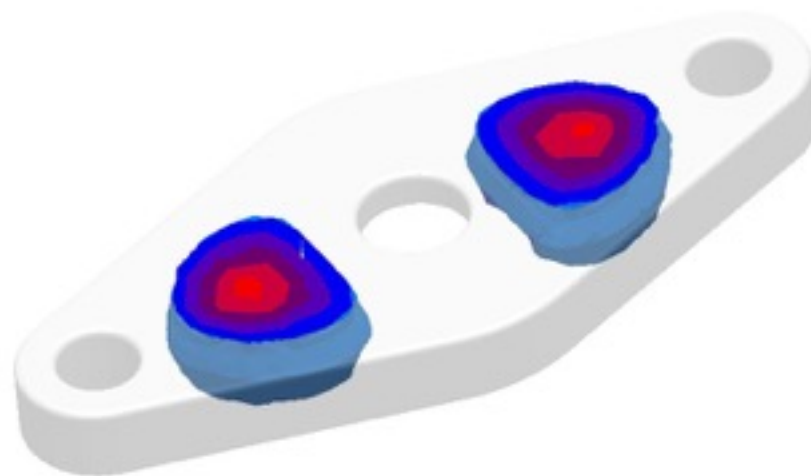


Fraction Liquid %

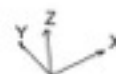
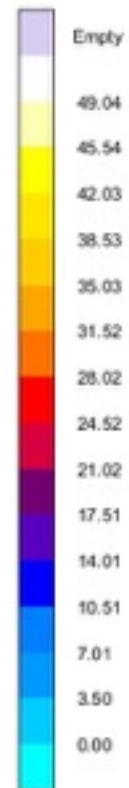


v05
Fraction Liquid
2.038s 7.38 %

MAGMA

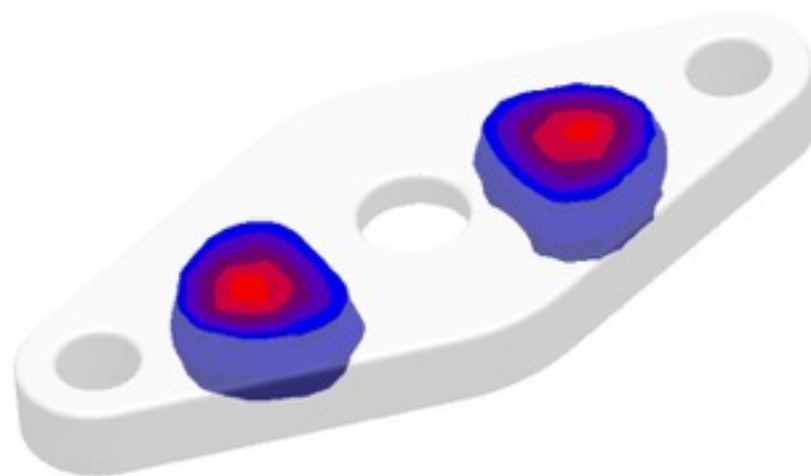


Fraction Liquid %

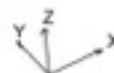
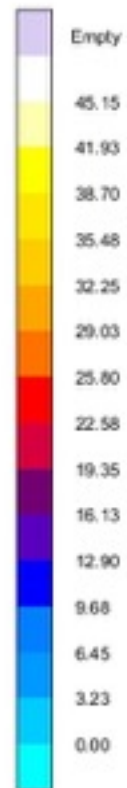


