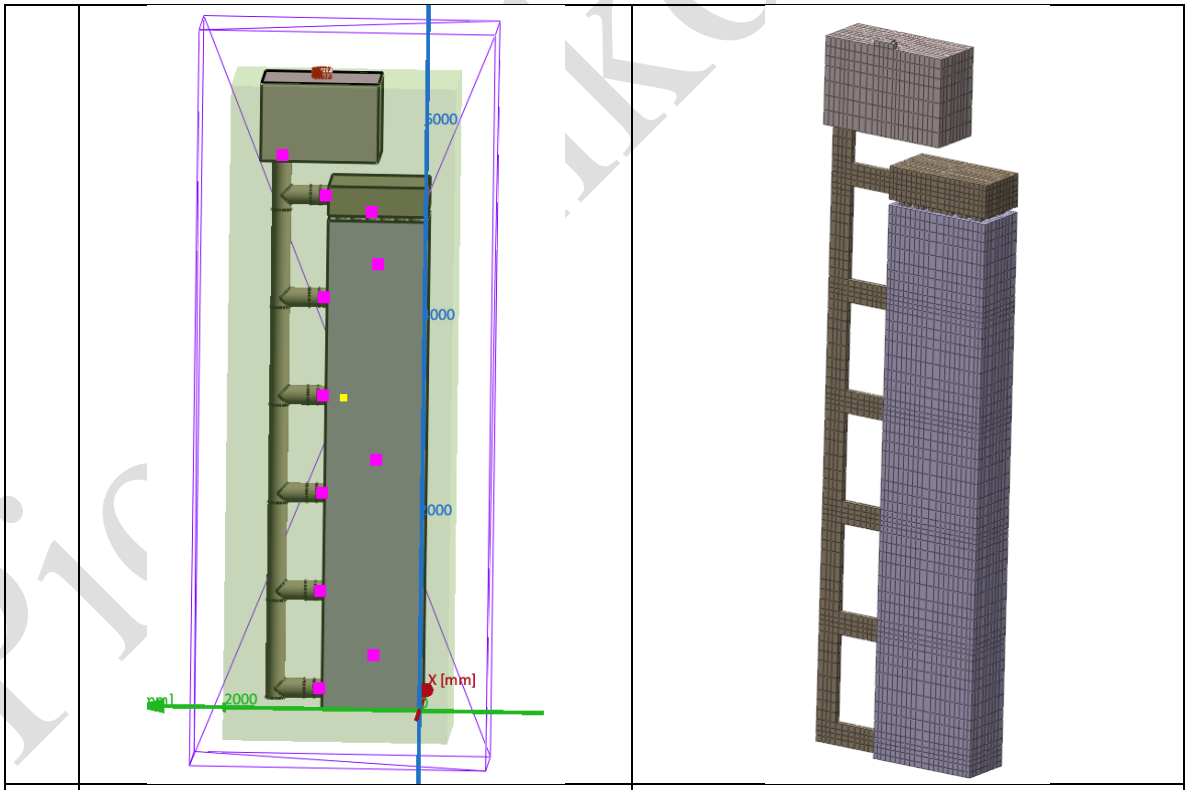
Przedmiot: Wspomaganie komputerowe zagadnień inżynierskich www.iFlowFePhase.info				
Temat: **ĆW. Nr 1**…….		Prowadzący: **Piotr Mikołajczak**		Ocena :
Imię i nazwisko:…….	Data wykonania:	Wydział:	Semestr :	Grupa :

1. Dane do przeprowadzenia symulacji (zgodnie z wytycznymi na liście studentów oraz instrukcją)



a) Geometria (Geometry) b) Dyskretyzacja przestrzenna (Mesh)

Rys. 1. Geometria odlewu z układem wlewowym, nadlewami (część stopu odlewniczego). Wersja v02 z wszystkimi kanałami wlewowymi.

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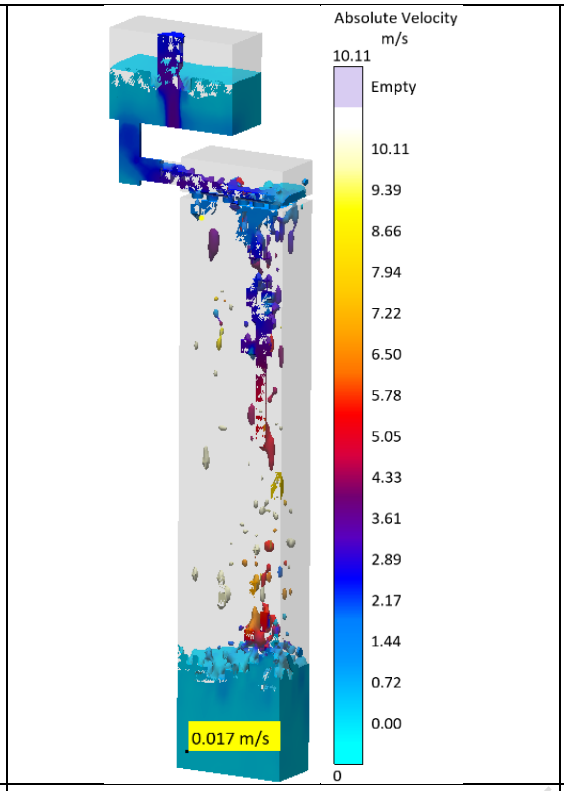
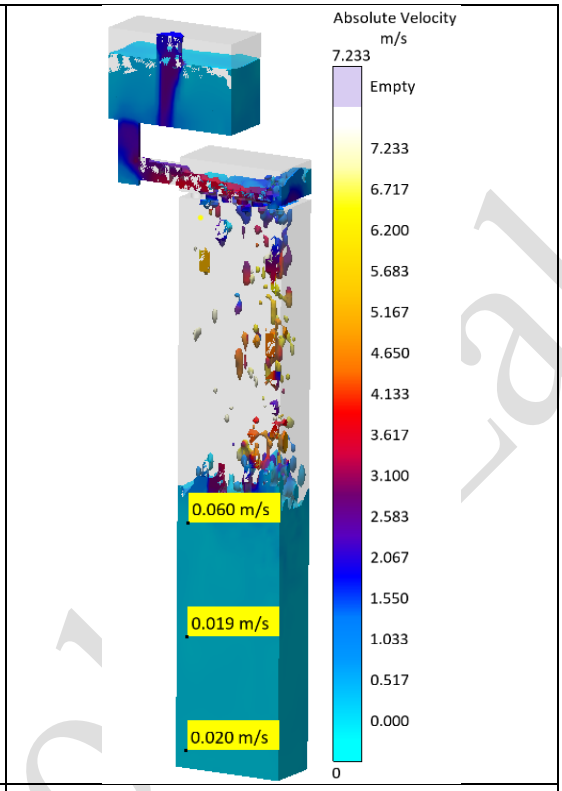
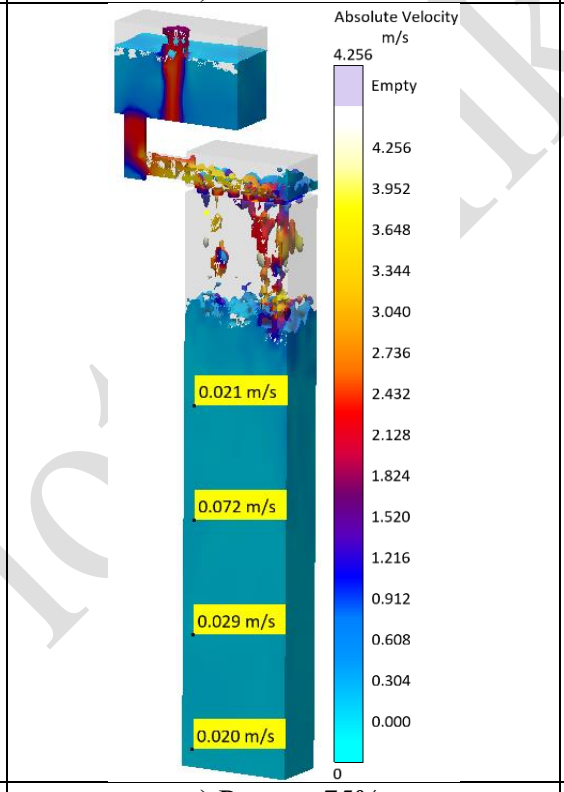
2. Wyniki symulacji



