

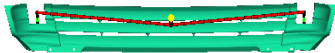
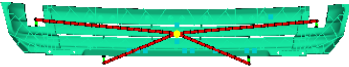
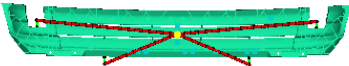
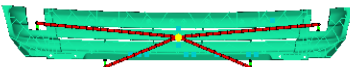
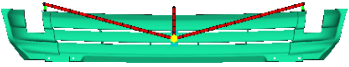
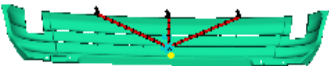
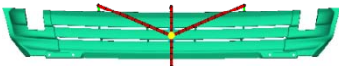
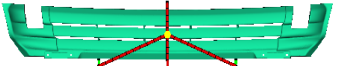
Moldflow Analysis Report

Part name : Middle Grill

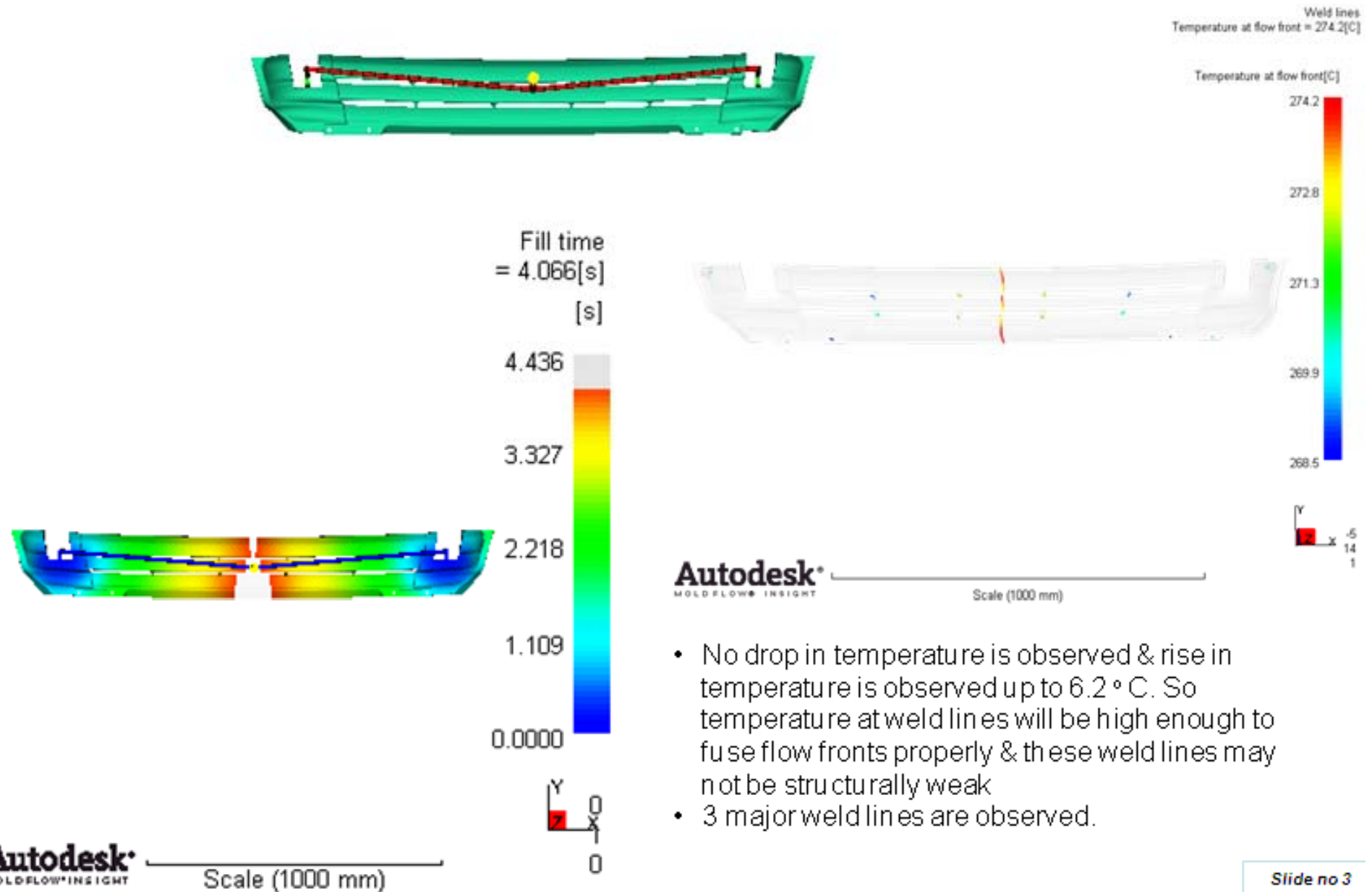


Executive Summary

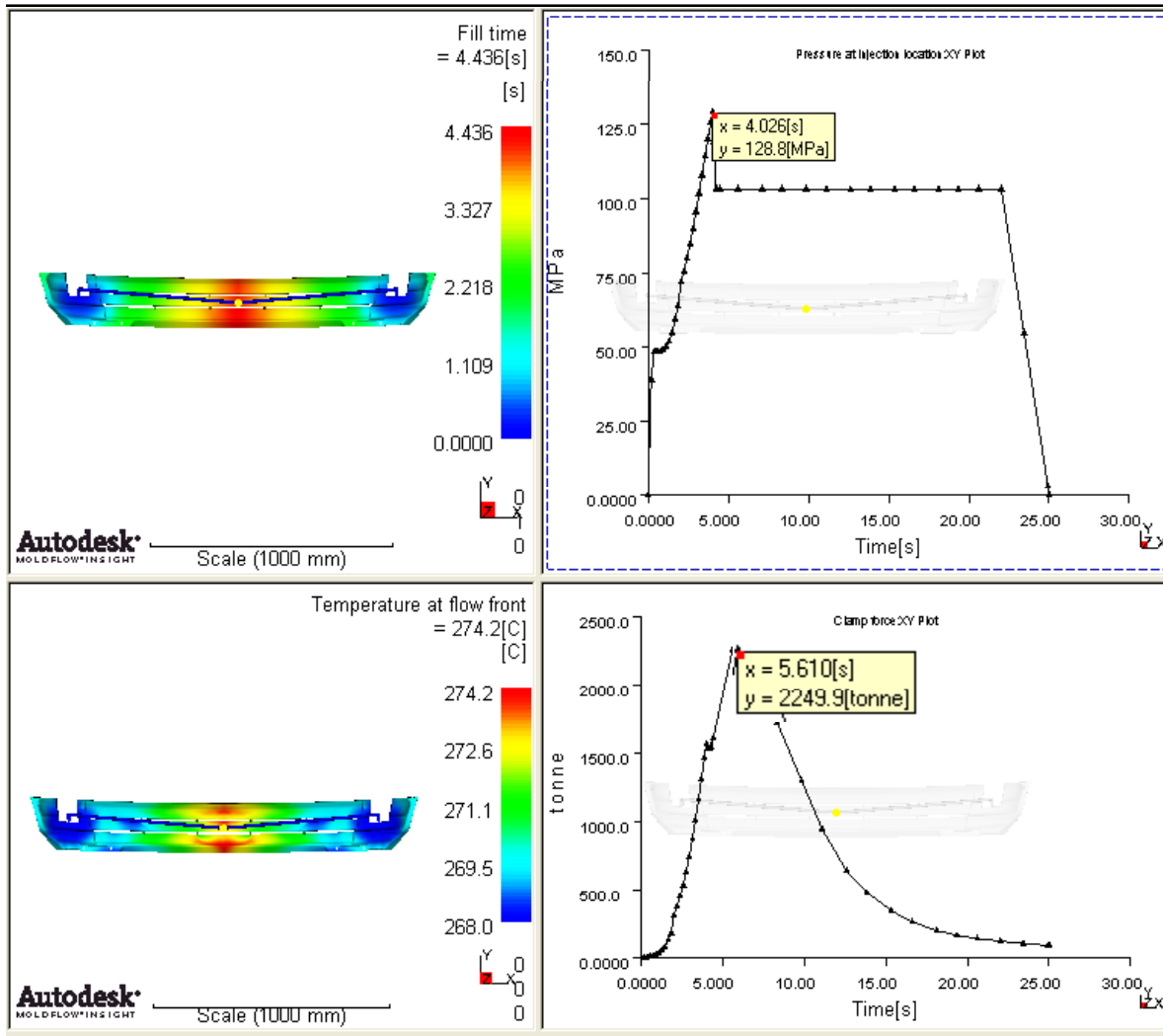
Options Given By Tool Maker

Iterations	Details	Feed system view
Option 1.0	2 drops open type	
Option 2.0	4 drops open type	
Option 2.1	2 top drops open type + 2 bottom drops sequential (Polysmart option)	
Option 2.2	2 top drops open type + 1 bottom drop sequential + 1 bottom drop open (Polysmart option)	
Option 4	1 centre drop open + 2 outer drops sequential type with bridge	
Option 5	1 centre drop open + 2 outer drops sequential type with bridge at top side	
Option 5.1	Option 5 + added 1more open type drop at bottom side (Polysmart option)	
Option 5.2	reverse of option 5.1 (Polysmart option)	