v05
Fraction Liquid
2.057s 6.96 %

MAGMA

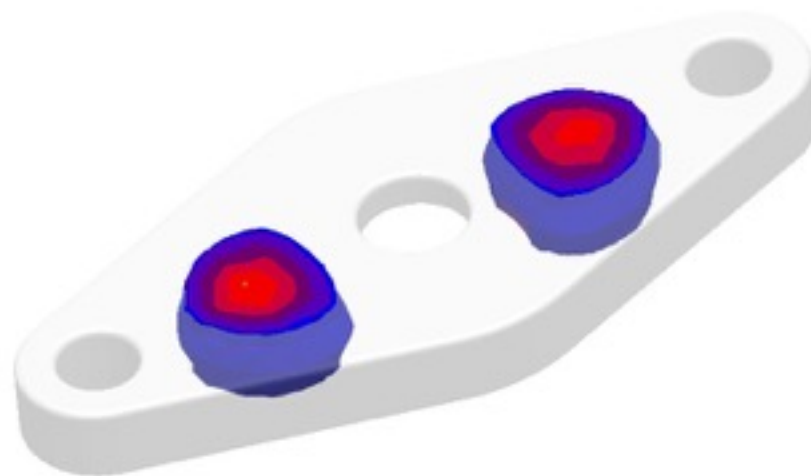


Fraction Liquid %

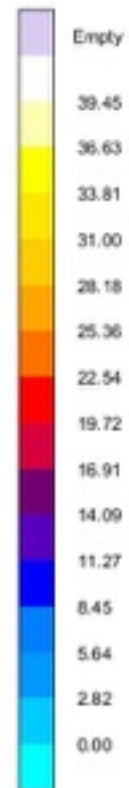


v05
Fraction Liquid
2.093s 6.20 %

MAGMA

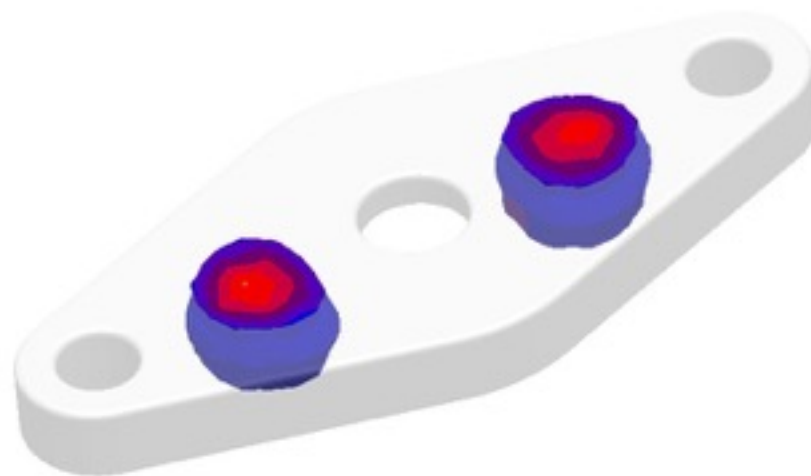


Fraction Liquid %

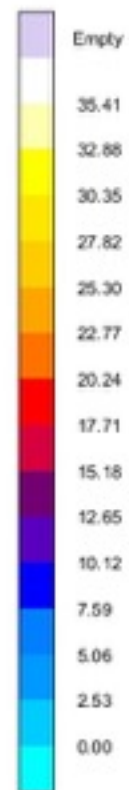


v05
Fraction Liquid
2.147s 5.16 %

MAGMA

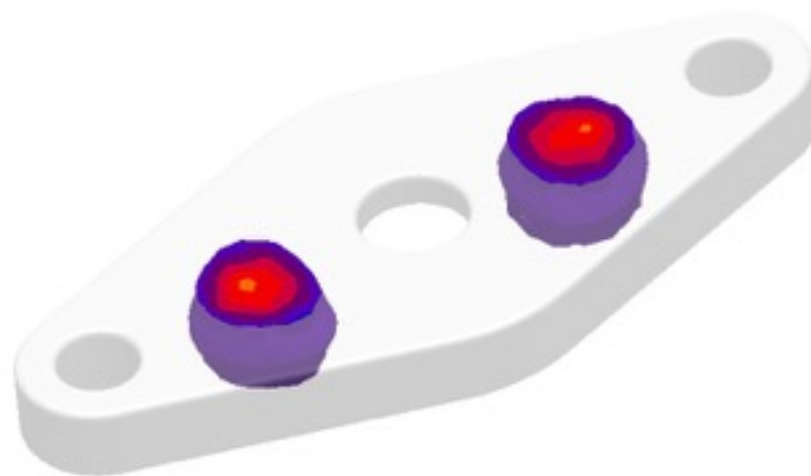


Fraction Liquid %

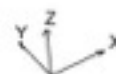
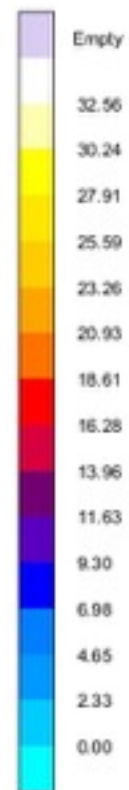


v05
Fraction Liquid
2.217s 4.00 %

MAGMA

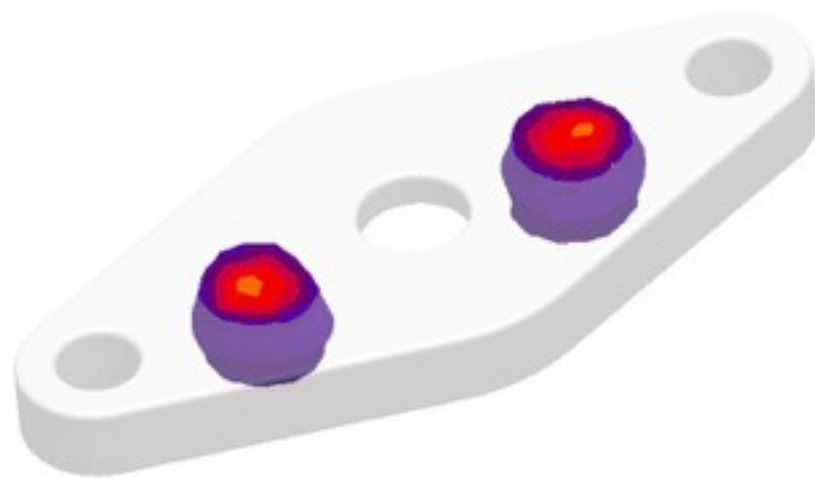


Fraction Liquid %

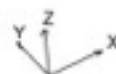
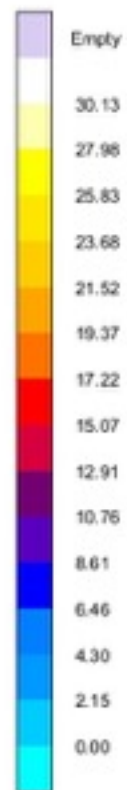


v05
Fraction Liquid
2.236s 3.68 %

MAGMA

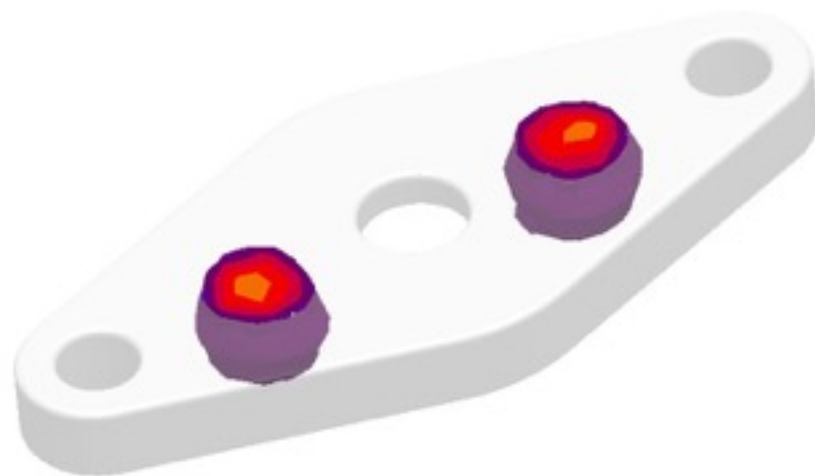


Fraction Liquid %

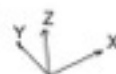
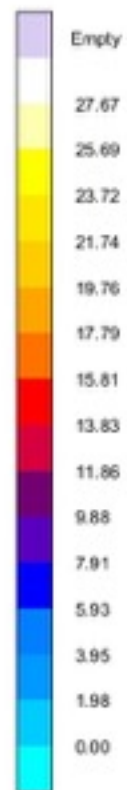


v05
Fraction Liquid
2.256e 3.38 %

MAGMA

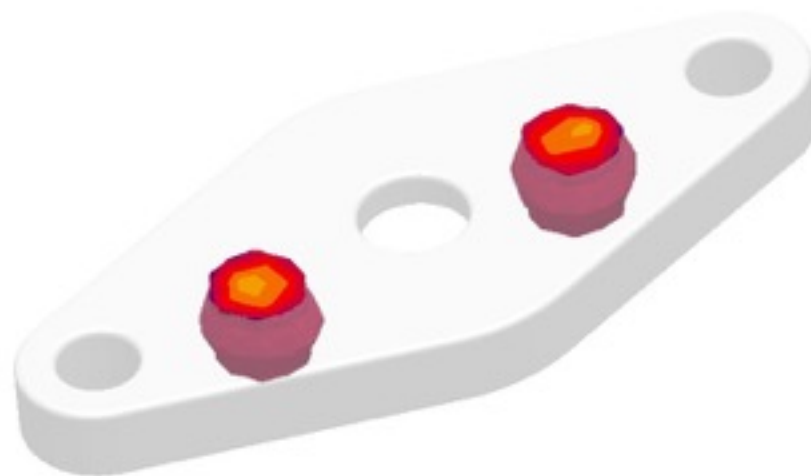


Fraction Liquid %

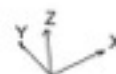
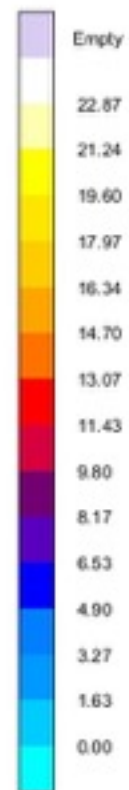