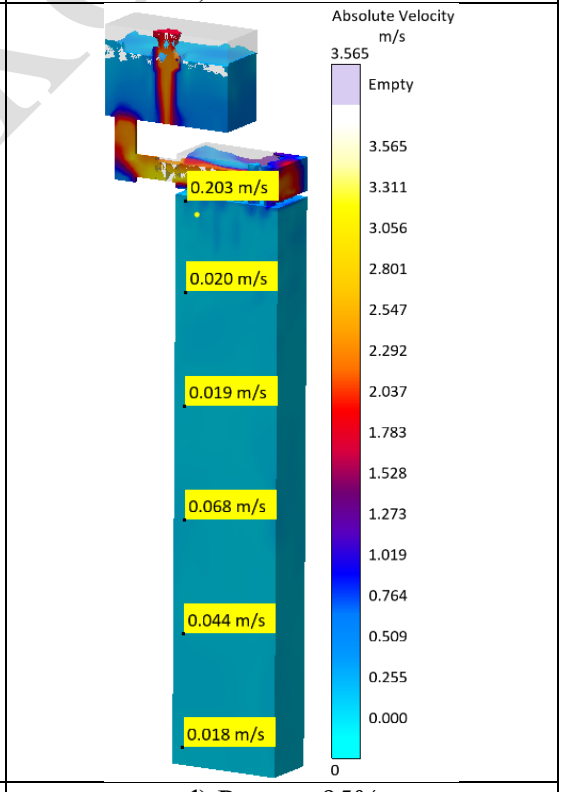
a) Percent 25%



b) Percent 50%



c) Percent 75%



d) Percent 95%

Rys. 2. Zalewanie - prędkość (Pouring – Velocity), wersja v03 (A ukł. DESZCZOWY).

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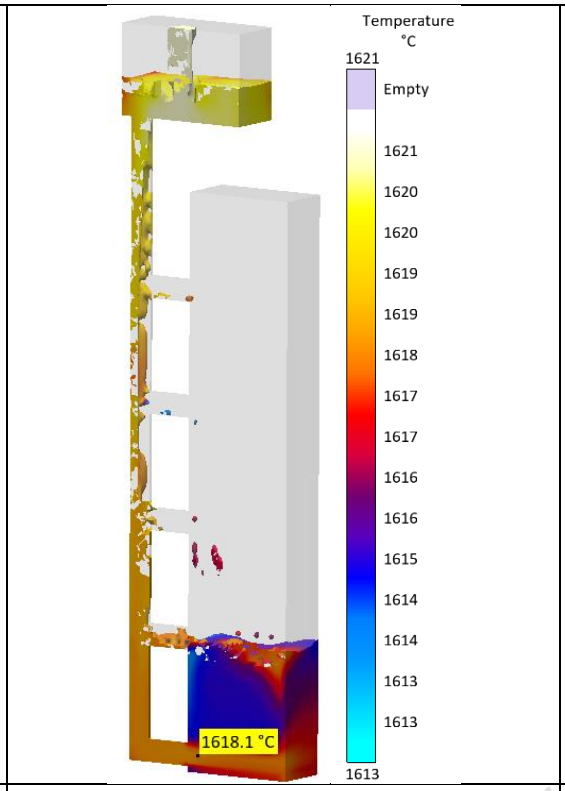
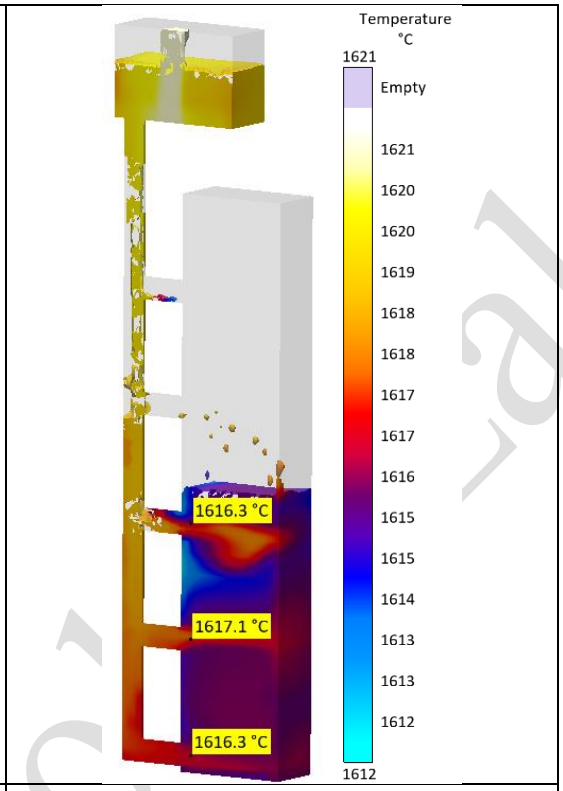
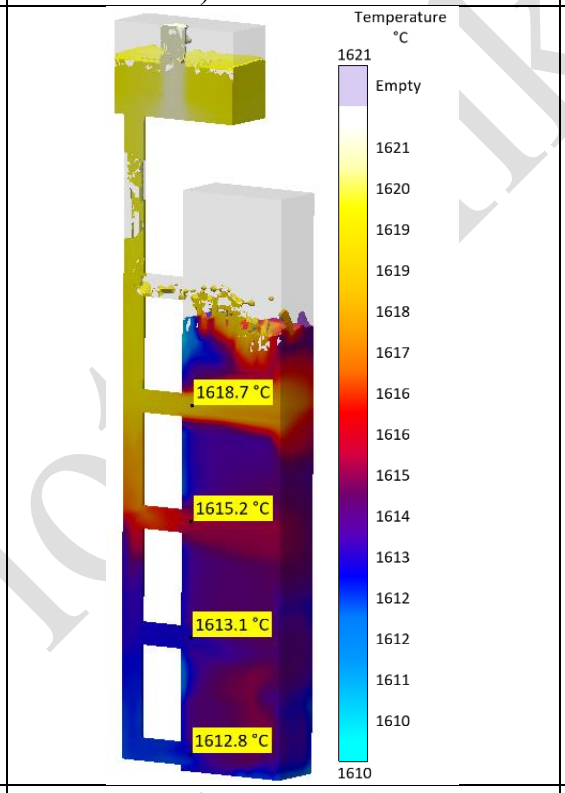


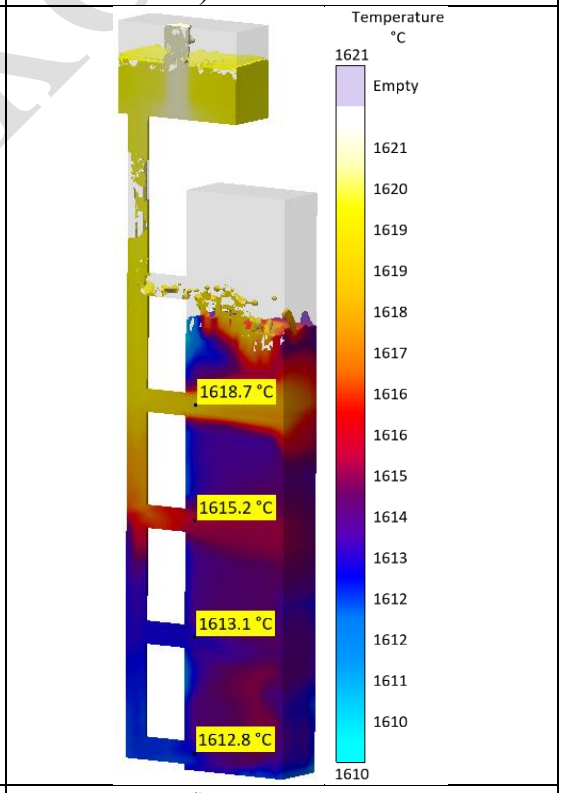
a) Percent 25%



b) Percent 50%



c) Percent 75%



d) Percent 95%

Rys. 3. Zalewanie - temperatura (Pouring – Temperature), wersja v04
(B ukł. SYFON.-BOCZNY).