Option 1 : 2 Drops Open Type

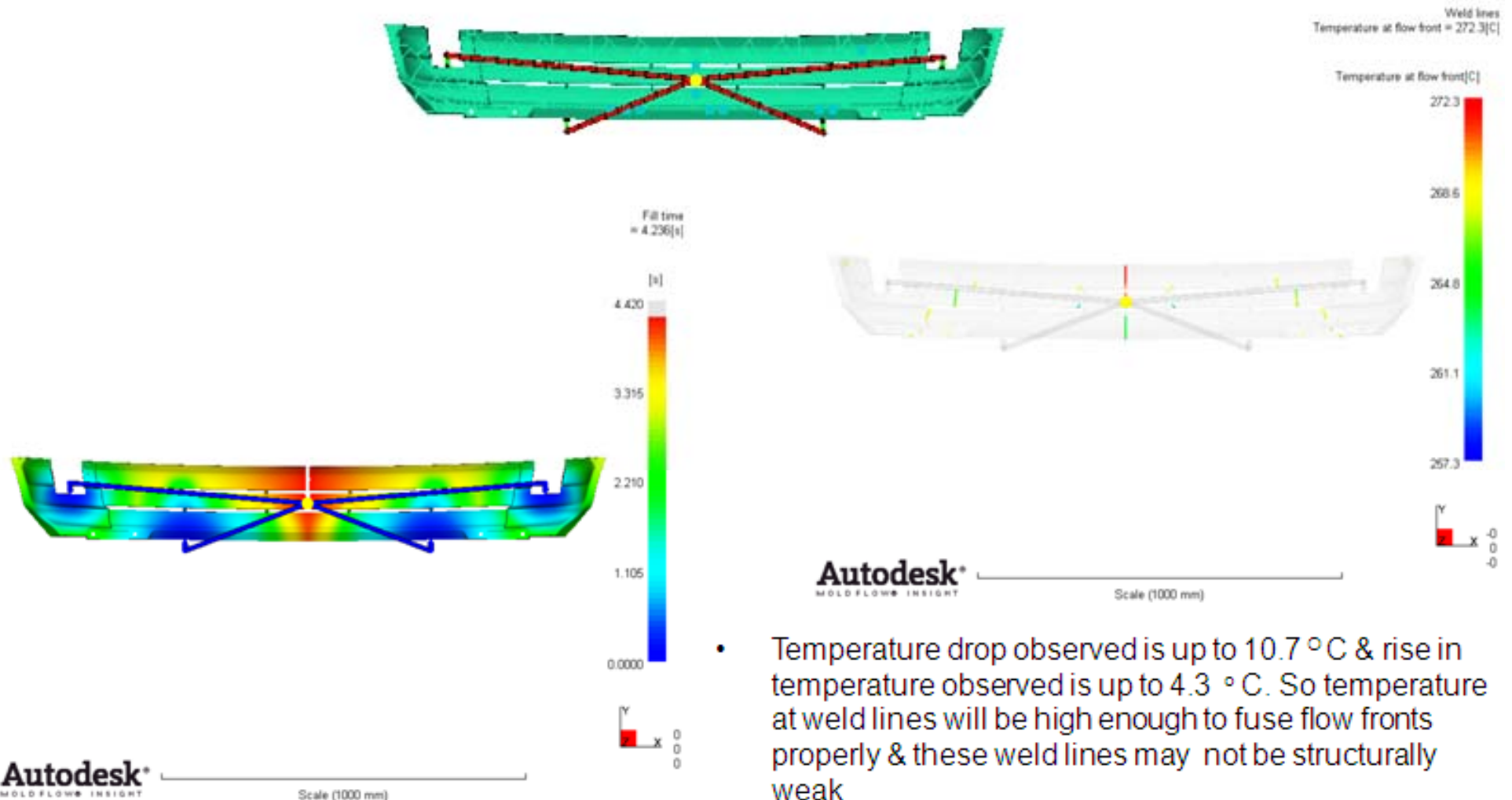


Option 1 : 2 Drops Open Type



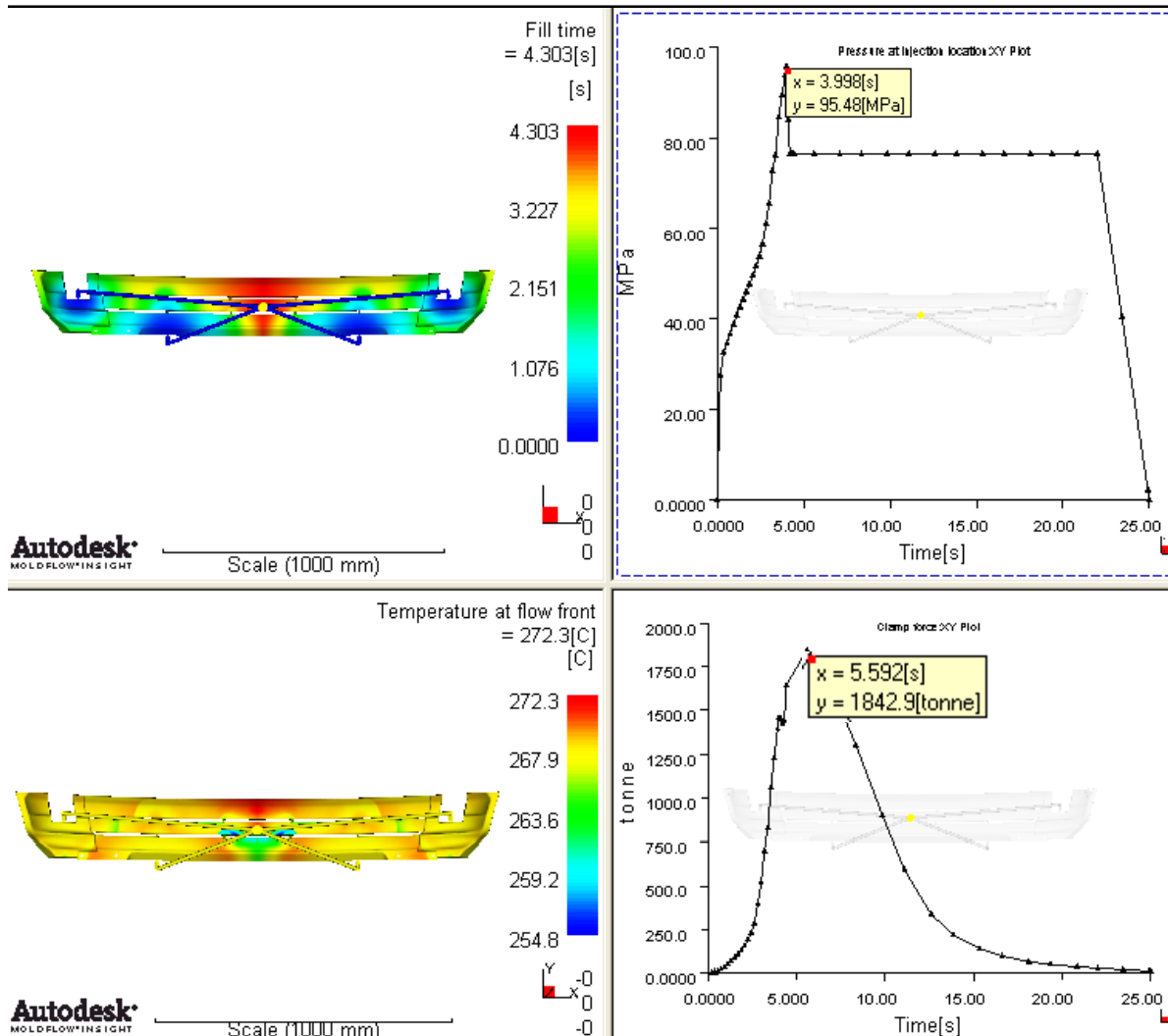
- Maximum pressure required to fill the part is 128.8 Mpa
- Clamp force required is 2250 tonne.
- No drop in temperature is observed & rise in temperature is observed up to 6.2 ° C.
- 3 major weld lines are observed & temperatures are high enough at weld line.

Option 2 : 4 Drops Open Type



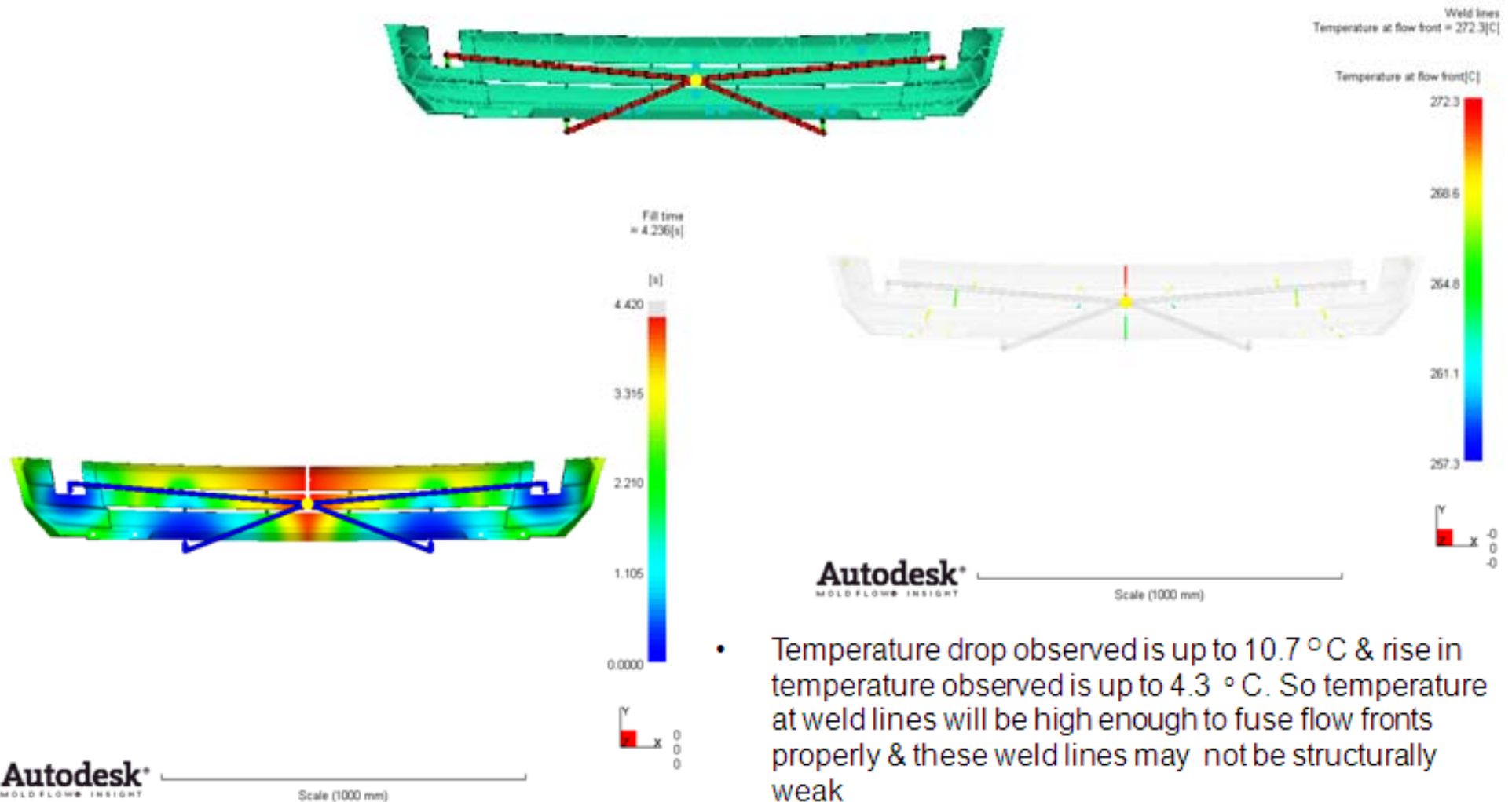
- Temperature drop observed is up to 10.7 °C & rise in temperature observed is up to 4.3 °C. So temperature at weld lines will be high enough to fuse flow fronts properly & these weld lines may not be structurally weak
- 5 major weld lines are observed.