v05
Fraction Liquid
2.27fs 3.10 %

MAGMA

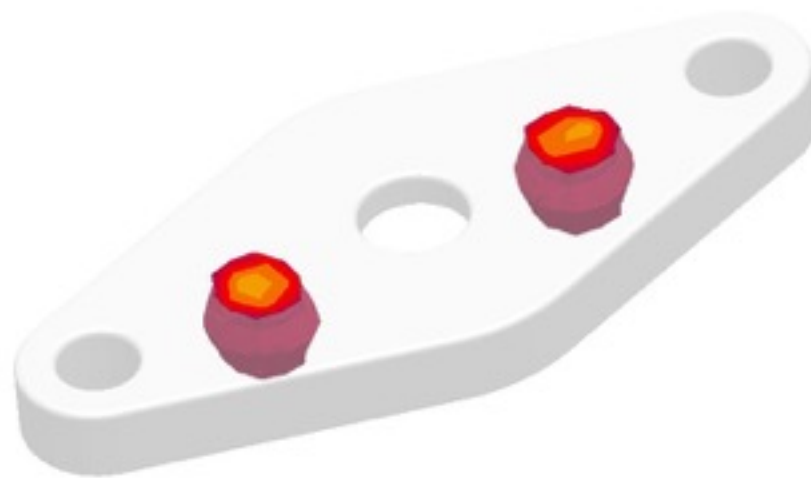


Fraction Liquid %

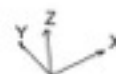
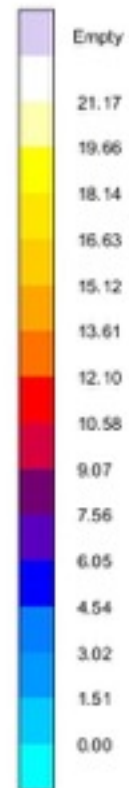


v05
Fraction Liquid
2.311s 2.59 %

MAGMA

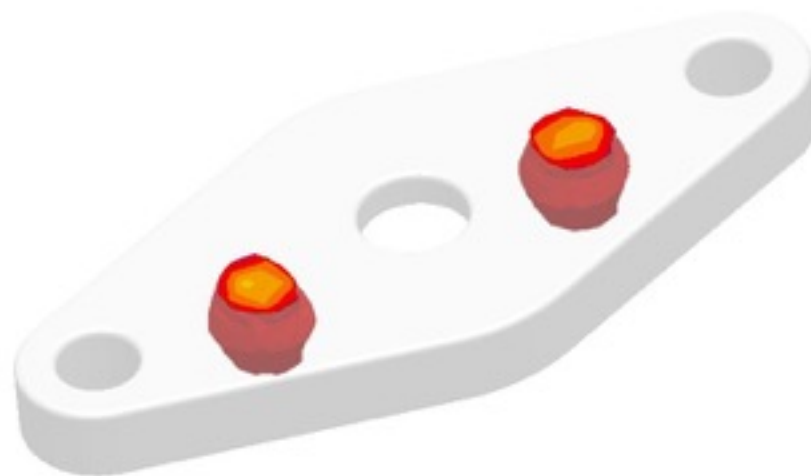


Fraction Liquid %

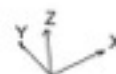
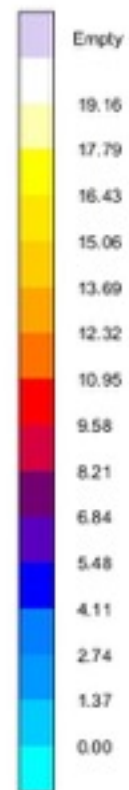


v05
Fraction Liquid
2.330s 2.35 %

MAGMA

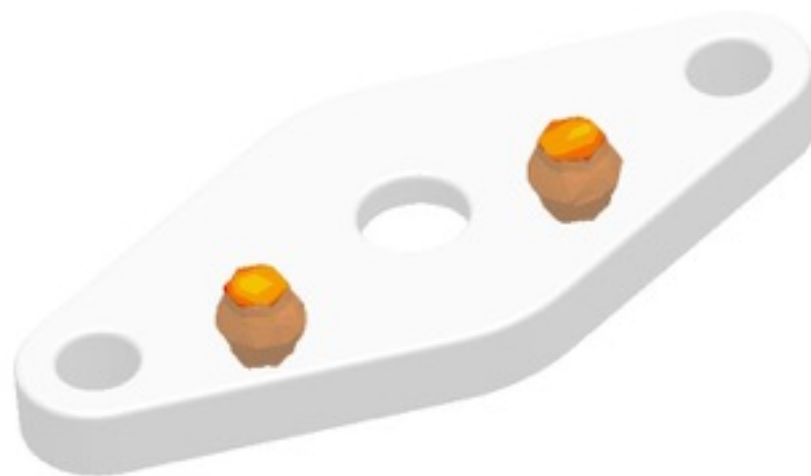


Fraction Liquid %

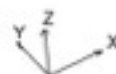
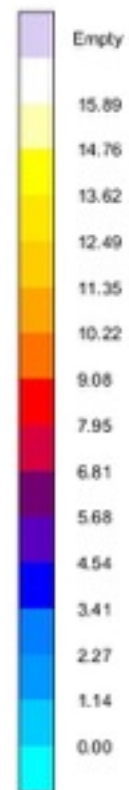