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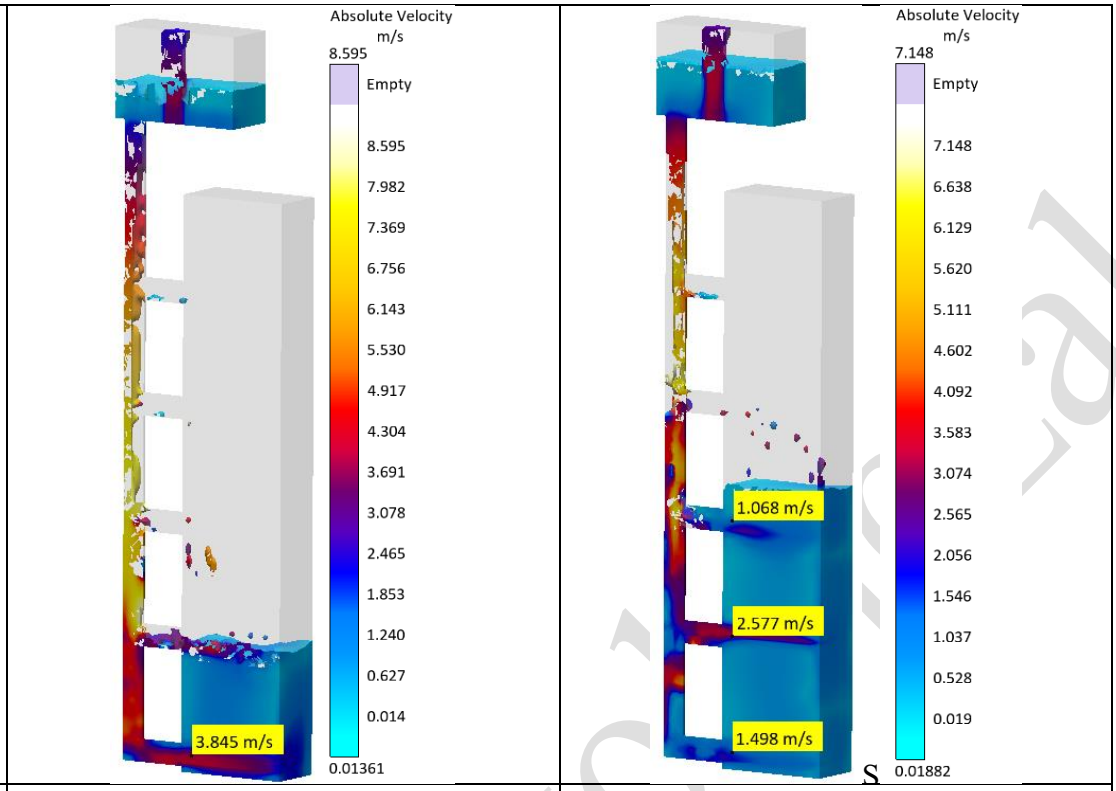
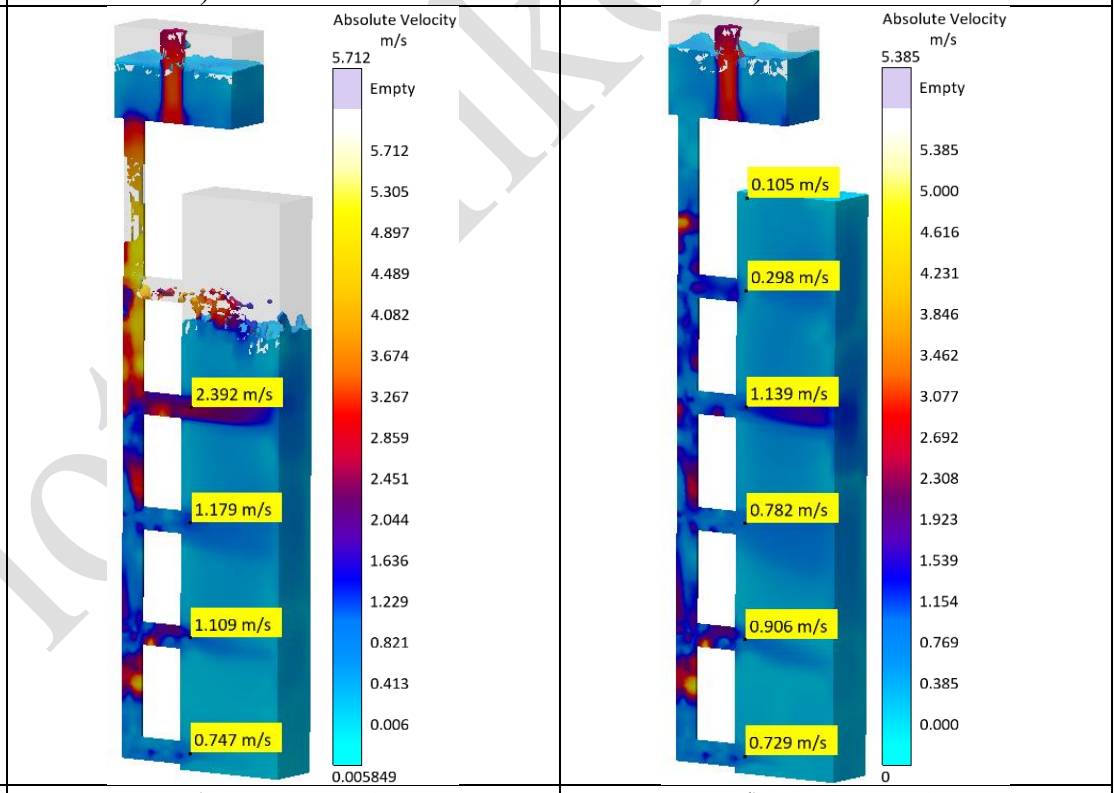
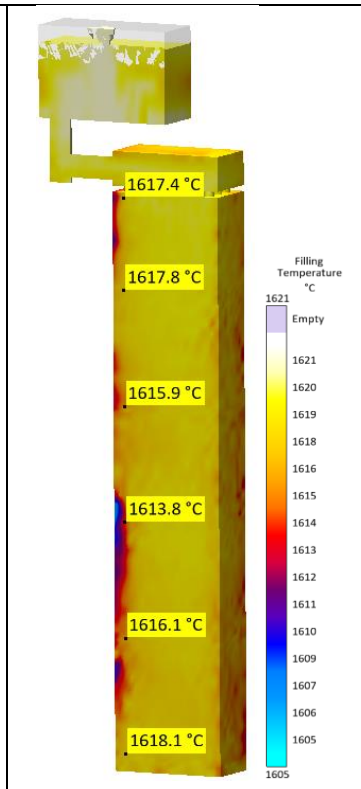


a) Percent 25% b) Percent 50%

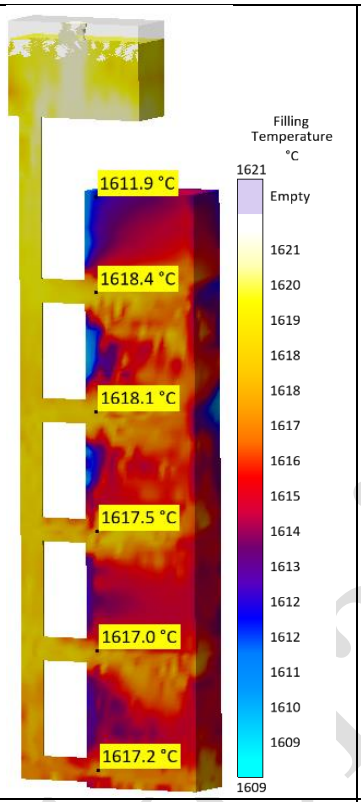


c) Percent 75% d) Percent 95%

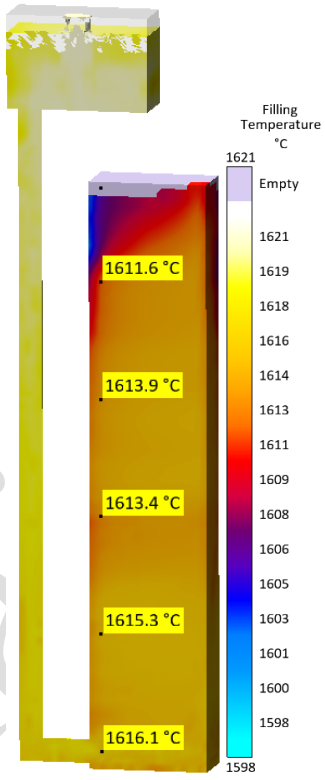
Rys. 4. Zalewanie - prędkość (Pouring – Velocity), wersja v04 (B ukł. SYFON.-BOCZNY).