Option 2 : 4 Drops Open Type



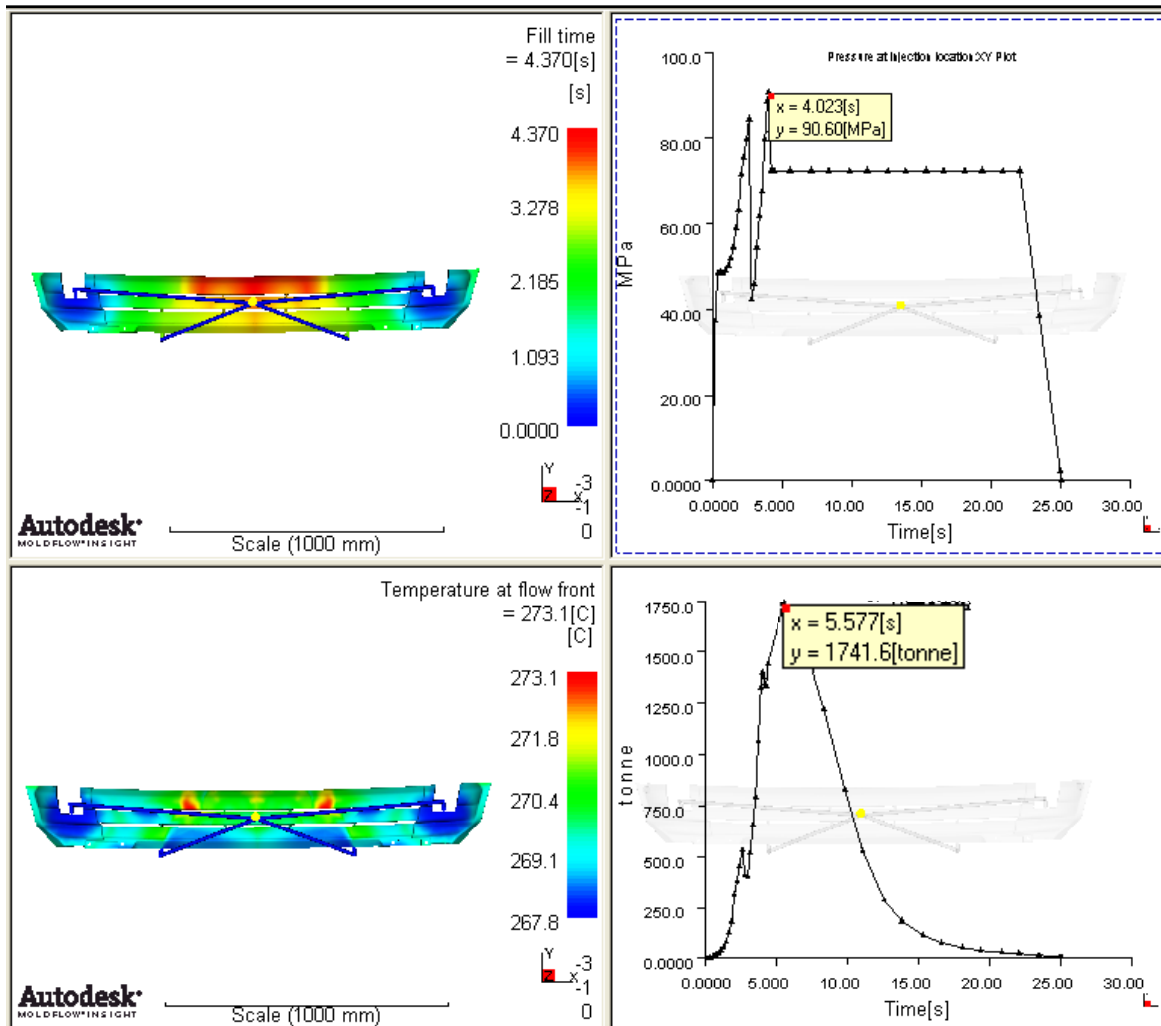
- Maximum pressure required to fill the part is 95.48 Mpa
- Clamp force required is 1843 tonne
- Drop in temperature observed is 13.2 ° C & rise in temperature is observed up to 4.3 ° C.
- 5 major weld lines are observed & temperatures are high enough at weld line

Option 2 : 4 Drops Open Type



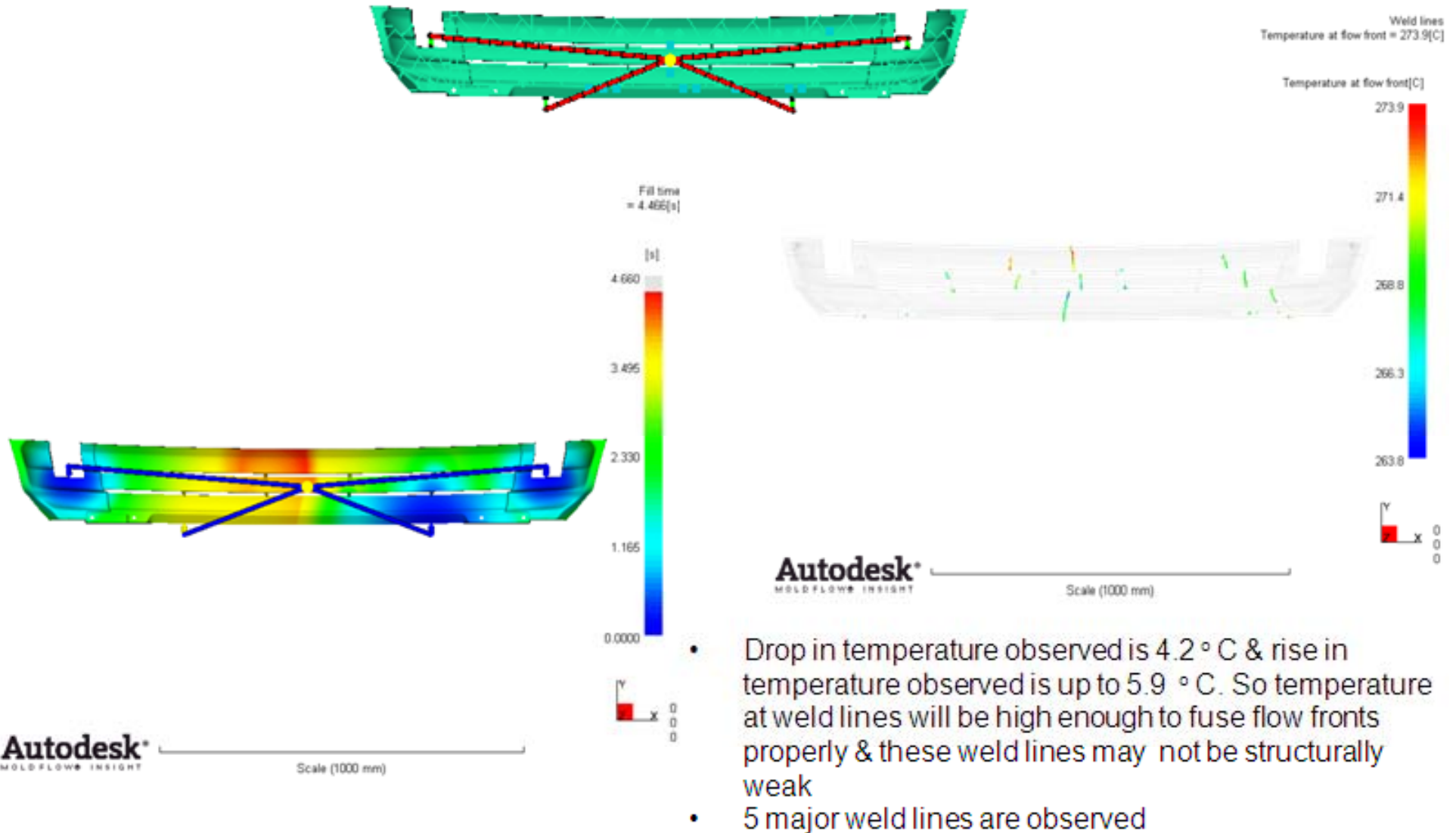
- Temperature drop observed is up to 10.7 °C & rise in temperature observed is up to 4.3 °C. So temperature at weld lines will be high enough to fuse flow fronts properly & these weld lines may not be structurally weak
- 5 major weld lines are observed.