v05
Fraction Liquid
2.348s 2.11 %

MAGMA

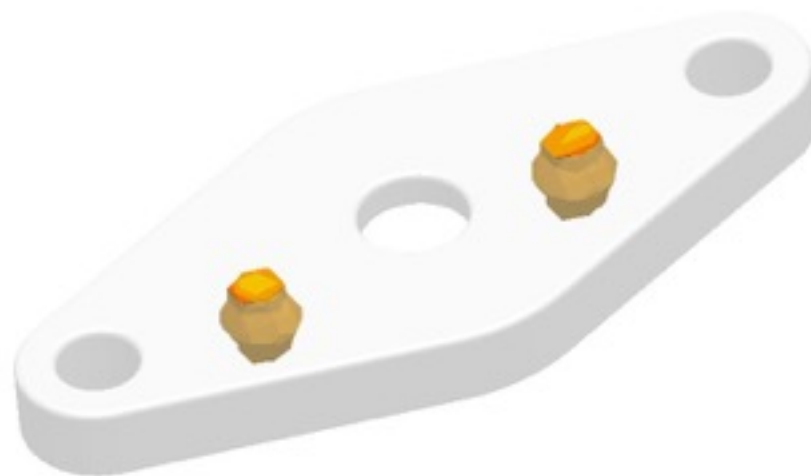


Fraction Liquid %

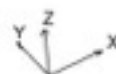
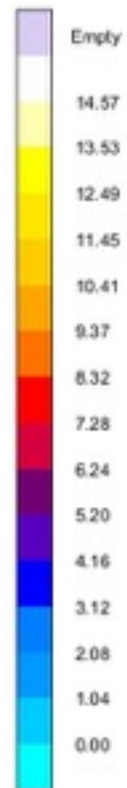


v05
Fraction Liquid
2.385e 1.70 %

MAGMA

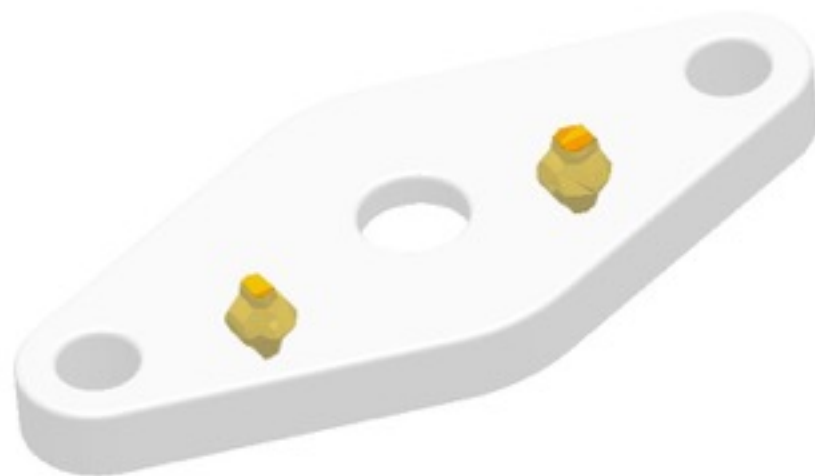


Fraction Liquid
%

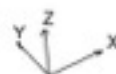
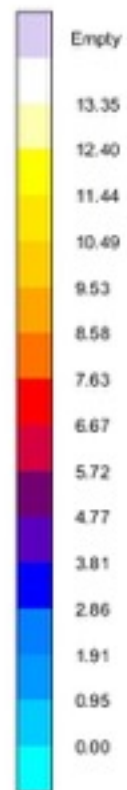


v05
Fraction Liquid
2.404s 1.50 %





Fraction Liquid %

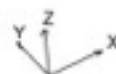
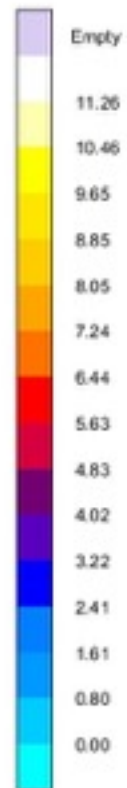


v05
Fraction Liquid
2.424s 1.31 %

MAGMA



Fraction Liquid
%

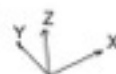
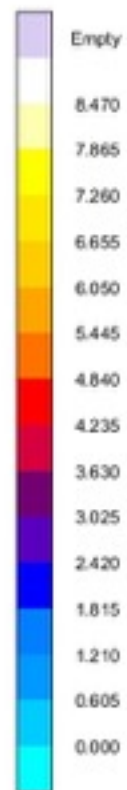


v05
Fraction Liquid
2.460s 0.98 %

MAGMA



Fraction Liquid
%



v05
Fraction Liquid
2.513s 0.60 %

MAGMA



REPORTE DE CAPACITACIÓN Y ANÁLISIS DE VALIDACIÓN DE LAS VÁLVULAS GLOBO CON BANCO DE PRUEBAS HIDROSTÁTICAS Y DE HERMETICIDAD

DISEÑO, DESARROLLO Y VALIDACIÓN DE
PROTOTIPOS DE VÁLVULAS TIPO GLOBO EN ACERO
INOXIDABLE 316L Y ASIENTOS POLIMÉRICOS

PROGRAMA DE APOYO PARA LA MEJORA TECNOLÓGICA DE LA
INDUSTRIA DE ALTA TECNOLOGÍA



REPORTE DE CAPACITACIÓN Y ANÁLISIS DE VALIDACIÓN DE LAS VÁLVULAS GLOBO CON BANCO DE PRUEBAS HIDROSTÁTICAS Y DE HERMETICIDAD

OBJETIVO: Validar la integridad estructural y de hermeticidad de válvulas tipo globo en acero inoxidable 316L, con la finalidad de garantizar la confiabilidad durante su operación normal de acuerdo a la norma API 598 (Valve Inspection and Testing, 598 American Petroleum Institute).



PROCEDIMIENTO:

1. Recibir, identificar y registrar las piezas en el formato correspondiente.
2. Antes de ejecutar las pruebas, realizar un examen general de las válvulas para determinar la existencia de defectos, daños o fallas externas.
3. Colocar las válvulas en el banco de pruebas sujetándolas de los extremos del cuerpo mediante grapas de fijación cuidando de no afectar el sellado de las mismas.



4. Las pruebas deberán realizarse de acuerdo a los siguientes requerimientos.

Tipo de válvula		Compuerta	Globo
Diámetro	DN (mm)	100	100-200
	NPS (pulgadas)	4	4 a 8
Clase de Presión		800	800
Cuerpo		Requerida	Requerida
Asientos		Requerida	Requerida
Cavidad baja presión		Requerida	Requerida
Cavidad alta presión		Opcional	Requerida
Fluido de prueba		Aceite a temperatura < 30°C	

CRITERIO DE ACEPTACIÓN:

No deberán presentarse fugas en las válvulas durante los tiempos mínimos de duración de pruebas.

Las mediciones de presión de deben relizar entre el 25% y el 75% del rango total de presión.





