Input structure: Machine scheduling in underground mining: An application in the potash industry

$$
\begin{array}{llllllllll}
|J| & & & & & & & & & \\
|U| & |J^{u_1}| & \cdots & |J^{|U|}| & & & & & & \\
|K| & |M^1| & \cdots & |M^{|K|}| & & & & & & \\
 & & & & & & & & & \\
j_1 & p_{j_1,1,1} & \cdots & p_{j_1,|M^1|,1} & p_{j_1,1,2} & \cdots & p_{j_1,|M^2|,2} & \cdots & p_{j_1,1,|K|} & \cdots & p_{j_1,|M^{|K|}|,|K|} \\
\vdots & \vdots & & \vdots & \vdots & & \vdots & & \vdots & & \vdots \\
j_{|J|} & p_{j_{|J|},1,1} & \cdots & p_{j_{|J|},|M^1|,1} & p_{j_{|J|},1,2} & \cdots & p_{j_{|J|},|M^2|,2} & \cdots & p_{j_{|J|},1,|K|} & \cdots & p_{j_{|J|},|M^{|K|}|,|K|} \\
 & & & & & & & & & & \\
|D| & & & & & & & & & \\
i_1 & \kappa_{i_1} & \hat{C}_{i_1} & & & & & & & & \\
\vdots & \vdots & \vdots & & & & & & & & \\
i_{|D|} & \kappa_{i_{|D|}} & \hat{C}_{i_{|D|}} & & & & & & & &
\end{array}
$$

Symbols

Symbol	Denotes
$\|J\|$	Number of jobs, $j = 1, \ldots, \|J\|$
$\|U\|$	Number of underground locations
$\|J^u\|$	Number of jobs that belong to underground location $u \in U$
$\|K\|$	Number of production stages
$\left\|M^k\right\|$	Number of parallel machines at stage $k \in K$
p_{jmk}	Processing time of job $j \in J$ on machine $m \in M^k$ at stage $k \in K$
$\|D\|$	Number of jobs that do not start at the first production stage, $i = 1, \ldots, \|D\|$
κ_i	Production stage at which job $i \in D$ will be processed at the beginning of the planning period, i.e., $1 < \kappa_i \leq 8$
$\hat{C}_i$	Completion time of job $i \in D$ at the first production stage, $\hat{C}_i \leq 0$