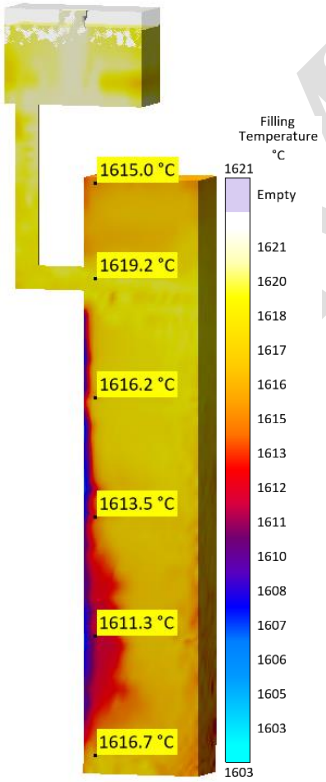
a) wersja A (v03)



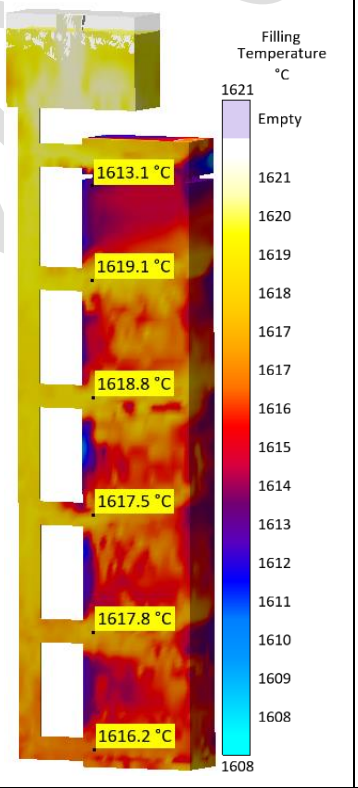
b) wersja B (v04)



c) wersja C (v05)

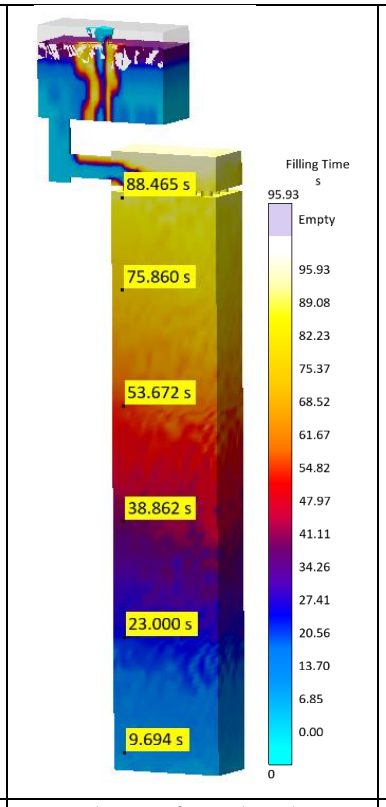


d) wersja D (v06)

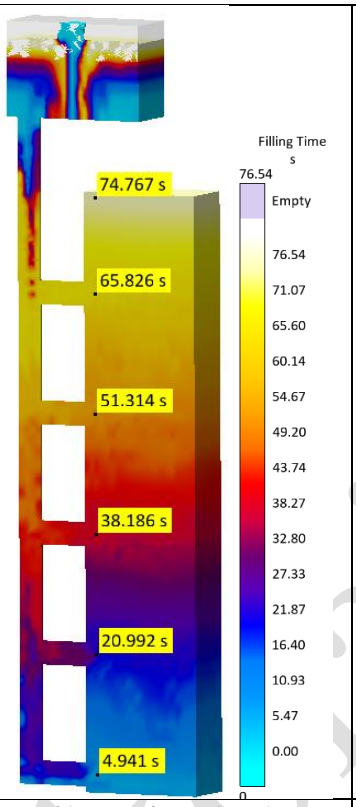


e) wersja E (v07)

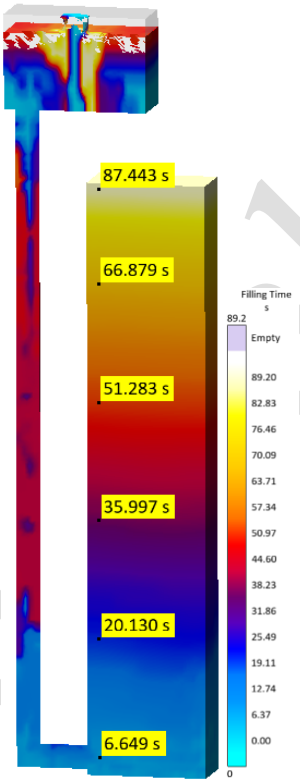
Rys. 5. Temperatura wypełnienia (Pouring/General Criteria/Filling Temperature).



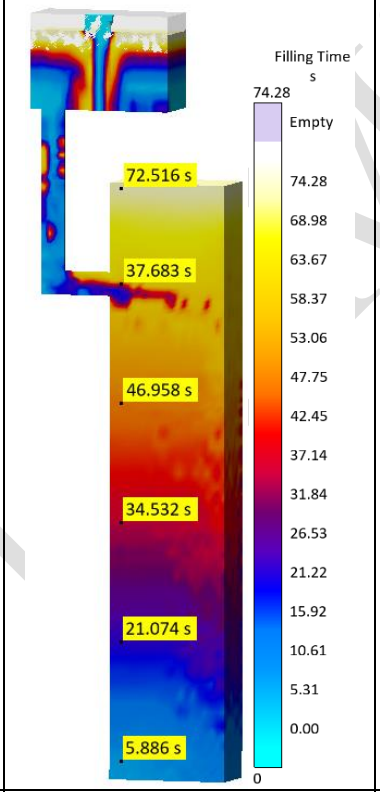
a) wersja A (v03)



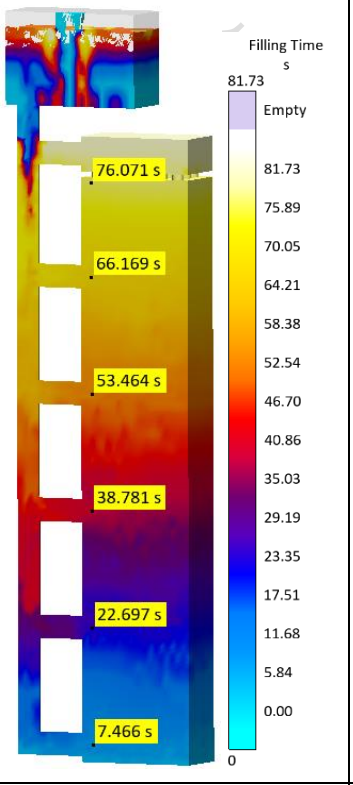
b) wersja B (v04)



c) wersja C (v05)

