

# Results for the HIRP-BS instances

Instances available at <https://perso.limos.fr/~diperdigao/research/HIRP-BS/instances/>

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## 1 Results for the small-scale instances

Id.	MILP model				SEMPO algorithm					$Gap_{LR}$	$Gap_{UB}$
	LR	UB	$Gap_{UL}$	$t^*$ (s)	$z^*$	$z^w$	$\bar{z}$	$z^{sdv}$	$\bar{t}^*$ (s)		
1	14362.21	-	-	3600	<b>15070.70</b>	15186.60	15134.38	39.25	789	4.70	-
2	14349.83	-	-	3600	<b>15430.10</b>	15554.10	15477.01	38.34	626	7.00	-
3	13192.78	<b>13787.07</b>	2.31	2755	14000.50	14188.70	14086.11	57.48	947	5.77	1.52
4	15117.77	16070.72	4.11	3600	<b>15860.80</b>	15945.00	15899.31	32.12	841	4.68	-1.32
5	12649.02	14871.81	12.26	3600	<b>14470.00</b>	14746.90	14575.43	93.03	722	12.58	-2.78
6	12013.27	<b>12709.82</b>	2.71	3600	13077.60	13188.20	13140.11	32.91	951	8.14	2.81
7	11091.08	<b>11667.72</b>	2.33	3600	11855.70	11948.10	11910.31	24.30	1063	6.45	1.59
8	13417.15	<b>13948.06</b>	1.96	3600	14497.40	14663.30	14583.48	63.23	546	7.45	3.79
9	11195.60	<b>11722.88</b>	1.98	3560	11953.50	11997.70	11979.08	12.65	994	6.34	1.93
10	12406.95	13327.03	4.31	3600	<b>13324.60</b>	13420.20	13374.03	34.05	970	6.89	-0.02
11	15287.85	17630.63	11.70	3600	<b>16263.50</b>	16363.60	16317.16	33.57	1245	6.00	-8.41
12	15118.76	<b>15689.13</b>	1.92	3562	16041.20	16142.80	16105.04	30.15	716	5.75	2.19
13	16058.64	<b>16535.69</b>	1.51	3600	16889.80	17046.40	16984.97	50.20	636	4.92	2.10
Avg			4.28	3519				41.64	850	6.67	0.31

Table 1: Results for the small-scale instances

## 2 Results for the medium-scale instances

Instances			MILP model		SEMPO algorithm					$Gap_{LR}$
$ \mathcal{N} $	$ \mathcal{T} $	Id.	LR		$z^*$	$z^w$	$\bar{z}$	$z^{sdv}$	$\bar{t}^*$ (s)	
20	14	1	31765.05		33861.00	34310.40	34135.72	152.40	568	6.19
		2	35995.55		38037.40	38184.90	38098.06	50.75	934	5.37
		3	36849.88		39391.00	39677.50	39533.20	87.06	845	6.45
	21	1	70705.51		74315.90	74685.10	74477.94	125.89	634	4.86
		2	67279.77		71637.70	71959.80	71773.83	86.61	697	6.08
		3	81136.08		85644.50	86204.60	85957.79	213.05	1069	5.26
	28	1	105572.10		112247.97	114155.00	113299.10	813.64	1213	5.95
		2	108853.94		115040.73	116761.00	115569.96	486.08	723	5.38
		3	96870.66		102777.00	104181.00	103317.85	482.34	748	5.75
	7	1	21504.21		23272.60	23462.20	23372.28	64.95	928	7.60
		2	25220.85		26918.00	27388.40	27168.72	138.79	843	6.30
		3	19551.37		21610.70	21773.50	21699.36	66.91	634	9.53
34	14	1	64725.84		68249.90	68664.50	68480.09	148.40	1175	5.16
		2	58026.87		63853.30	64305.60	64156.87	152.21	471	9.12
		3	60027.36		66903.30	69413.60	67992.80	749.34	945	10.28
	21	1	112811.34		120413.00	121767.00	121000.50	449.45	788	6.31
		2	142540.14		152232.00	154337.00	153684.00	812.55	1019	6.37
		3	125961.65		135518.00	137021.00	136466.10	484.19	941	7.05
	28	1	199983.60		210551.00	211847.00	211313.40	379.20	948	5.02
		2	194899.22		211936.00	213026.00	212255.30	303.29	914	8.04
		3	198494.93		212032.48	214014.00	213063.18	730.89	1227	6.38
	7	1	28952.92		31531.70	32216.50	31836.35	186.75	1070	8.18
		2	31393.57		34461.50	35002.90	34739.92	179.66	772	8.90
		3	25408.63		27565.80	27845.20	27684.01	79.09	833	7.83
	14	1	70858.72		74801.30	75545.10	75232.20	203.08	1058	5.27