Option 2.1 : 2 Drops Open Type, & 2 bottom drops sequential

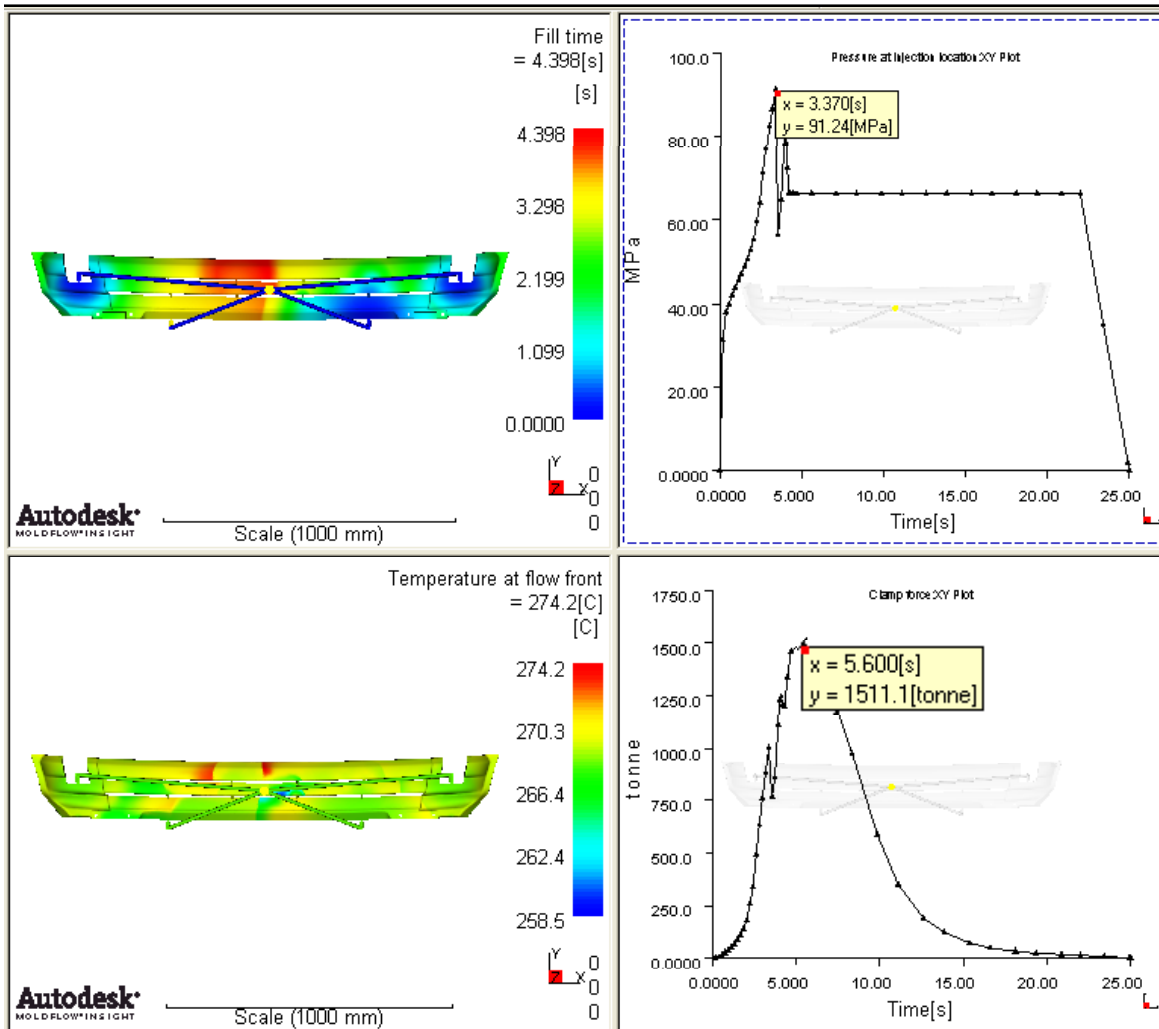


- Maximum pressure required to fill the part is 90.60 Mpa
- Clamp force required is 1742 tonne
- Drop in temperature observed is 0.2 ° C & rise in temperature is observed up to 5.1 ° C.
- 3 major weld lines are observed at middle strip & temperatures are high enough