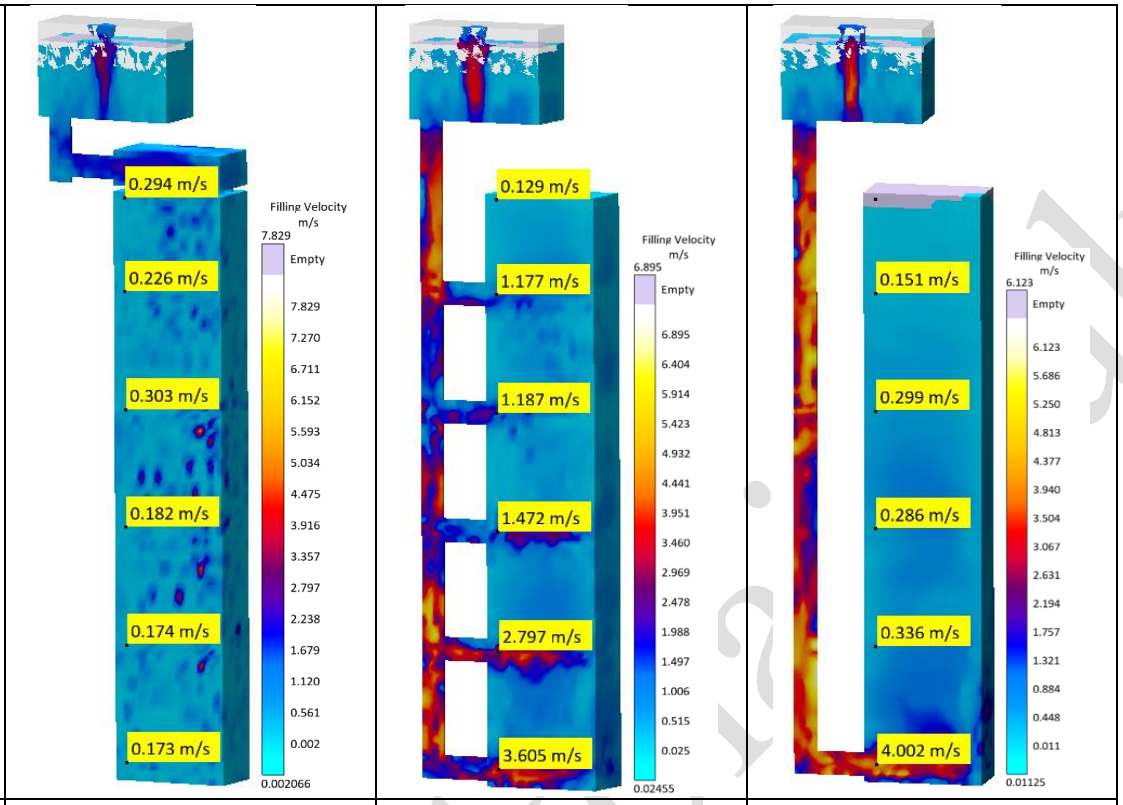


d) wersja D (v06)



e) wersja E (v07)

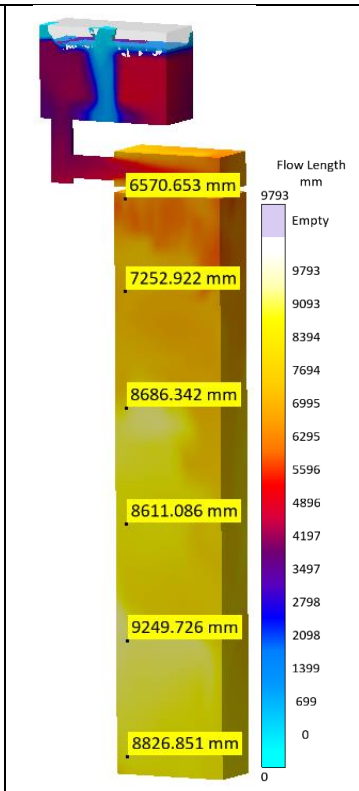
Rys. 6. Czas wypełnienia (Pouring/General Criteria/Filling Time).



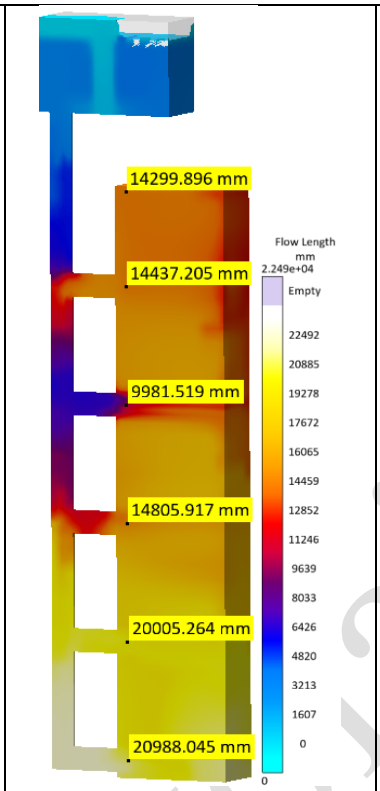
a) wersja A (v03) | b) wersja B (v04) | c) wersja C (v05)

d) wersja D (v06) | e) wersja E (v07)

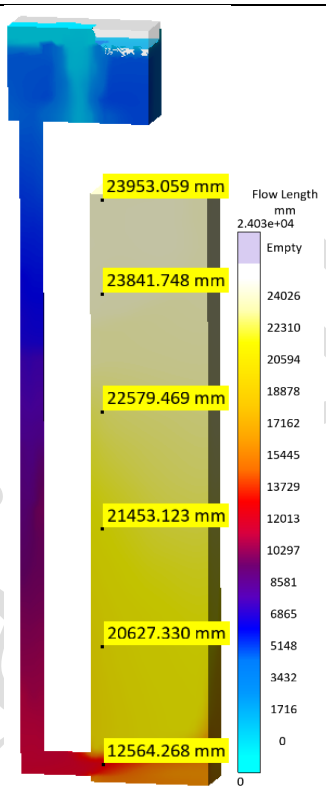
Rys. 7. Prędkość wypełnienia (Pouring/General Criteria/Filling Velocity).



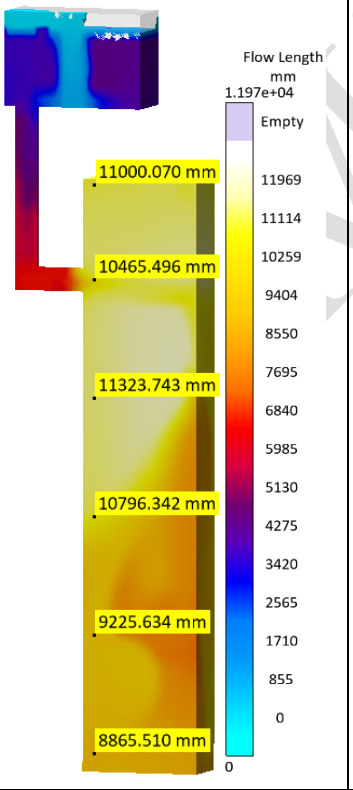
a) wersja A (v03)



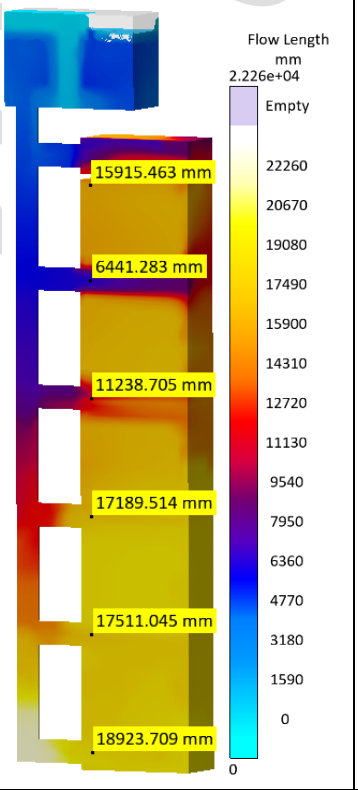
b) wersja B (v04)



c) wersja C (v05)