Fundición de Aleaciones Especiales de México, S.A. de C.V.
Ing. Horacio Villarreal Márquez

Ingeniería básica y de detalle de válvulas globo de 4"

- Cuerpo de Válvula
- Bonete
- Brida

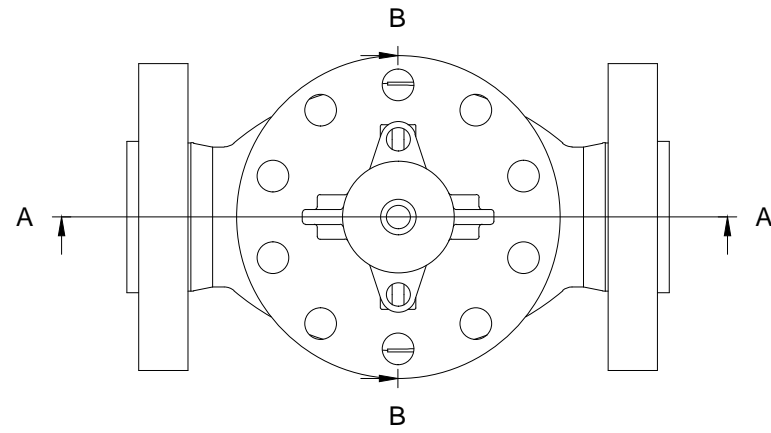
DIB. No.
Formato B

4

3

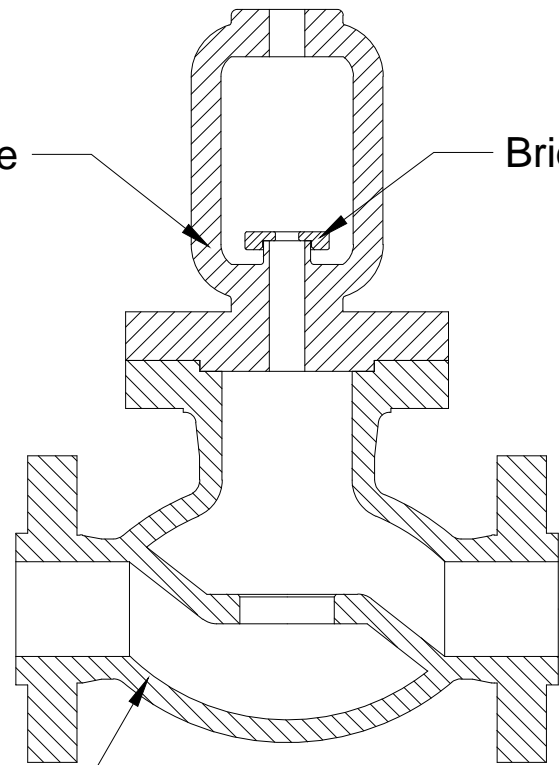
2

1



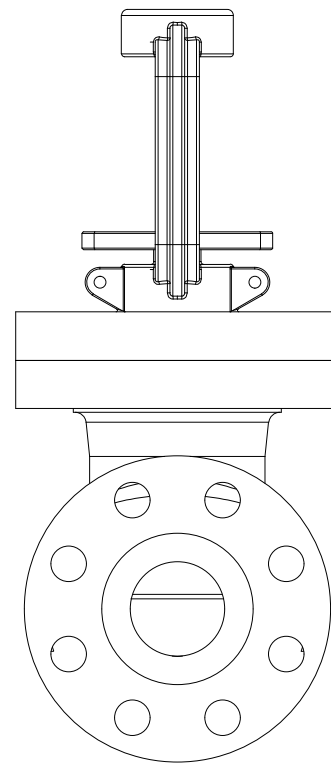
Bonete

Brida

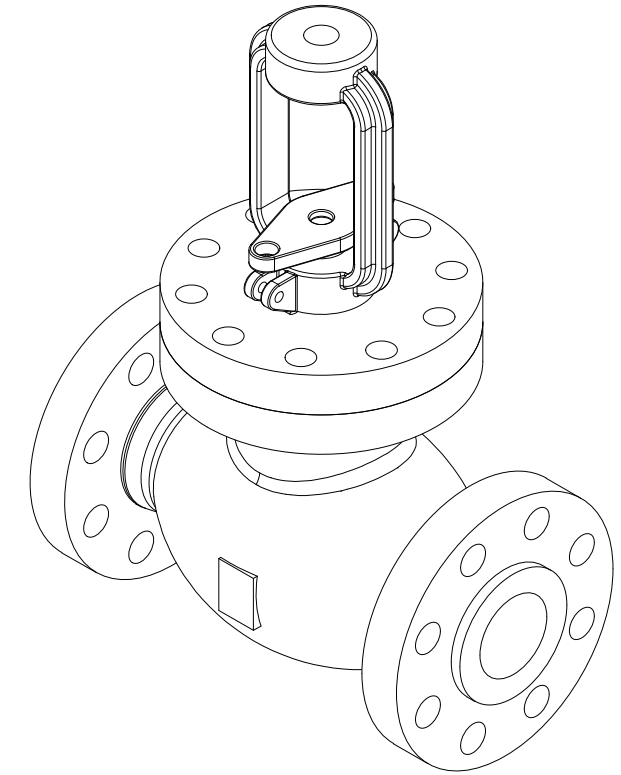
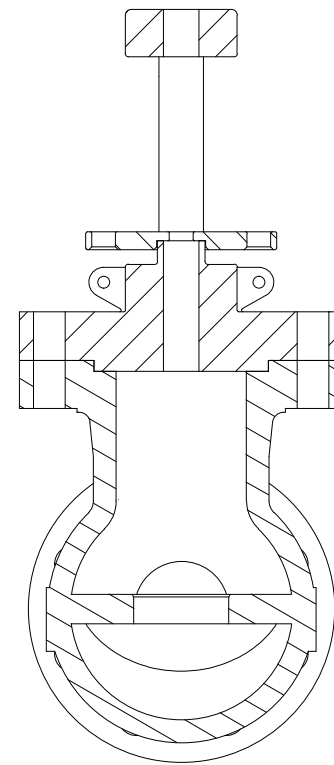


A-A (1:8)

Cuerpo de Valvula



B-B (1:8)



