

# New computational results for the paper “Integer Programming and Constraint Programming in Solving a Multi-Machine Assignment Scheduling Problem with Deadlines and Release Dates”

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Table 1: The Algorithms MIP+/CP and CG-MIP+/CP : Further Comparison

Test	Branch-and-Cut MIP+/CP					Branch-and-Price CG-MIP+/CP					
	<i>Obj</i>	Time	Nodes	Cuts	<i>XLP</i>	<i>Obj</i>	Time	Nodes	Iter	Cuts	<i>LP</i>
3-12a	101	<b>0.4</b>	61	0	99.9	101	2.6	1	26	9	100.5
3-12b	104	<b>0.3</b>	1	0	104.0	104	2.3	1	21	0	104.0
5-15a	115	<b>0.6</b>	62	0	114.5	115	5.3	3	32	11	114.5
5-15b	129	<b>0.6</b>	1	0	129.0	129	5.3	3	35	10	129.0
5-20a	158	<b>1.3</b>	77	0	157.7	158	11.2	3	51	11	157.8
5-20b	139	<b>2.7</b>	392	8	137.5	139	18.2	5	45	305	138.5
6-24	227	<b>3.7</b>	416	0	226.3	227	36.8	2	44	212	226.5
7-30	213	<b>16.7</b>	516	10	211.0	213	57.8	6	83	314	212.2
8-34	252 <sup>1</sup>	>1h	221168	0	250.1	252	<b>90.9</b>	10	76	195	251.3
	<i>250.1</i>										
7-35-0.6-1	270	507.8	28930	10	261.3	270	<b>214.5</b>	19	163	4317	266.3
7-35-0.6-2	236	227.1	16462	10	231.8	236	<b>79.9</b>	8	79	559	234.4
7-35-0.6-5	306 <sup>1</sup>	>1h	213424	5	294.9	306	<b>154.8</b>	13	107	2268	302.1
	<i>303.8</i>										
8-32-0.6-3	278	107.3	5230	3	269.1	278	<b>38.2</b>	3	41	186	276.3
8-32-0.6-4	277	500.5	28350	0	267.9	277	<b>168.8</b>	37	176	735	273.4
8-32-0.6-5	243	915.0	47335	9	235.6	243	<b>73.8</b>	9	68	527	240.4
8-40-0.6-1	282	145.3	5491	16	279.7	282	<b>47.6</b>	1	42	506	282.0
8-40-0.6-2	354 <sup>1</sup>	>1h	95637	23	330.3	<b>344</b>	<b>166.7</b>	1	53	5659	343.4
	<i>340.1</i>										
8-40-0.6-3	288	1964.8	84367	13	280.4	288	<b>295.4</b>	17	136	2850	286.3
8-40-0.8-1	271	182.5	6442	12	268.5	271	<b>130.8</b>	8	90	752	270.4
8-48-0.6-1	373 <sup>1</sup>	>1h	51822	2	356.7	<b>363</b>	<b>596.5</b>	20	185	4373	361.2
	<i>359.9</i>										
8-48-0.6-4	391	1078.8	25267	2	386.1	391	<b>554.3</b>	13	166	651	389.9
8-48-0.6-5	441	<b>343.5</b>	7687	2	432.5	441	354.0	9	121	2641	438.7
8-48-0.8-3	322	<b>164.0</b>	3808	0	320.5	322	336.6	12	150	131	321.4

<sup>1</sup> optimality is not proven

<sup>2</sup> a feasible solution is not found

Table 2: The Algorithms MIP+/CP and CG-MIP+/CP : Further Comparison (part 2)

Test	Branch-and-Cut MIP+/CP					Branch-and-Price CG-MIP+/CP					
	<i>Obj</i>	Time	Nodes	Cuts	<i>XLP</i>	<i>Obj</i>	Time	Nodes	Iter	Cuts	<i>LP</i>
9-36-0.6-4	312	1290.0	43844	2	299.9	312	<b>195.6</b>	19	120	631	306.1
9-36-0.6-5	248	214.1	6943	7	243.1	248	<b>91.1</b>	6	62	429	247.0
9-36-0.8-1	228	<b>125.5</b>	5062	4	225.3	228	183.6	21	140	538	226.6
9-45-0.6-2	345 <sup>1</sup>	>1h	55214	15	329.4	<b>339</b>	<b>364.2</b>	15	123	3612	336.7
9-54-0.5-3	<del>335.5</del> - <sup>2</sup>	>1h	35219	0	481.7	<b>504</b>	<b>677.3</b>	11	147	2429	496.4
9-54-0.6-1	<del>495.1</del> 435	861.4	11803	0	430.5	435	<b>781.6</b>	11	121	77	432.9
9-54-0.6-2	452	676.4	8466	2	446.9	452	<b>241.8</b>	1	60	708	452.0
9-54-0.6-3	- <sup>2</sup>	>1h	32069	1	410.4	<b>425</b>	<b>1553.2</b>	33	253	12572	420.1
9-54-0.6-4	<del>417.1</del> - <sup>2</sup>	>1h	28387	0	435.3	<b>445</b>	<b>1952.8</b>	57	436	7969	440.8
9-54-0.6-5	<del>440.9</del> 437	<b>643.0</b>	11406	1	431.9	437	952.8	14	164	5948	435.9
9-54-0.8-4	405	1313.0	17652	1	402.7	405	<b>1193.7</b>	11	147	125	403.7

<sup>1</sup> optimality is not proven

<sup>2</sup> a feasible solution is not found