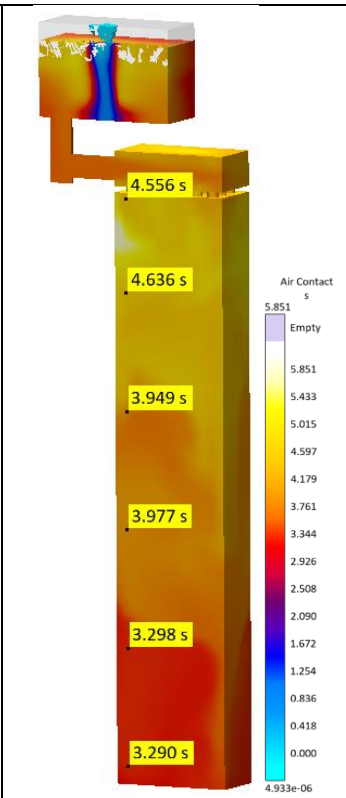


d) wersja D (v06)

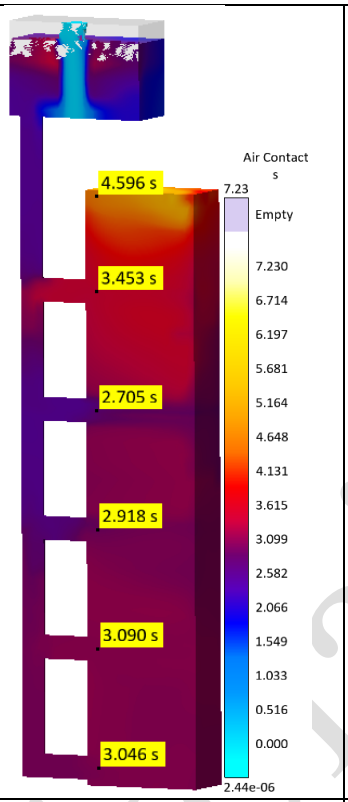


e) wersja E (v07)

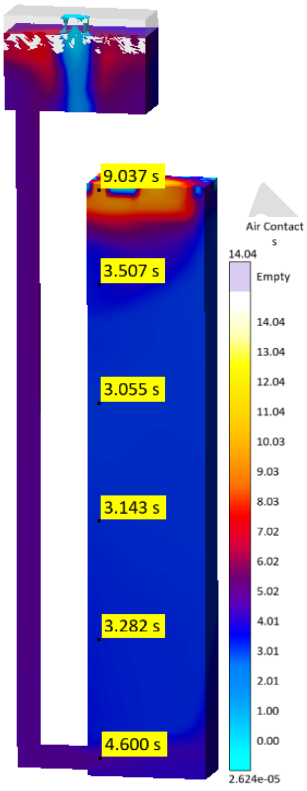
Rys. 8. Długość przepływu (Pouring/Flow Length).



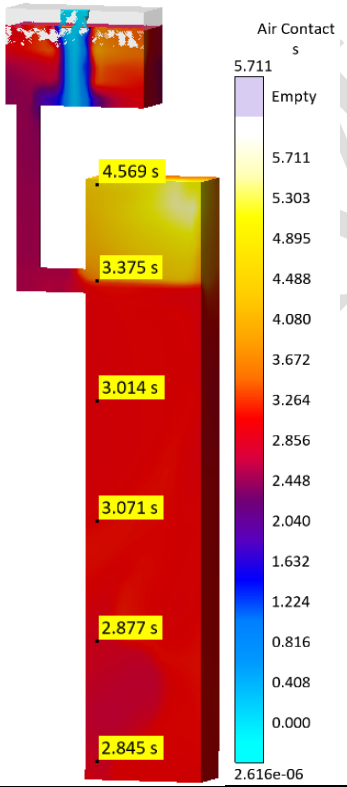
a) wersja A (v03)



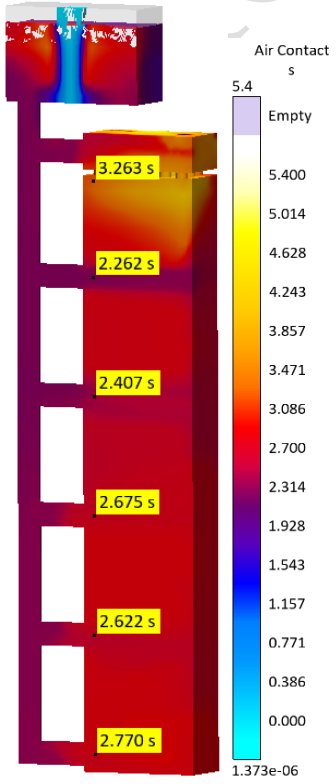
b) wersja B (v04)



c) wersja C (v05)

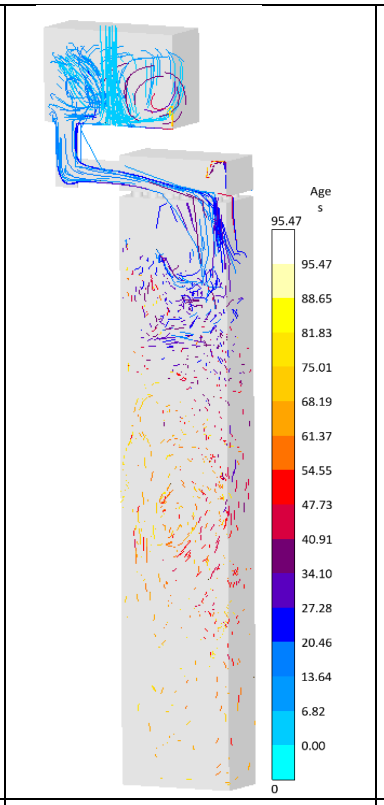


d) wersja D (v06)

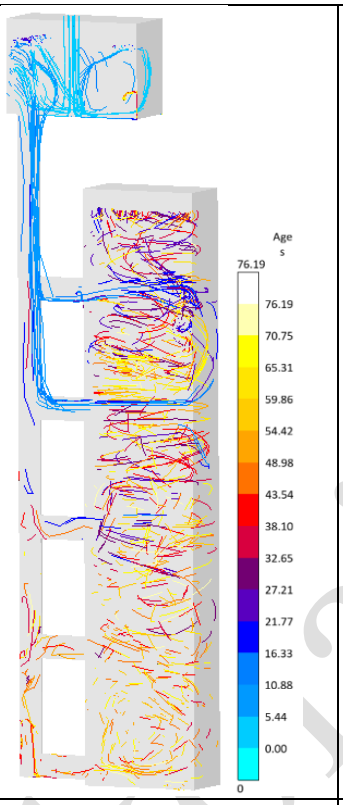


e) wersja E (v07)

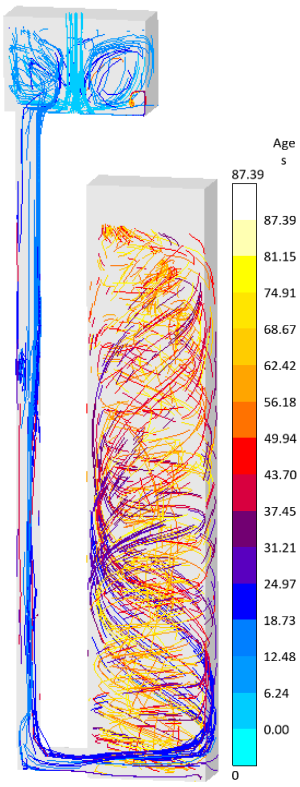
Rys. 9. Czas kontaktu z powietrzem (Pouring/Air contact).