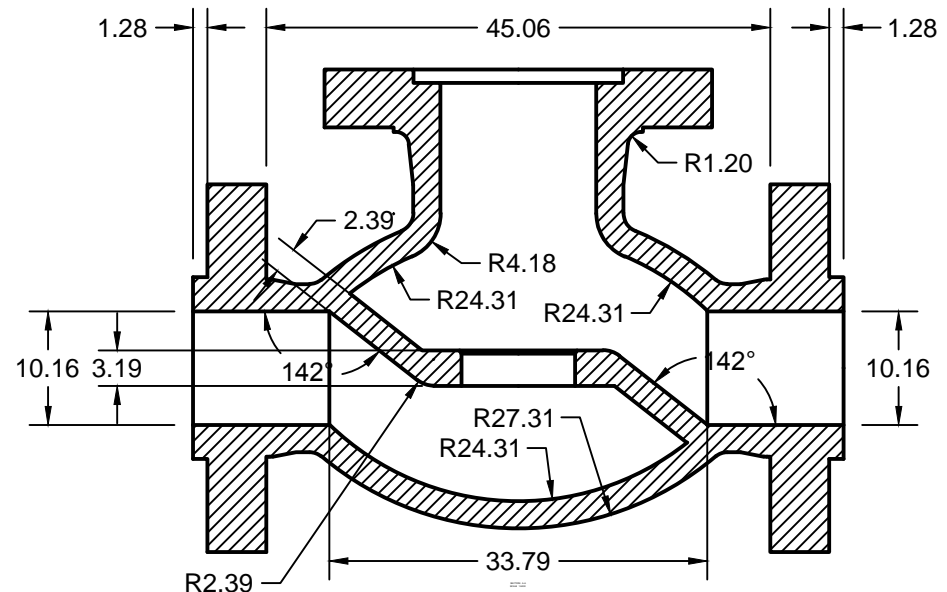
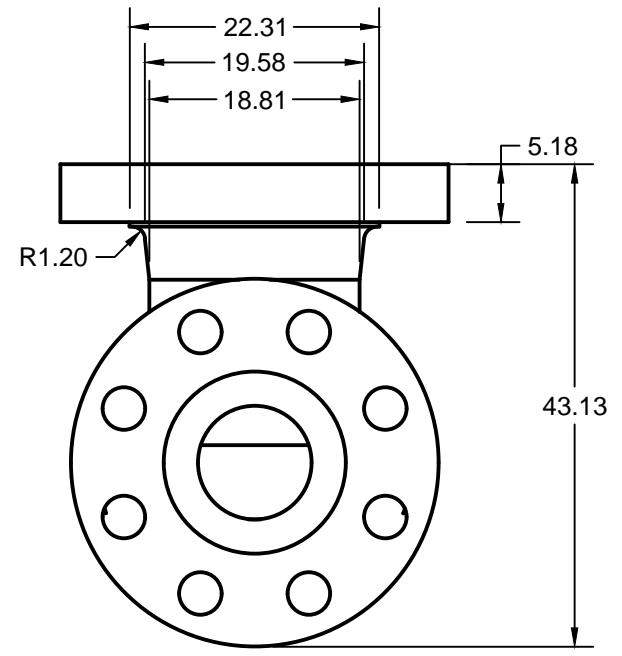
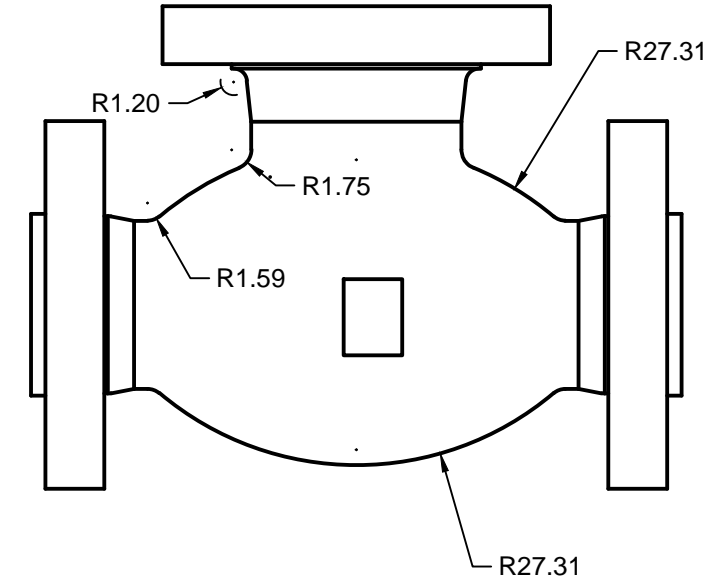
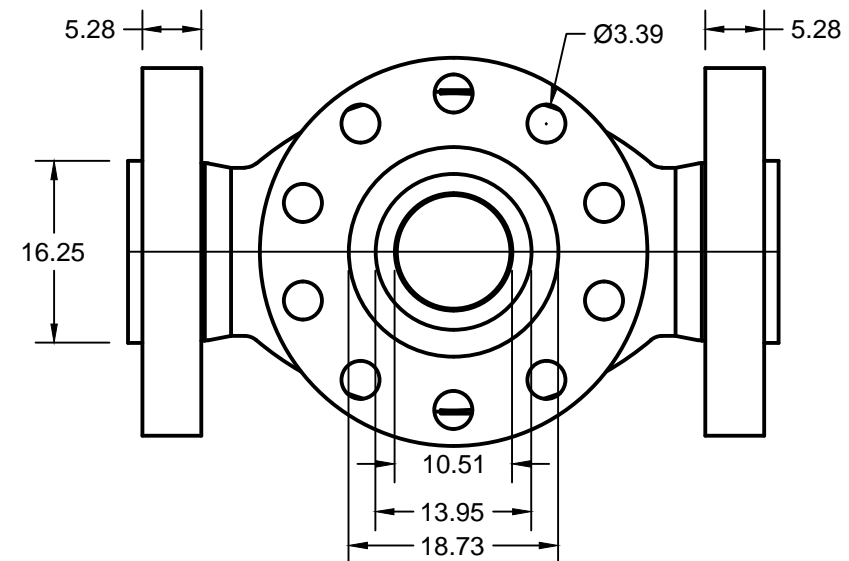
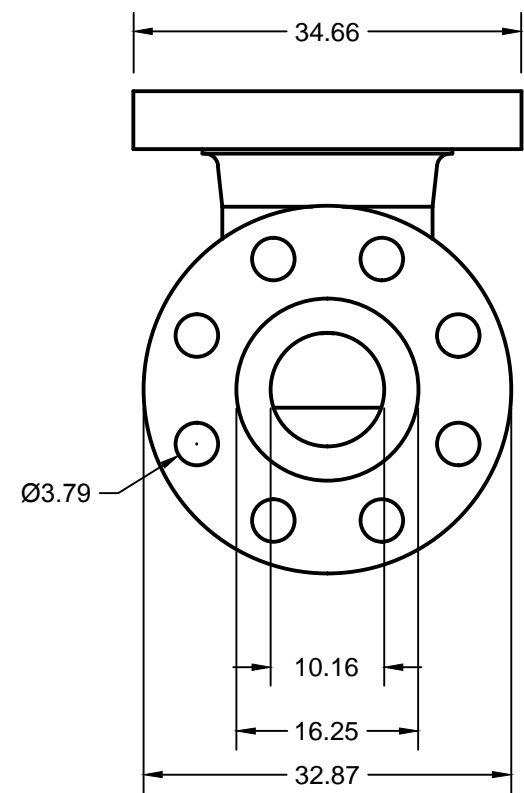
						
