Instances

Table 1 presents data from mining equipment in operation collected from dispatch and telemetry systems. The equipment set comprises loaders, shovels, drills, motor graders, heavy haulers, and bulldozers. Column 1 reports the characteristic, while column 2 presents the range of values that this characteristic can assume in the mining equipment that composes the instances used. The first line presents the amount of mining equipment. Line 2 is the fuel consumption of the mining equipment in liters per hour. Lines 3 and 4 report the mining equipment's tank capacity and the fuel amount at the beginning of the work shift, both in liters. Line 5 presents the critical level of the mining equipment in percentage. Finally, lines 6 and 7 show the beginning and end of the time window in minutes. When mining equipment reaches the critical fuel level, the equipment may run dry. Therefore, the critical level is used to calculate the end of the time window, which is the maximum time limit that the equipment can continue operating with the existing fuel supply in its tank without refueling.

Table 1.: Mining equipment characteristics

Characteristics	**Range values**
#Mining equipment	10 - 92
Fuel consumption (L/h)	10 - 246
Tank capacity (L)	300 - 4940
Fuel at the beginning of the work shift (L)	162 - 3897
Critical level (%)	20 - 35
Start of time window (min)	0
End of time window (min)	25 - 1927

Table 2 reports data on available fuel convoys for operation in the next work shift. Column 1 reports the characteristic, while column 2 presents the range of values this characteristic can assume in the convoys composing the instances used. Line 1 presents the amount of convoys. Line 2 indicates the fuel loading capacity of the convoys in liters. Line 3 reports the fuel fill rate of the convoy pump in liters per minute. Finally, Line 4 presents the average speed of the convoys in kilometers per hour.

Table 2.: Convoys characteristics.

Characteristics	**Range values**
# Convoy	3 - 13
Fuel loading capacity (L)	20000 - 30000
Fuel fill rate (L/min)	250
Average speed (km/h)	20 - 40

Table 3 summarizes the evaluated instances. According to table, in instance 1, ten mining equipment must be filled, and three convoys are available. Likewise, in instance 2, we have 12 mining equipment to be filled, and three convoys can be used. This logic is repeated for the other instances. Instances are divided into two groups: small instances, which include instances 1 to 3, and large instances, which include instances 4 to 12.

Table 3.: Instances.

	#Instance	**#Convoys**	**#Mining Equipment**
Small Instances	1	3	10
	2	3	12
	3	5	31
Large Instances	4	8	40
	5	10	40
	6	12	40
	7	8	50
	8	10	50
	9	12	50
	10	8	60
	11	10	60
	12	12	60