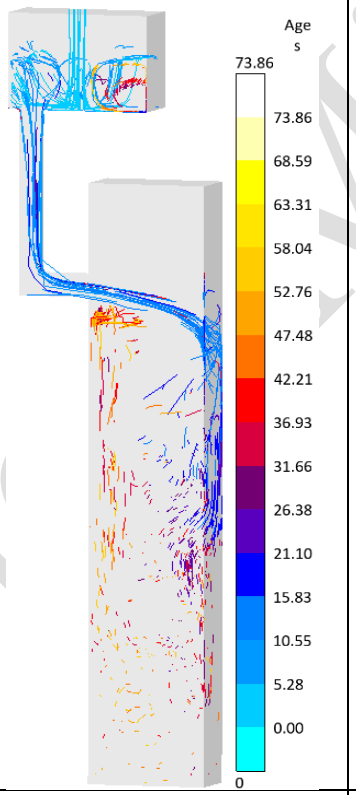
a) wersja A (v03)



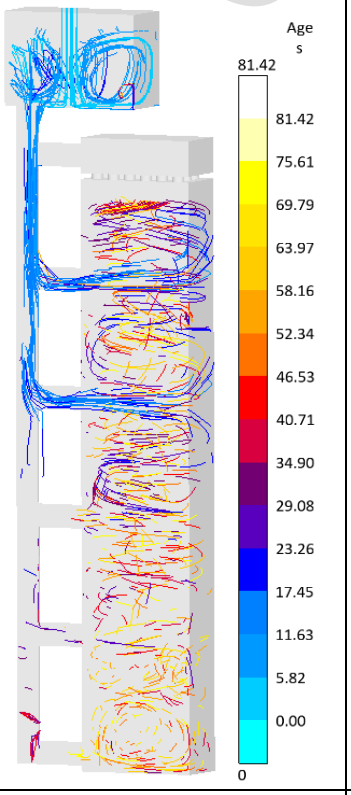
b) wersja B (v04)



c) wersja C (v05)



d) wersja D (v06)



e) wersja E (v07)

Rys. 10. Znaczniki przepływu (Pouring/Tracer/Flow Tracer) – na etapie około 90% wypełnienia formy.

Przeanalizuj inne rodzaje wyników symulacji (np. Pressure, Solidification Time, Porosity) i trzy z nich przedstaw podobnie do powyższych rysunków.

Wybierz najciekawsze wyniki. Liczba stron sprawozdania nie powinna przekraczać 30 (nie wliczając w to Protocol Listing przesyłanego jedynie w wersji elektronicznej sprawozdania na wskazany adres e-mailowy).

3. Wnioski

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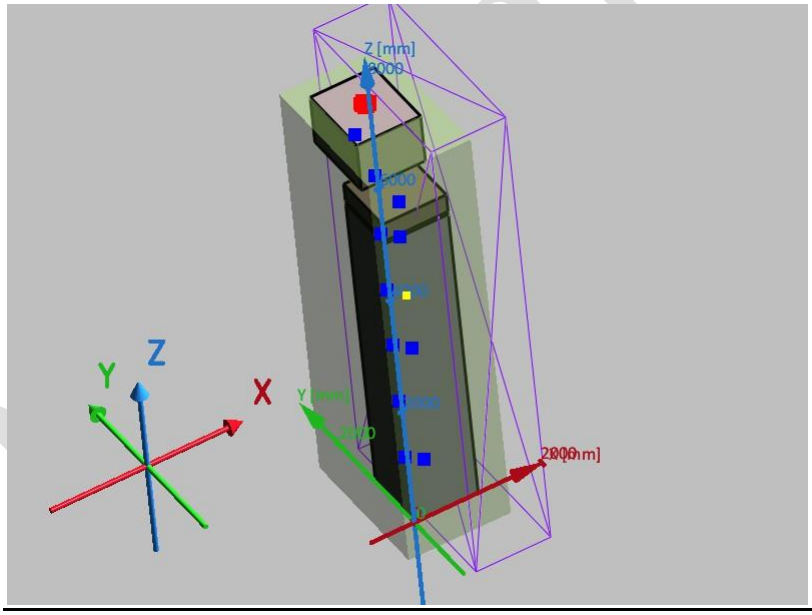
4. Załącznik – PROTOCOL LISTING (Info/Protocol Listing …) dla wersji v02 - jedynie w WERSJI ELEKTRONICZNEJ sprawozdania (przesyłanej na wskazany adres e-mailowy). (dla redukcji liczby stron, można zmniejszyć wielkość protokołu - pomniejszyć czcionkę i tabele do granic czytelność).

Piotr Mikołajczak

Protocol listing information

Created by	PiotrM
Created on	Oct 15, 2024, 1:02:29 PM
Path	D:\0000__Piotr_Mikolajczak\Student_PP\001_Belka_pion_FLOW_01\v07\UserData\Report

001_Belka_pion_FLOW_01/v07

Process mode	Sand Mold Casting
Material type	Steel
Description	E - CAŁOŚĆ
Created On	Oct 11, 2024, 9:44:31 AM
Created By	PiotrM
Parent Versions	v01 (PiotrM), v02 (PiotrM)
Mesh cells (cavity/all)	14259 / 49980
Project Version path	D:\0000__Piotr_Mikolajczak\Student_PP\001_Belka_pion_FLOW_01\v07
Memo	
Modifications	PiotrM Oct 11, 2024, 5:57:04 PM PiotrM Oct 11, 2024, 9:44:31 AM Version created with mode 'Required and Mesh Files'.
Version picture	

Mesh Configuration

Number of Critical Cells	0
Mesh for Solver 5	yes
Generate Core	no
Mesh Mode	Number of Elements

Geometry Definitions

Boundary ID 1

ID Label	ID 1
Volume in Mesh	0.0 cm³
Active in Geometry	no
Active in Mesh	yes
Assembly Name	

Cut Box ID 1

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Cut Box Factor	2.0

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Active in Geometry	yes
Active in Mesh	yes
Assembly Name	

Inlet ID 1

ID Label	ID 1
Region ID	0
Inlet Cross Section Area	14437.19 mm²
Flow Direction	(0.0 | 0.0 | -1000.0) mm
Active in Geometry	yes
Active in Mesh	yes
Assembly Name	
Volume in Mesh	1587.83 cm³

Control Points

Thermocouple

	ID Label	Control Point Coordinates	Control Point Material	Active in Geometry	Active in Mesh
Thermocouple TC_01	TC_01	(500.0 | 500.0 | 2500.0) mm	Casting ID 1	yes	yes
Thermocouple TC_02	TC_02	(500.0 | 500.0 | 500.0) mm	Casting ID 1	yes	yes
Thermocouple TC_03	TC_03	(500.0 | 500.0 | 4500.0) mm	Casting ID 1	yes	yes
Thermocouple TC_04	TC_04	(500.0 | 1050.0 | 150.0) mm	Runner ID 1	yes	yes
Thermocouple TC_05	TC_05	(500.0 | 1050.0 | 1150.0) mm	Runner ID 1	yes	yes
Thermocouple TC_06	TC_06	(500.0 | 1050.0 | 2150.0) mm	Runner ID 1	yes	yes
Thermocouple TC_07	TC_07	(500.0 | 1050.0 | 3150.0) mm	Runner ID 1	yes	yes
Thermocouple TC_08	TC_08	(500.0 | 1050.0 | 4150.0) mm	Runner ID 1	yes	yes
Thermocouple TC_09	TC_09	(500.0 | 1050.0 | 5200.0) mm	Runner ID 1	yes	yes
Thermocouple TC_10	TC_10	(575.0 | 575.0 | 5025.0) mm	Runner ID 1	yes	yes
Thermocouple TC_11	TC_11	(500.0 | 1499.0 | 5600.0) mm	Pouring Basin ID 1	yes	yes

Fill Tracer

	ID Label	Control Point Coordinates	Control Point Material	Active in Geometry	Active in Mesh
Fill Tracer TR_inlet2_001_01	Fill Tracer TR_inlet2_001_06		TR_inlet2_001_01 (521.94 | 1100.0 | 6450.0) mm	TR_inlet2_001_02 (500.0 | 1078.06 | 6450.0) mm	
Fill Tracer TR_inlet2_001_02					
Fill Tracer TR_inlet2_001_03				TR_inlet2_001_03 (478.06 | 1100.0 | 6450.0) mm	
Fill Tracer TR_inlet2_001_04					
Fill Tracer TR_inlet2_001_05				TR_inlet2_001_04 (500.0		