APROBACIONES		FECHA		TITULO		
DIB.	Ing. C.G.T.O.	05/05/2016		Ensamble de valvula de 4 pulgadas		
REV.	Ing. M.A.					
APROBO	Ing. H.V.	TAMAÑO	CODIGO	DIB. No.	REV.	
		B	VAL-4IN-EN	4-01	0	
ESCALA INDICADA		ACOT. mm	PESO CAL.	PESO REAL	HOJA	FECHA
					1 / 1	

4

3

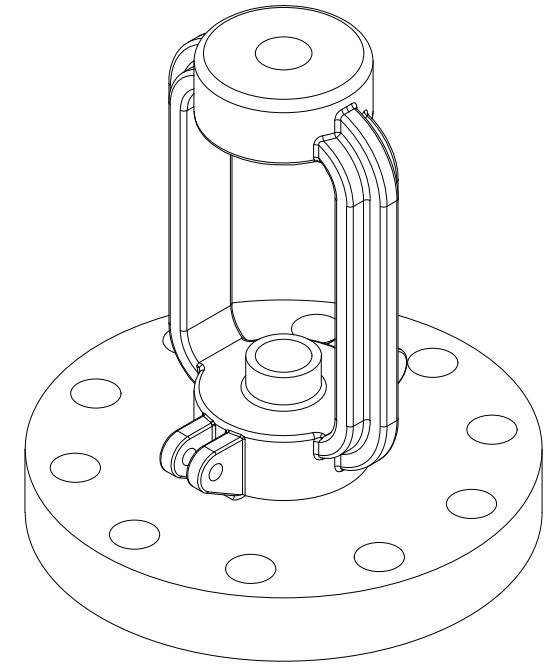
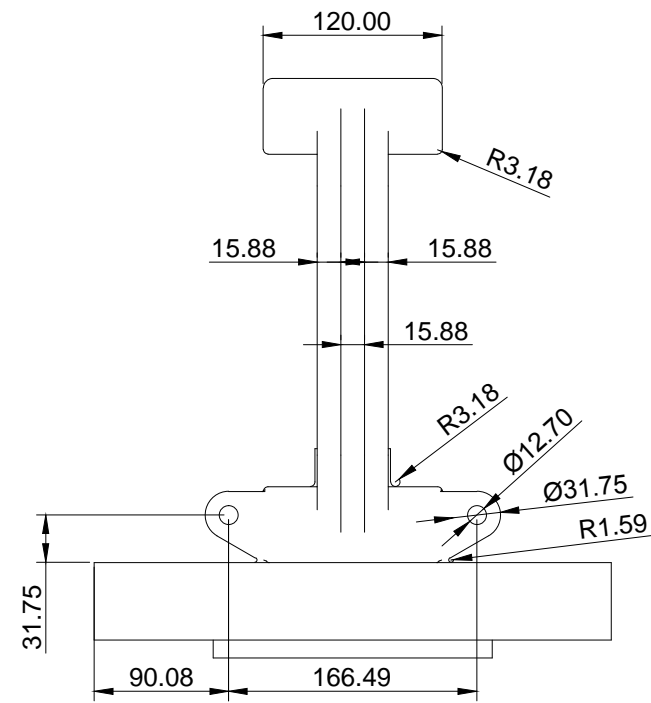
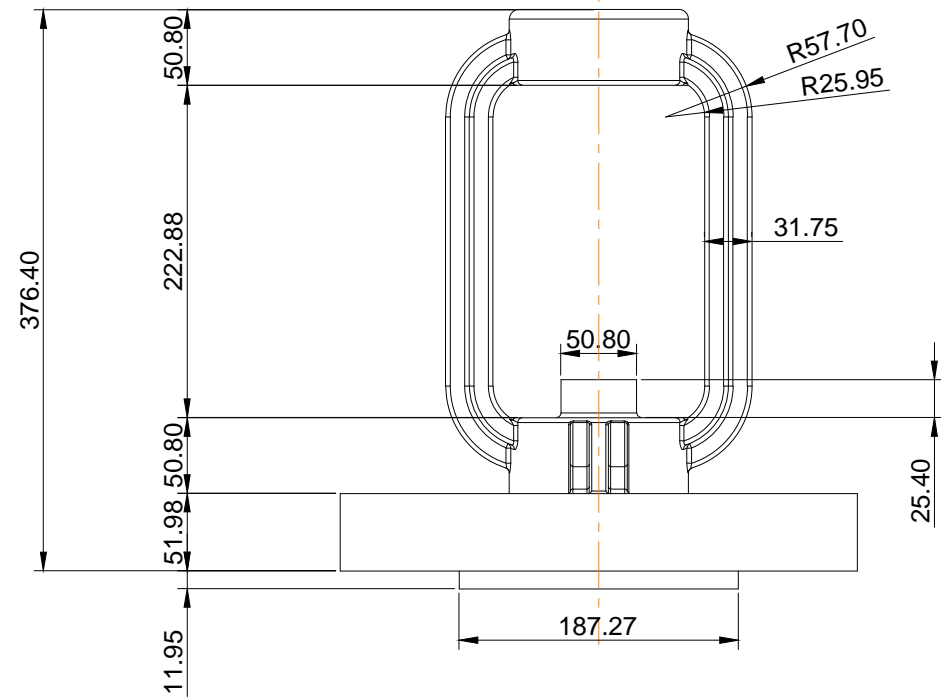
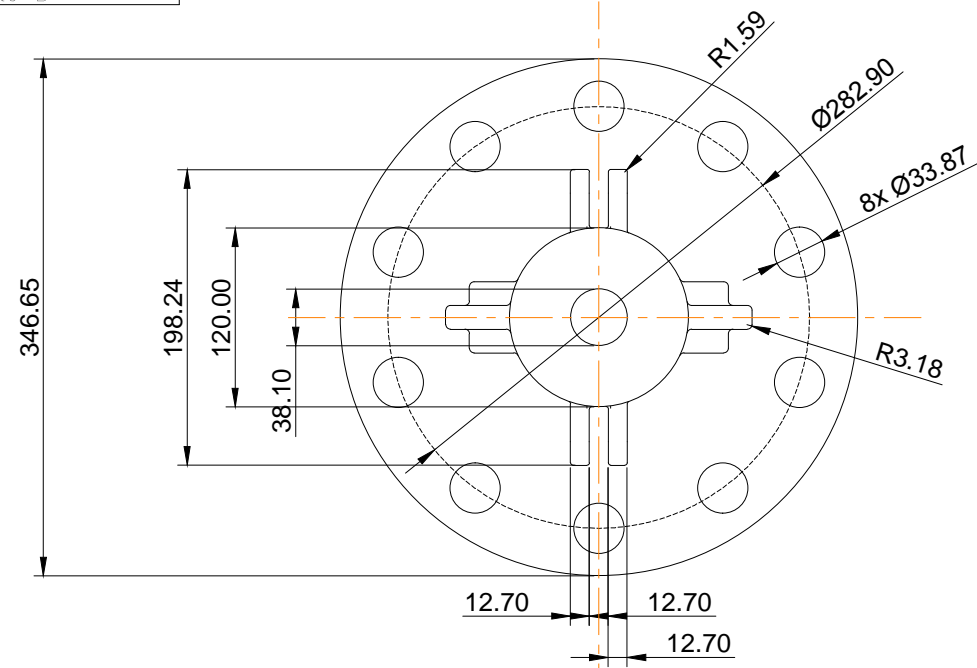
2