	2	85473.88	91480.70	91840.00	91686.45	103.67	802	6.57
	3	78769.42	85545.30	86500.70	86094.61	267.94	850	7.92
	1	163482.68	174044.00	174392.00	174175.90	99.85	945	6.07
21	2	165078.24	173148.00	174971.00	174330.50	679.94	1088	4.66
	3	129226.17	138930.00	139341.00	139166.00	108.66	888	6.98
	1	232277.48	245113.00	245555.00	245387.30	148.83	888	5.24
28	2	263986.87	281252.00	282505.00	281903.30	396.04	936	6.14
	3	249555.84	265153.00	265668.00	265435.40	191.95	1053	5.88
	1	46315.26	52713.20	53387.20	53026.60	251.08	676	12.14
7	2	27474.70	33768.10	34370.00	34107.19	194.95	1036	18.64
	3	37506.27	43614.60	44267.90	44028.97	242.42	784	14.01
	1	100262.00	112607.00	113317.00	112918.60	228.33	950	10.96
14	2	102989.70	124007.00	124892.00	124339.50	266.90	728	16.95
	3	118288.86	129879.00	132119.00	131319.70	847.64	1164	8.92
58	1	199673.24	222510.00	223928.00	222944.20	479.55	1308	10.26
	2	198632.42	220827.00	222426.00	221688.20	527.22	910	10.05
	3	187080.90	216367.00	217453.00	216936.00	383.59	774	13.54
	1	312777.77	338614.00	341230.00	340238.10	831.13	993	7.63
28	2	289651.41	324261.00	325817.00	324912.10	505.19	1091	10.67
	3	344415.47	380963.00	385579.00	382520.00	1399.66	822	9.59
	1	46176.09	53916.50	54359.30	54054.96	132.68	801	14.36
7	2	45115.89	53376.90	53819.60	53657.34	124.79	679	15.48
	3	48785.68	55261.00	55892.40	55641.00	211.91	997	11.72
	1	150855.25	168151.00	168906.00	168624.30	251.30	874	10.29
14	2	115554.71	129975.00	131003.00	130494.40	370.69	812	11.09
	3	161514.81	179839.00	180555.00	180194.70	214.70	811	10.19
83	1	220407.99	240328.00	242961.00	241556.80	713.51	1225	8.29
	2	272141.84	298430.00	301140.00	299549.70	826.73	1095	8.81
	3	254559.93	280787.00	282879.00	281799.80	659.61	1372	9.34
	1	–	485412.00	488434.00	487275.20	924.85	1044	–
28	2	458910.43	499365.00	501946.00	500579.90	798.14	863	8.10
	3	–	442948.00	444221.00	443590.80	420.45	1250	–
Avg						375.97	921	8.53

Table 2: Results for the medium-scale instances

### 3 Results for the large-scale instances

Instances			MILP model	SEMPO algorithm					$Gap_{LR}$
$ \mathcal{N} $	$ \mathcal{T} $	Id.	LR	$z^*$	$z^w$	$\bar{z}$	$z^{sdv}$	$\bar{t}^*$ (s)	
		1	63214.61	73697.50	74914.70	74120.87	357.73	1288.13	14.22
	7	2	62803.88	72296.70	73236.40	72902.97	293.43	1057.53	13.13
		3	62229.09	70788.60	71175.00	70952.09	129.24	836.96	12.09
114		1	160846.19	183068.00	184650.00	183790.90	524.65	689.14	12.14
	14	2	240633.57	268914.00	271892.00	270369.50	965.68	809.31	10.52
	21	1	368429.18	409142.00	410697.00	409722.40	627.68	683.57	9.95
149	28	1	–	900932.00	905981.00	904061.50	2204.26	780.12	–
	21	1	–	537235.00	539239.00	538574.90	687.44	1103.05	–
170	28	1	–	852666.00	856599.00	854943.00	1628.57	888.50	–
183	7	1	–	98708.70	99711.30	99123.17	326.58	806.78	–
Avg							774.53	894.31	12.01

Table 3: Results for the large-scale instances