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| 1121.94 | 6450.0) mm	Pouring Basin ID 1		yes
	Pouring Basin ID 1		yes
TR_inlet2_001_05 (570.71 | 1100.0 | 6450.0) mm	nothing referenced		
	Pouring Basin ID 1		yes
	Pouring Basin ID 1		yes
TR_inlet2_001_06 (550.0 | 1050.0 | 6450.0) mm	Pouring Basin ID 1		yes
			no
			yes
			yes
			yes
			yes
			yes
			yes

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Fill Tracer TR_inlet2_001_07	TR_inlet2_001_07	(500.0 | 1029.29 | 6450.0) mm	Pouring Basin ID 1	yes	yes
Fill Tracer TR_inlet2_001_08	TR_inlet2_001_08	(450.0 | 1050.0 | 6450.0) mm	nothing referenced	yes	no
Fill Tracer TR_inlet2_001_09	TR_inlet2_001_09	(429.29 | 1100.0 | 6450.0) mm	nothing referenced	yes	no
Fill Tracer TR_inlet2_001_10	TR_inlet2_001_10	(450.0 | 1150.0 | 6450.0) mm	nothing referenced	yes	no
Fill Tracer TR_inlet2_001_11	TR_inlet2_001_11	(500.0 | 1170.71 | 6450.0) mm	Pouring Basin ID 1	yes	yes
Fill Tracer TR_inlet2_001_12	TR_inlet2_001_12	(550.0 | 1150.0 | 6450.0) mm	Pouring Basin ID 1	yes	yes

Material Definitions

Al (Aluminum)	0.0 %
C (Carbon)	0.25 %
Co (Cobalt)	0.0 %
Cr (Chromium)	0.0 %
Cu (Copper)	0.0 %
Mn (Manganese)	0.5 %
Mo (Molybdenum)	0.0 %
Ni (Nickel)	0.0 %
P (Phosphorus)	0.04 %
S (Sulfur)	0.04 %
Si (Silicon)	0.6 %
Ti (Titanium)	0.0 %
V (Vanadium)	0.0 %
W (Tungsten)	0.0 %

Cast Alloy

Casting

	ID Label	Initial Temperature	Active in Geometry	Active in Mesh	Initial Temperature	Material Data	Volume in Mesh	Feeding Effectivity
Casting ID 1	ID 1	1621.0 °C	yes	yes	1621.0 °C*	MAGMA/GS38	5000000.0 cm³	40.0 %

Casting System

	ID Label	Initial Temperature	Active in Geometry	Active in Mesh	Initial Temperature	Material Data	Volume in Mesh
Runner ID 1	ID 1	1621.0 °C	yes	yes	1621.0 °C*	MAGMA/GS38	566601.13 cm³
Pouring Basin ID 1	ID 1	1621.0 °C	yes	yes	1621.0 °C*	MAGMA/GS38	961587.81 cm³

Sand Mold

	ID Label	Initial Temperature	Active in Geometry	Active in Mesh	Initial Temperature	Material Data	Volume in Mesh
Sand Mold ID 1	ID 1	20.0 °C	yes	yes	20.0 °C	MAGMA/Furan	18129400.0 cm³

* value is user changed

Heat Transfer Definitions

Cast Alloy - Sand Mold

Casting - Sand Mold

Neighborhood Surface	HTC Dataset Container Reference	HTC Type

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Casting ID 1 - Sand Mold ID 1	MAGMA/Steel-Sand	Temperature Dependent HTC

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Casting System - Sand Mold

Neighborhood Surface	HTC Dataset Container Reference	HTC Type
Sand Mold ID 1 - Runner ID 1	MAGMA/Steel-Sand	Temperature Dependent HTC
Sand Mold ID 1 - Pouring Basin ID 1	MAGMA/Steel-Sand	Temperature Dependent HTC

Casting Process

External Boundaries	Cut Box Boundary Cut Box Boundary Cut Box Boundary Cut Box Boundary Cut Box Boundary Cut Box Boundary Standard Boundary Standard Boundary Standard Boundary

Preparation

Pouring

Pouring Control	Automatic Filling Control
Leveling Time	0.0 s
Pouring Stop Control	Automatic Stop Condition
Automatic Stop Condition	Automatic Stop Condition

Automatic Filling Control

Use same configuration for all inlets	no
Pouring Basin Level	(see Parameterlist)
Common Automatic Filling Control Configuration	Stop pouring at reference volume

	Neighborhood	Pouring Basin Fill Level	Wait Time	Filling Condition
Parameterlist	Inlet ID 1 / Pouring Basin ID 1	70.0	0.0	Distance from ladle to inlet 300.0 mm

Solidification & Cooling

Solidification & Cooling Control	User Defined Temperature (Casting)
User Defined Temperature (Casting)	as soon as max. temp. in Casting Materials falls below 1371.0 °C

Result Definitions

Casting Process

Pouring

Results Dependent on Process Progress

		Materials	Conditions	
Air Contact, Flow Length, Fraction Liquid, Fraction Solid, Material Age, Pressure, Temperature, Velocity, Wall Contact		NoMatRefSets	Percent Filled	from 0.0 % to 100.0 % every 2.0 %
			Process Event	0.0 s after Begin of Pouring
			Process Event	0.0 s after End of Pouring
			Time	from 0.0 s to 10.0 s every 1.0

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Criteria and Cumulative Results

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General Criteria

Filling Temperature, Filling Time, Filling Velocity, Hot Spot, Liquidus to Solidus, Mold Erosion, Pore Free Zone, Sand Inclusion Area Fraction, Solidification Time, Soundness

	Parameters
Niyama Criterion	Criterion Temperature (°C): 1431.0

Tracer

Flow Tracer, Sand Inclusions

Hot Spot FSTime

Hot Spot FSTime

Solidification & Cooling

Results Dependent on Process Progress

	Materials	Conditions	
Fraction Liquid, Fraction Solid, Gradient Time, Porosity, Temperature	NoMatRefSets	Percent Solidified	from 0.0 % to 100.0 % every 2.0 %
		Process Event	0.0 s after Begin of Solidification & Cooling
		Process Event	0.0 s after End of Solidification & Cooling

Criteria and Cumulative Results

General Criteria

Feedmod, Hot Spot, Liquidus to Solidus, Microporosity, Pore Free Zone, Pore Volume, Solidification Rate, Solidification Time, Soundness, Total Porosity

	Parameters
Sand Burn On, Sand Penetration	Critical Temperature (°C): 1491.0
Niyama Criterion	Criterion Temperature (°C): 1431.0
Cooling Rate, Gradient	Criterion Temperature (°C): 1523.0

FSTime

	Parameters
FSTime	Percent Fraction Solid: Click to add values

Hot Spot FSTime

Hot Spot FSTime

Curves

	Parameters
Sand Temperature Distribution	Sand Observation Temperatures (°C): 100.0 200.0 300.0 400.0 500.0 600.0 700.0 800.0 900.0 1000.0

Result Preparation (during simulation)

General

	Active
Criteria (Filling & Solidification)	yes

Filling

	Active
Filling Criteria (Material Trace), Filling Pressure, Filling Results X-Ray Mode Empty, Filling Temperature, Filling Velocity	yes

Solidification

	Active	X-Ray Range (Show All Below)
Fraction Solid	yes	90.0 %
	Active	X-Ray Range (Show All Above)

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Fraction Liquid	yes	10.0 %

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	Solidification Temperature	yes	1421.0 °C

Stress

	Active
Stress	yes

Simulation Settings

Calculation Flags

	Active
Calculate Filling	yes
Calculate Solidification & Cooling	yes
Prepare Results	yes

Filling Simulation

	Active
Surface Tension	yes

Solidification & Cooling Simulation

	Active
Consider Water Content	yes

Start Configurations

	Start Date	Number of Cores	User	Queue ID
Simulation Configuration	Oct 11, 2024, 5:57:25 PM	1	PiotrM	Q1@batch@localhost:6997

Optimization

Template	No Template selected

Design Variable

Output Value Parameters

ID	Value	Type

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Start Sequence Settings

Start Sequence Constraints Objectives Design Statistics

Pareto Set Data Table

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