1



			
APROBACIONES	FECHA	TITULO	
DIB. Ing. C.G.T.O.	08/02/2016	Valvula de globo de 4 pulgadas	
REV.		TAMAÑO	CODIGO
APROBO		B	
		DIB. No.	REV.
			0
ESCALA	ACOT.	PESO CAL.	PESO REAL
INDICADA	mm		
		HOJA	FECHA
		1 / 1	

DIB. No.
Formato B



			
APROBACIONES	FECHA	TITULO	
DIB. Ing. C.G.T.O.	05/05/2016	Bonete para valvula de 4 pulgadas	
REV. Ing. M.A.			
APROBO Ing. H.V.		TAMAÑO	CODIGO
		B	VAL-4IN-B
		DIB. No.	REV.
		4-05	0
ESCALA	ACOT.	PESO CAL.	PESO REAL
INDICADA	mm		
		HOJA	FECHA
		1/1	

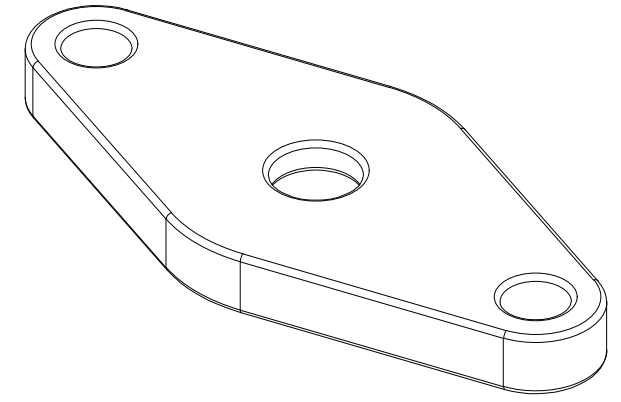
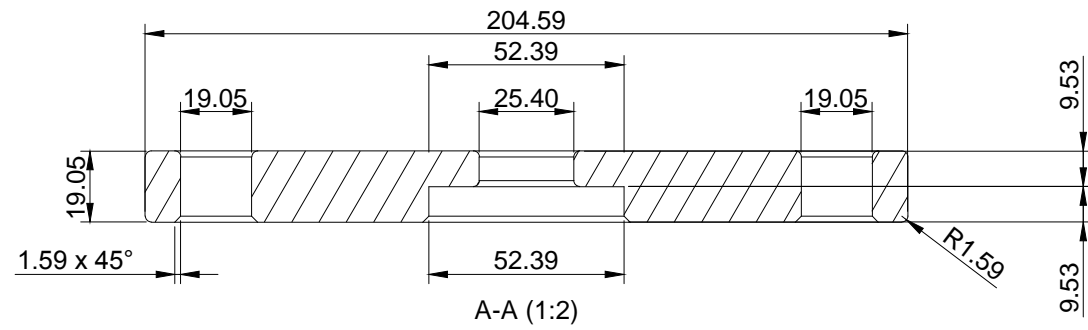
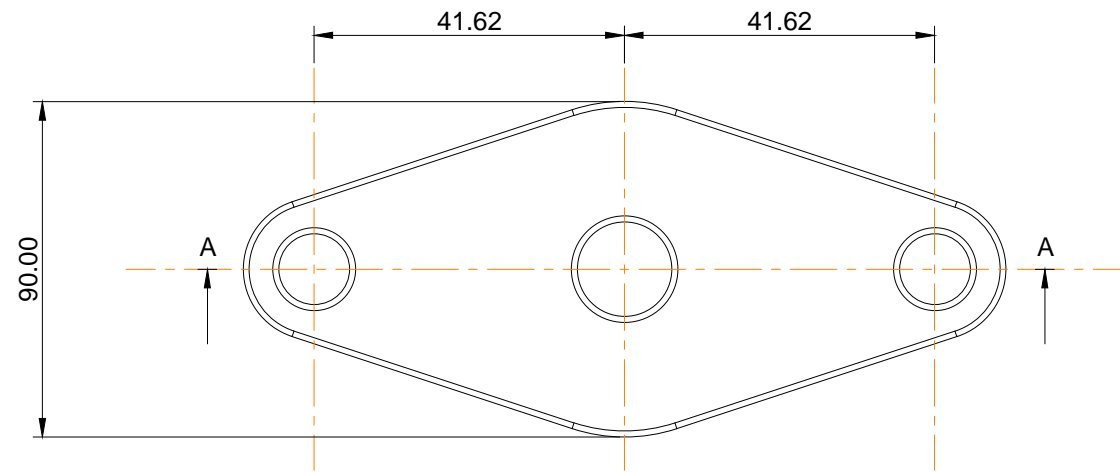
DIB. No.
Formato B

4

3

2

1



			
APROBACIONES		FECHA	TITULO
DIB.	Ing. C.G.T.O.	05/05/2016	Brida para bonete de valvula de 4 pulgadas
REV.	Ing. M.A.		
APROBO	Ing. H.V.		
TAMAÑO	CODIGO	DIB. No.	REV.
B	VAL-4IN-BR	4-06	0
ESCALA	ACOT.	PESO CAL.	PESO REAL
INDICADA	mm		HOJA
			1 / 1
			FECHA

4

3

2

1