Corrigendum to "Active subspaces for the optimal meanline design of unconventional turbomachinery" (Applied Thermal Engineering (2017) 127 (1108–1118), (S1359431117315466) (10.1016/j.applthermaleng.2017.08.093))

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Corrigendum to "Active subspaces for the optimal meanline design of unconventional turbomachinery" [Appl. Therm. Eng. 127 (2017) 1108–1118]

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By means of this corrigendum, the authors would like to include relevant information regarding the validation of the meanline turbine model employed in the original article. The improvement regarding the validation of the model was made possible thanks to the contribution of Prof. Jürg Schiffmann. The additional results documented here provide more confidence on the reliability of the model when it applied to mini-ORC turbines. Therefore, we kindly ask the Editor to add his name to the authors list.

The following paragraph extends the one that discusses the meanline validation located in Section 2.

The turbine preliminary design is performed by means of a meanline code, which is based on the loss models listed in Ref. [1]. These models have been developed for conventional turbomachinery operating with fluids in the ideal gas state, featuring subsonic flows and large Reynolds numbers. The meanline code has been validated with the results of literature test cases presenting these characteristics [2]. It has been also compared against an experimentally validated turbine model for *m*ORC machines operating in the subsonic regime [3]. Table 1 shows the information of the machine geometry for which results of the two codes were compared, while Fig. 1 presents the meridional channel of the

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Nomenclature

Symbols

r_0	turbine inlet radius [mm]
r_1	stator outlet radius [mm]
r_2	rotor inlet radius [mm]
b_0	turbine inlet blade height [mm]
r_3	stator outlet mean diameter [mm]
$t_{cl,rt}$	rotor tip clearance [mm]
$t_{te,st}$	stator trailing edge thickness [mm]
$t_{te,rt}$	rotor trailing edge thickness [mm]
N_{st}	stator number of blades
N_{rt}	rotor number of blades
P_0	turbine inlet pressure [bar]
P_3	turbine outlet pressure [bar]
T_0	turbine inlet temperature [°C]
R_s	isentropic degree of reaction
$\dot{m}$	mass flow [kg/s]

Greek symbols

$\alpha_{1,ge}$	stator outlet geometric angle [°]
$\beta_{3,ge}$	rotor outlet geometric angle [°]
Ω	rotational speed [krpm]

turbine. Table 2 shows the corresponding operating conditions. The results of the total-to-static efficiency computation are presented in Fig. 2.

It can be observed that the efficiency trend obtained with zTurbo is similar to that computed with the validated EPFL code. The comparison between the two models suggests a deviation lower than 2.5% for all the tested operating conditions. This deviation occurs because each model uses a different set of loss correlations. These correlations are described in Refs. [1,3].

Table 1
Turbine geometry specifications.

$\alpha_{1,ge}$	°	82
r_0	mm	
r_0/r_1	–	1.89
b_0	mm	2
r_1/r_2	–	1.06
r_2/r_3	–	2.17
$\beta_{3,ge}$	°	60
$t_{cl,rt}$	mm	0.1
$t_{te,st}$	mm	0.07
$t_{te,rt}$	mm	0.04
N_{st}	–	5
N_{rt}	–	9

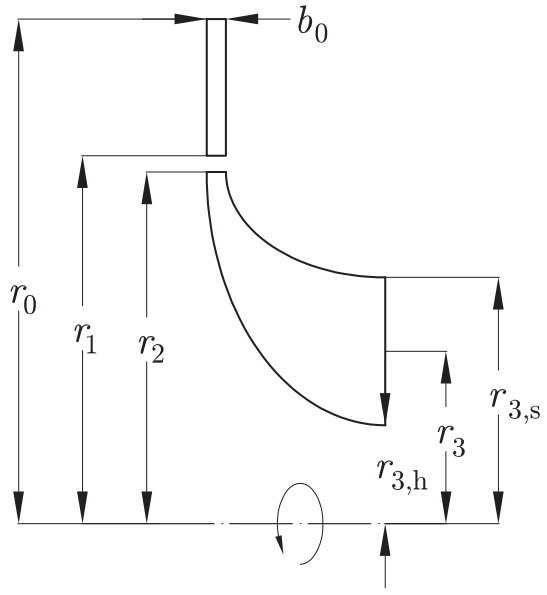

Fig. 1. Turbine meridional channel.

Table 2
Turbine operating conditions.

Sample	P_0 bar	P_3 bar	T_0 °C	R_s -	Ω krpm	$\dot{m}$ g/s
1	31.0	13.6	103	0.67	147	86
2	31.9	13.8	102	0.70	156	89
3	32.2	10.9	102	0.76	181	91
4	32.5	13.3	101	0.71	161	92
5	30.3	12.6	95	0.71	160	86

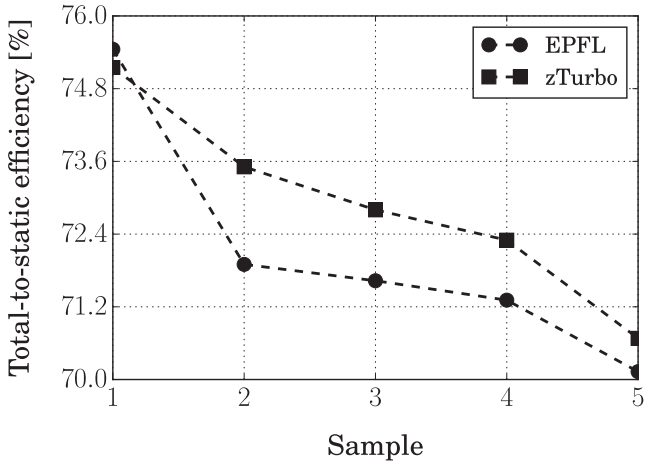

Fig. 2. (a) Total-to-static efficiency for five samples computed with a validated meanline design program [3], and with the meanline code used in this work [1]. (b) Relative deviation with respect to the validated software.

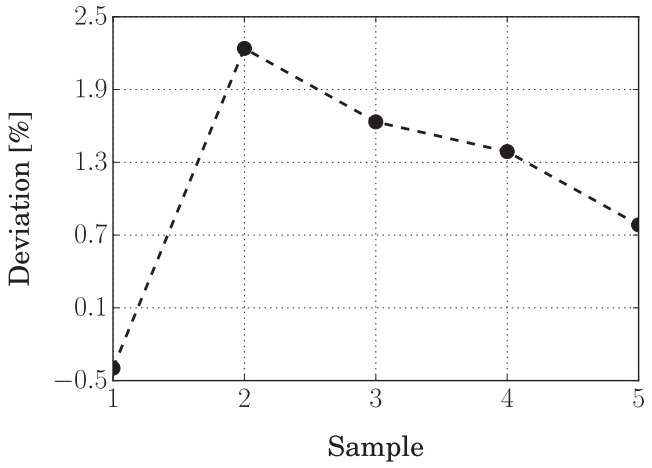

Fig. 2. (*continued*)

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