Option 2.2 : 2 Top & 1 Bottom Drop Open Type & 1 Bottom Drop Sequential Type

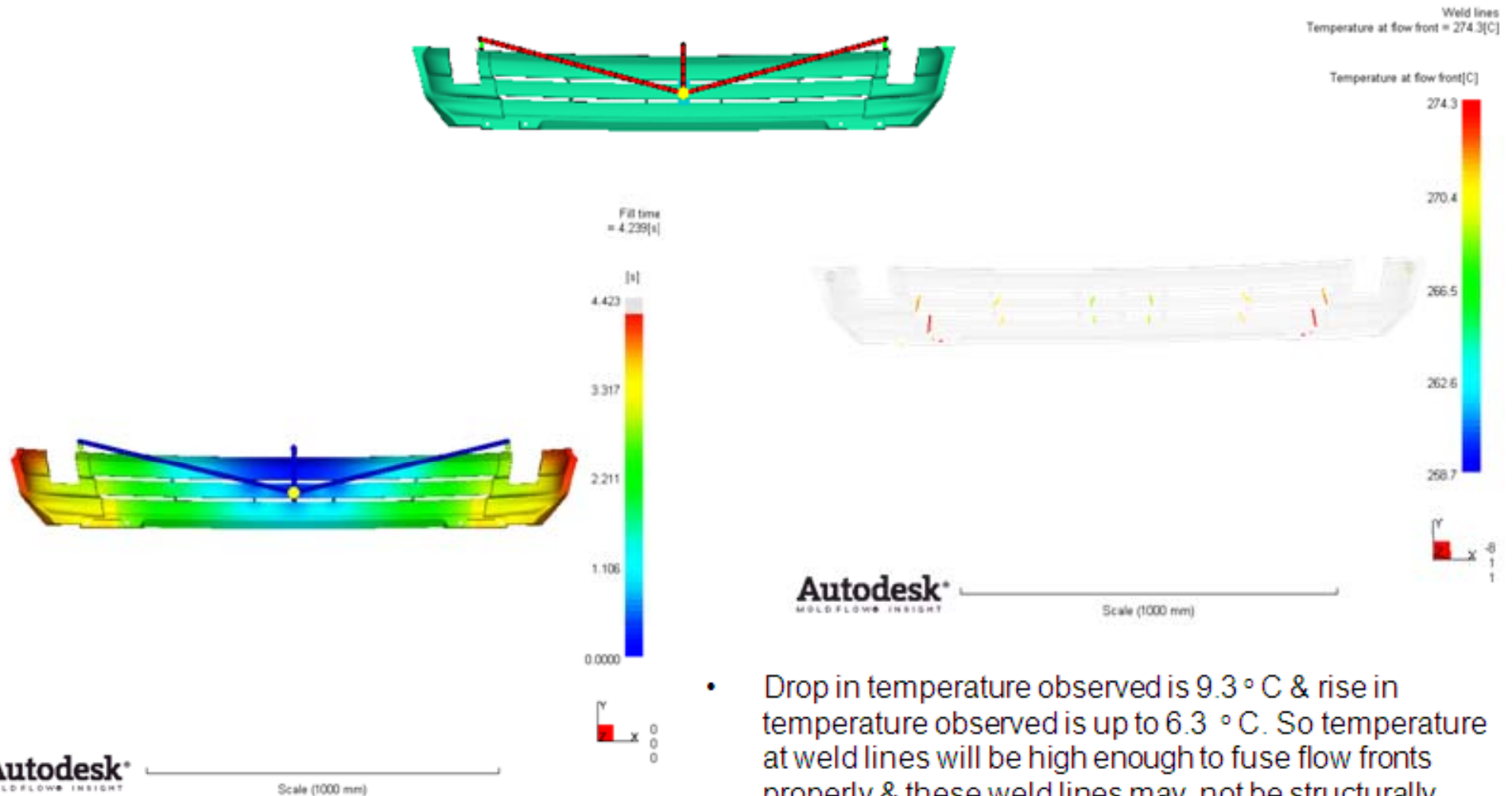


Option 2.2 : 2 Top & 1 Bottom Drop Open Type & 1 Bottom Drop Sequential Type



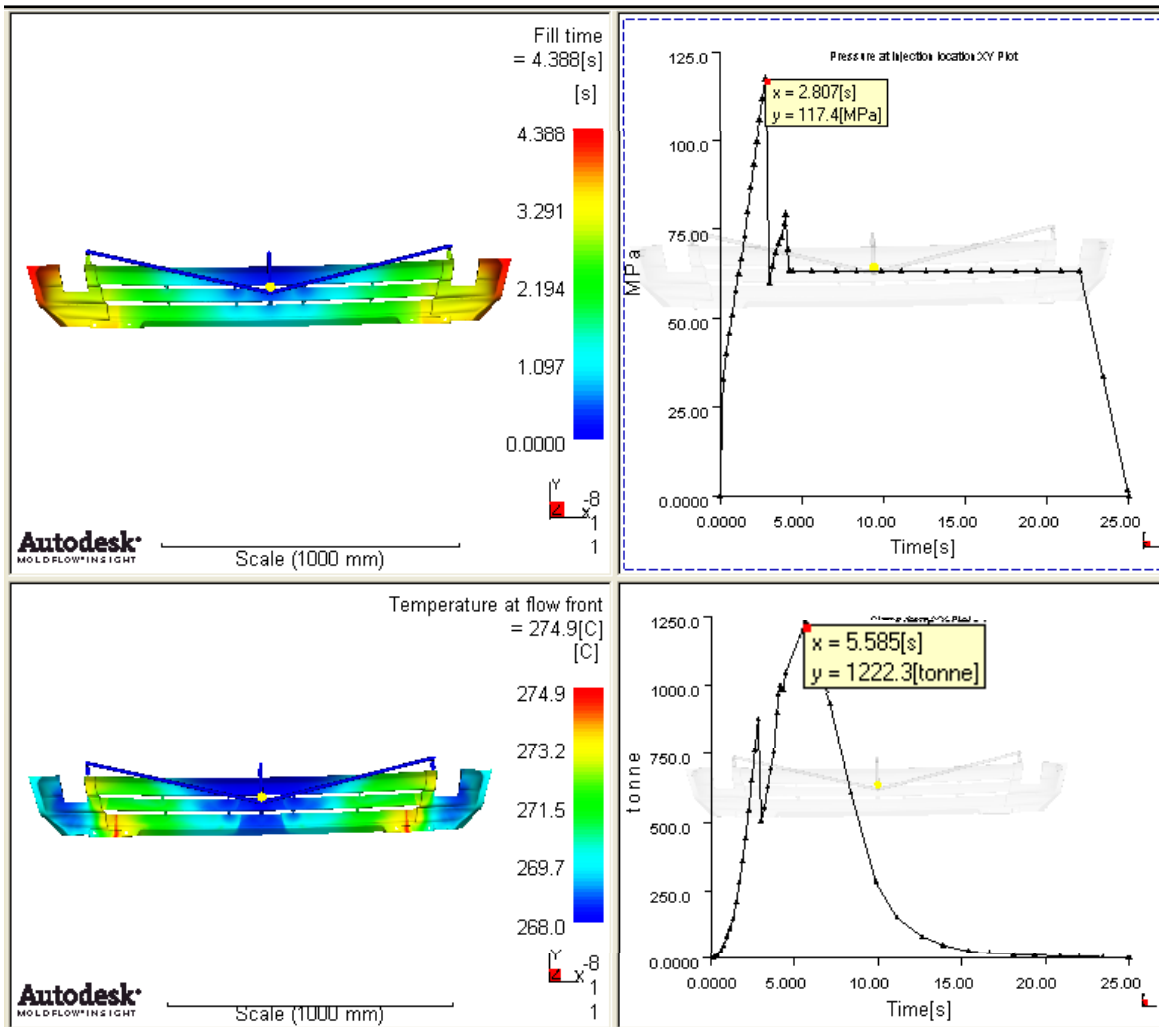
- Maximum pressure required to fill the part is 90.60 Mpa
- Clamp force required is 1512 tonne
- Drop in temperature observed is 9.5 ° C & rise in temperature is observed up to 6.2 ° C.
- 5 major weld lines are observed & temperatures are high enough

Option 4 : 1 centre drop open type & 2 outer drops sequential type with bridge



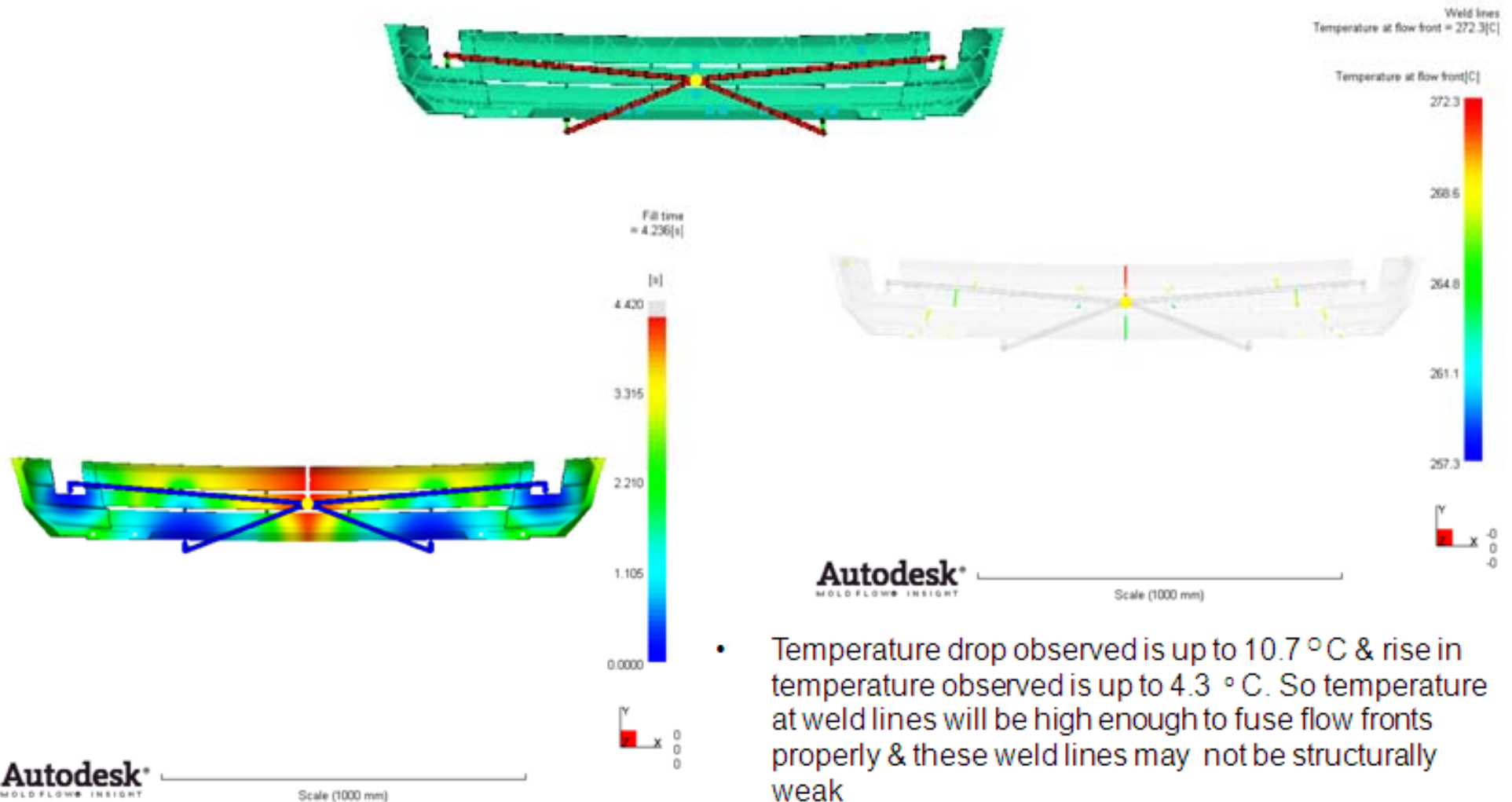
- Drop in temperature observed is 9.3°C & rise in temperature observed is up to 6.3°C . So temperature at weld lines will be high enough to fuse flow fronts properly & these weld lines may not be structurally weak
- 4 major weld lines are observed & 8 minor weld lines are observed due connecting ribs

Option 4 : 1 centre drop open type & 2 outer drops sequential type with bridge



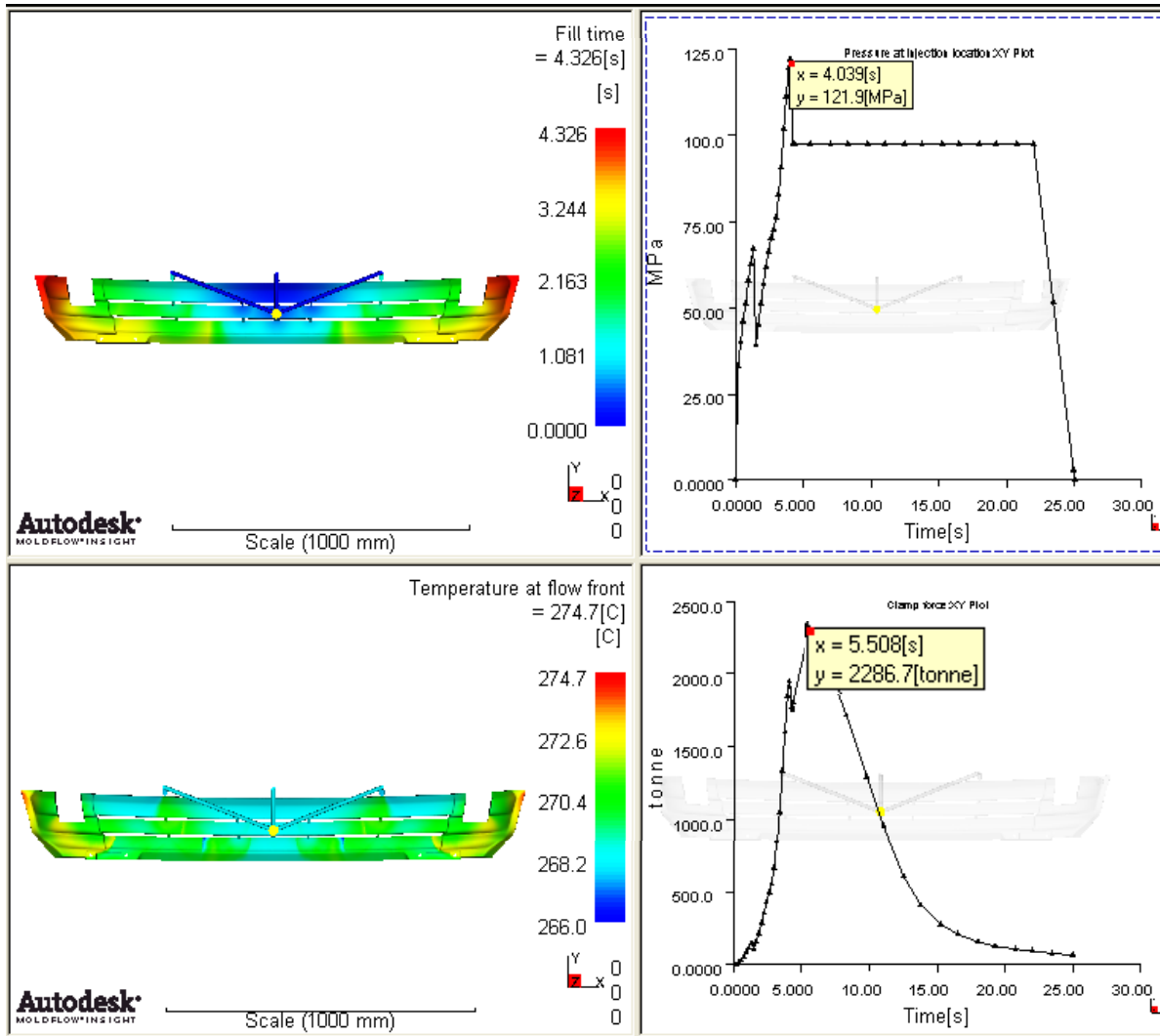
- Maximum pressure required to fill the part is 117.4 Mpa
- Clamp force required is 1223 tonne
- No drop in temperature is observed & rise in temperature is observed up to 6.9 ° C.
- 4 major weld lines are observed & temperatures are high enough

Option 2 : 4 Drops Open Type



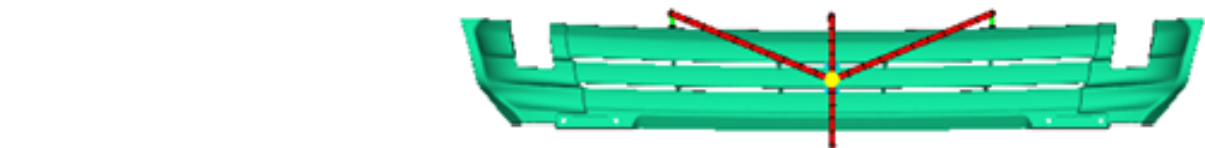
- Temperature drop observed is up to 10.7 °C & rise in temperature observed is up to 4.3 °C. So temperature at weld lines will be high enough to fuse flow fronts properly & these weld lines may not be structurally weak
- 5 major weld lines are observed.

Option 5 : 1 centre drop open & 2 outer drops sequential type with bridge

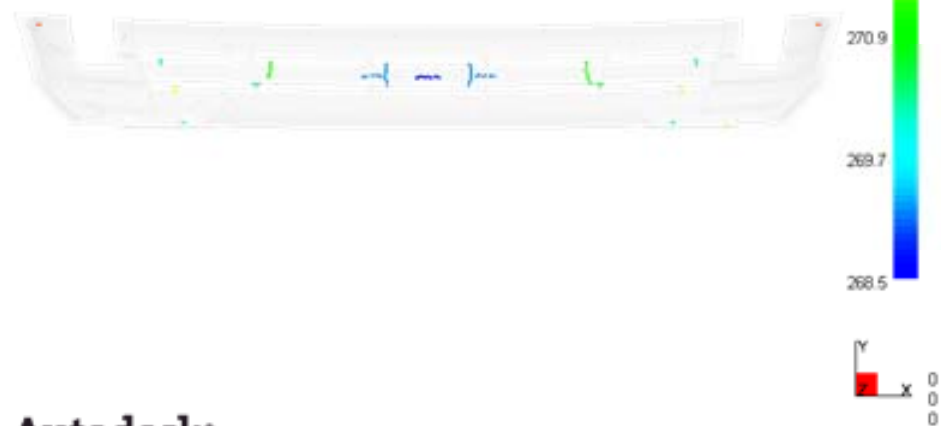
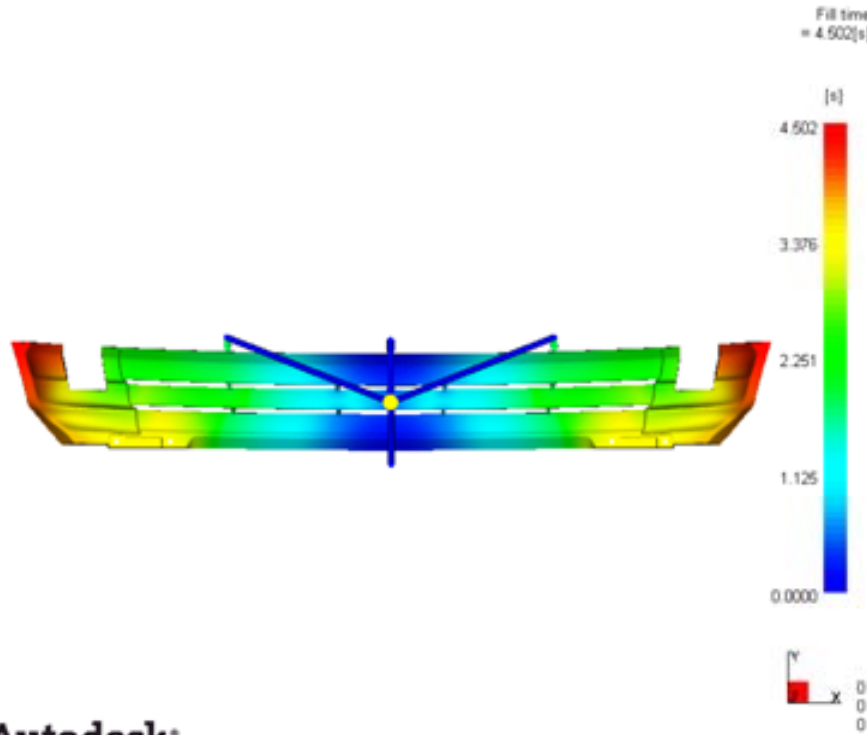


- Maximum pressure required to fill the part is 121.9 Mpa
- Clamp force required is 2287 tonne
- Temperature drop observed is 2 ° C & rise in temperature is observed up to 6.7 ° C.
- 4 major weld lines are observed & few minor weldines are observed and temperatures are high enough at weld lines

Option 5.1 : Option 5 + added 1 more open type drop at bottom side



Weld lines
Temperature at flow front = 273.4[C]

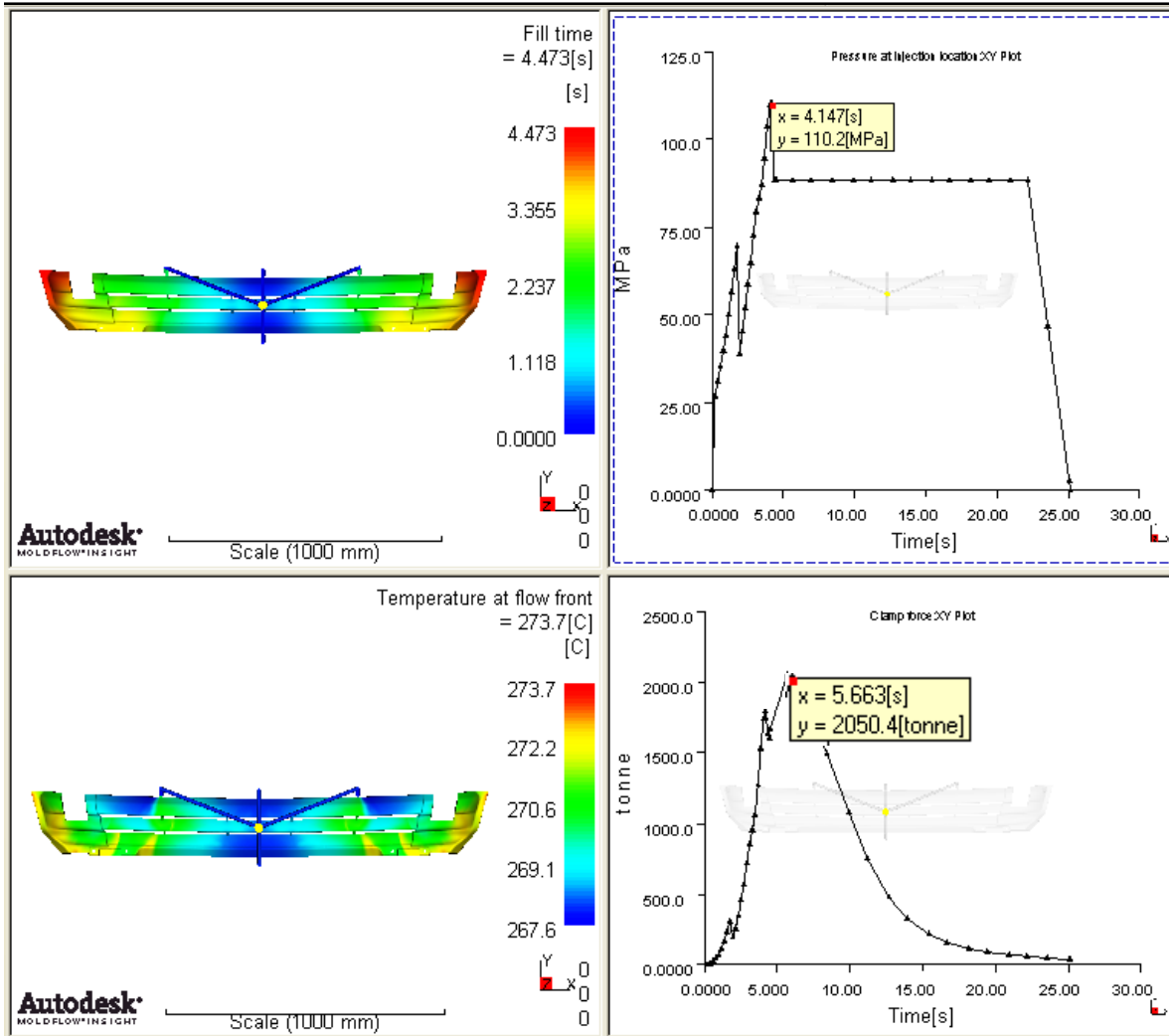


Autodesk®
MOLD FLOW® INSIGHT
Scale (1000 mm)

Autodesk®
MOLD FLOW® INSIGHT
Scale (1000 mm)

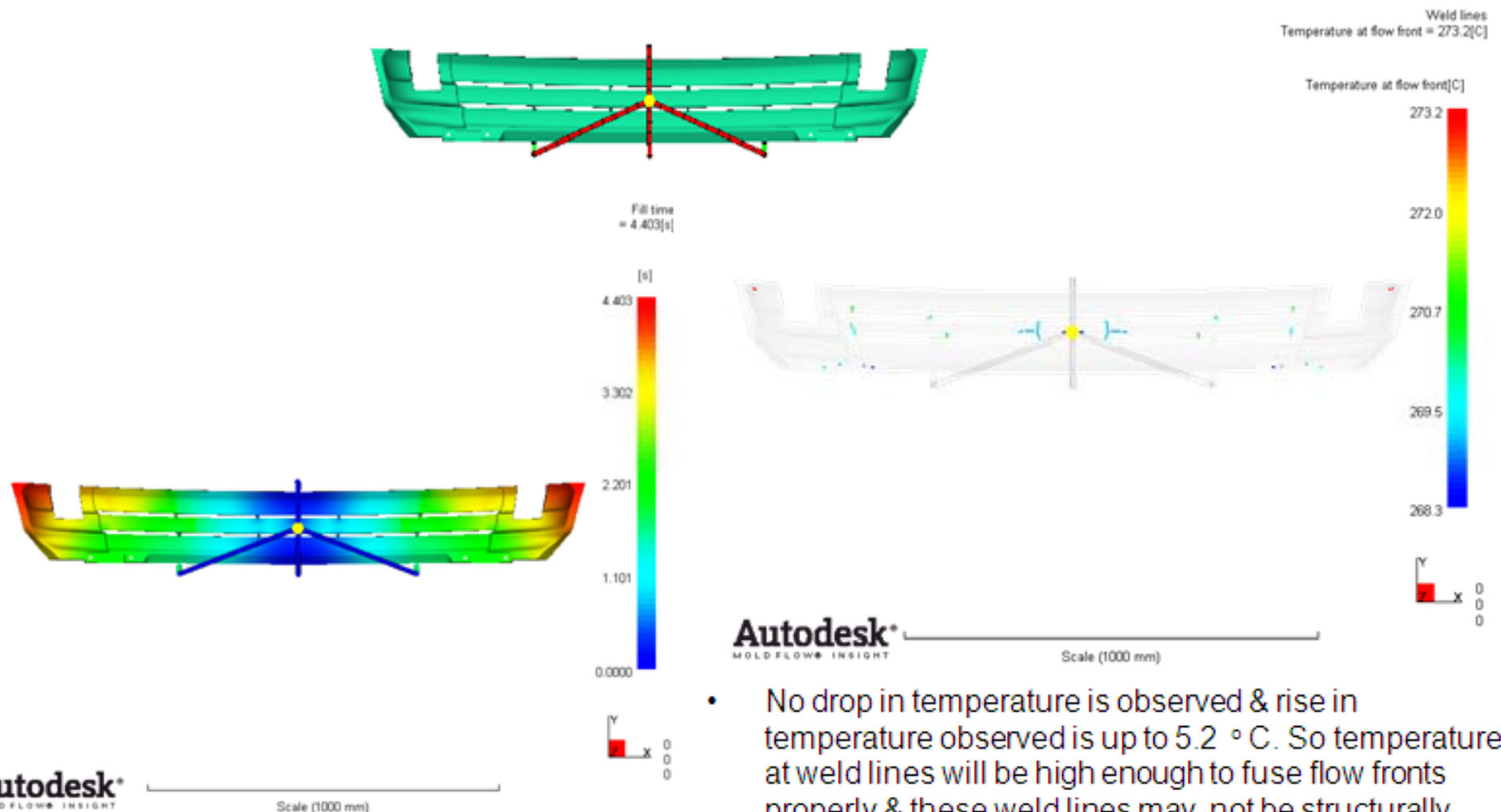
- No drop in temperature is observed & rise in temperature observed is up to 5.4 °C. So temperature at weld lines will be high enough to fuse flow fronts properly & these weld lines may not be structurally weak
- weld lines are observed due to connecting ribs at middle strip only

Option 5.1 :Option 5 + added 1 more open type drop at bottom side



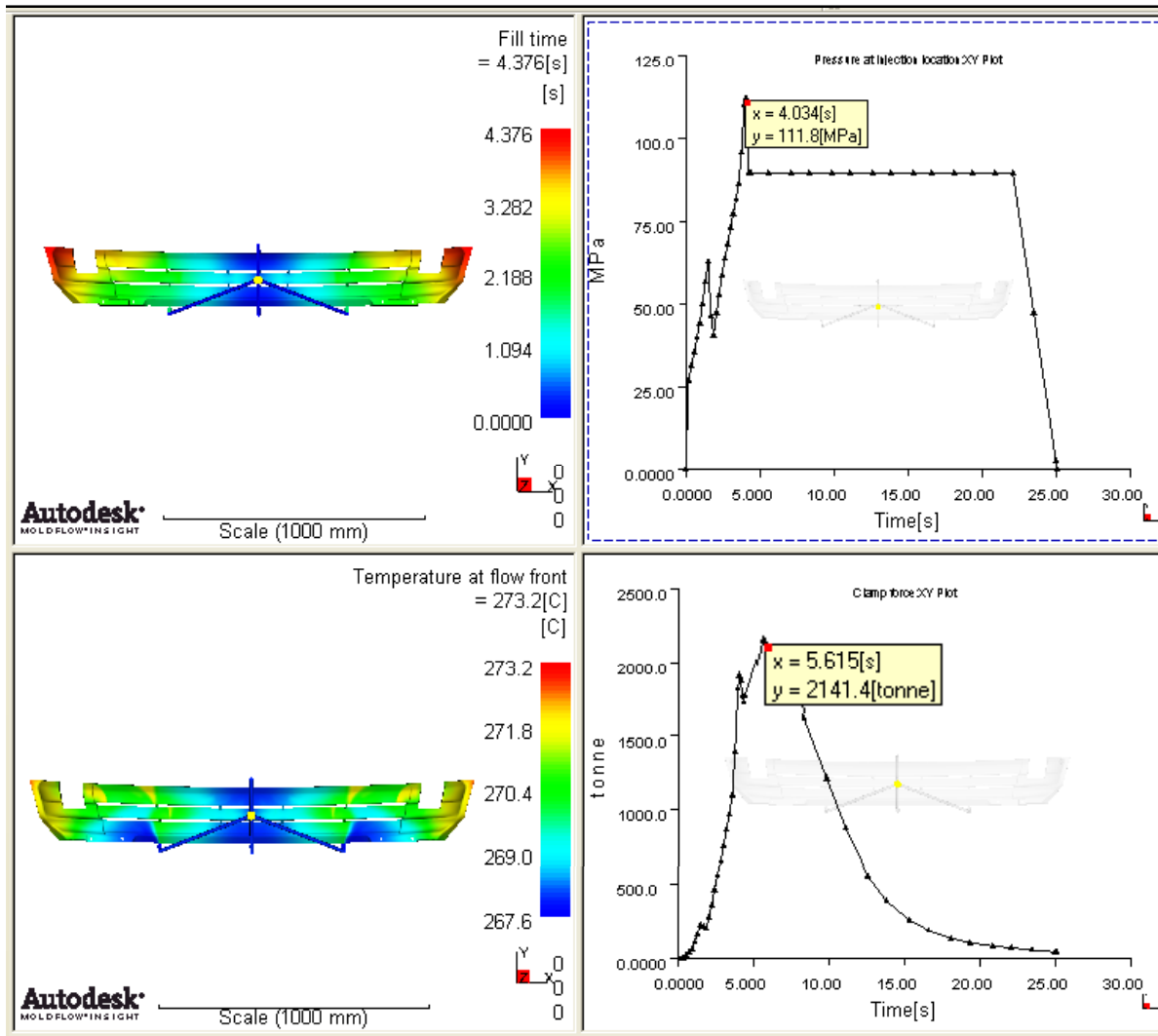
- Maximum pressure required to fill the part is 110.2 Mpa
- Clamp force required is 2051 tonne
- Temperature drop observed is 0.4 ° C & rise in temperature is observed up to 5.7 ° C.
- 4 major weld lines are observed & few minor weldines are observed and temperatures are high enough at weld lines

Option 5.2 : Reverse Of Option 5



- No drop in temperature is observed & rise in temperature observed is up to 5.2 ° C. So temperature at weld lines will be high enough to fuse flow fronts properly & these weld lines may not be structurally weak
- weld lines are observed due to connecting ribs.

Option 5.1 :Option 5 + added 1 more open type drop at bottom side



- Maximum pressure required to fill the part is 111.8 Mpa
- Clamp force required is 2142 tonne
- Temperature drop observed is 0.4 ° C & rise in temperature is observed up to 5.2 ° C.
- 4 major weld lines are observed & few minor weldines are observed and temperatures are high enough at weld lines

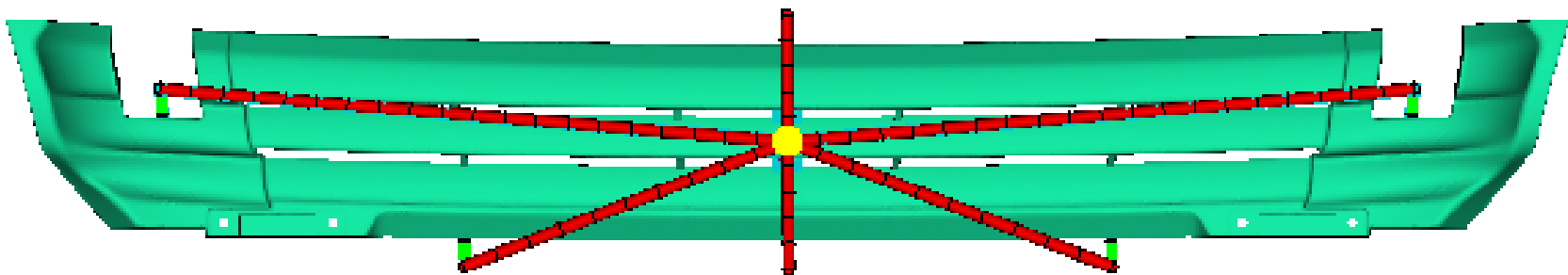
Summary



s.no	Iterations	Details	Feed system view	Maximum pressure required to fill part	Clamp tonnage	Temp drop at weldline
1	Option 1.0	2 drops open type		128.8 Mpa	2249 tonne	Only temperature rise is observed
2	Option 2.0	4 drops open type		95.48 Mpa	1842.9 tonne	10.7 deg C
3	Option 2.1	2 top drops open type + 2 bottom drops sequential		90.60 Mpa	1741.6 tonne	Only temperature rise is observed
4	Option 2.2	2 top drops open type + 1 bottom drop sequential + 1 bottom drop open		91.24 Mpa	1504.8 tonne	4.2 deg C
5	Option 4	1 centre drop open + 2 outer drops sequential type with bridge		117.4 Mpa	1222.3 tonne	9.3 deg C
6	Option 5	1 centre drop open + 2 outer drops sequential type with bridge		121.9 Mpa	2286.7 tonne	1.6 deg C
7	Option 5.1	Option 5 + added 1 more open type drop at bottom side		110.2 Mpa	2050 tonne	Only temperature rise is observed
8	Option 5.2	reverse of optin 5.1		111.8 Mpa	2149.4 tonne	Only temperature rise is observed

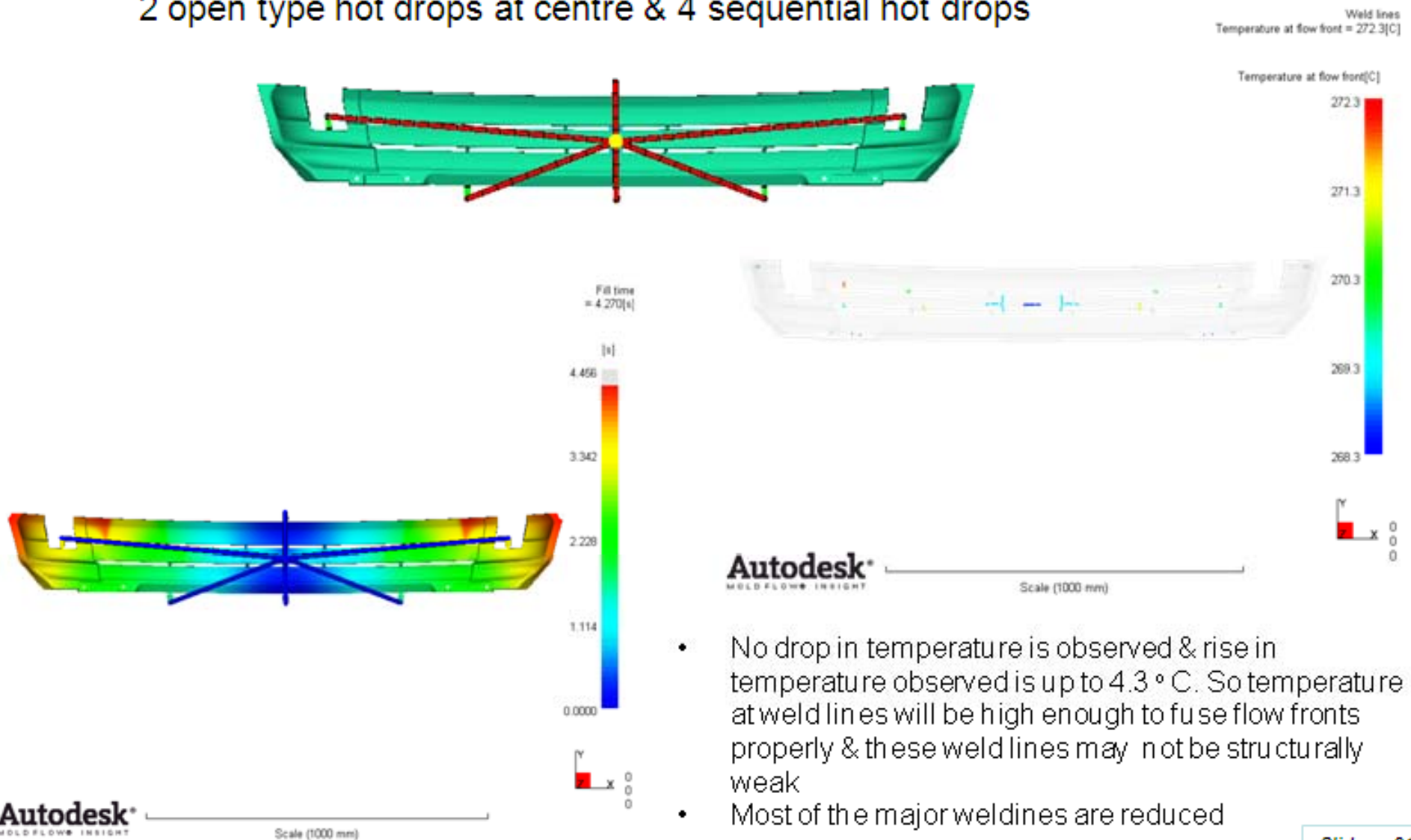
Conclusions

- Maximum pressure required to fill the part is ranging from 90Mpa -129Mpa with above options.
- Clamp force required is ranging from 1222 tonne to 2287 tonne with above options.
- Temperature drop observed at weldlines are less than 20 °C.
- Temperature drop observed in part during filling are less than 20 °C.
- To reduce required pressure & clamp tonnage further iterations are needed by adding 2 more sequential hot drops
i.e Total 4+2 drops finalized and further iterations are carried out. (refer next slides for details of final optimized study)

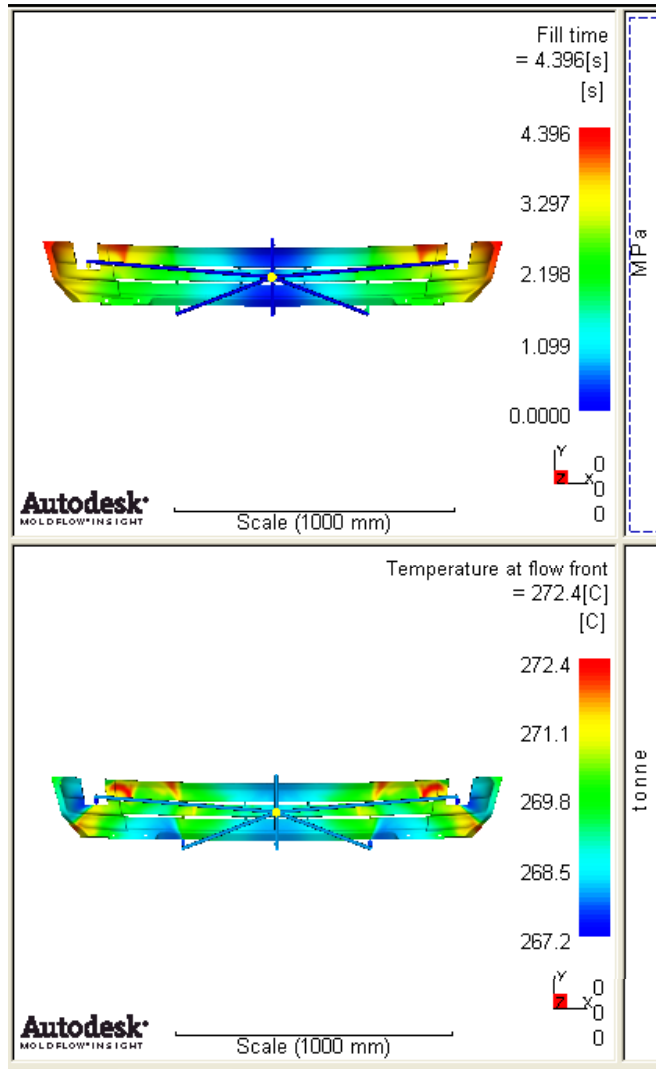


Final optimized study by Polysmart

2 open type hot drops at centre & 4 sequential hot drops



Final optimized study



- Maximum pressure required to fill the part is 76.95 Mpa
- Clamp force required is 977.4 tonne
- Temperature drop observed is 0.8 ° C & rise in temperature is observed up to 4.4 ° C.
- Most of maior weldines are reduced.

