

Financial Calculation for TMMCZ Window Preparation Line Automation

Item description	
Robot	Cooperative robotic arm of reach at least 1300 mm
Gripper	End effector required for robotic tasks
PLC	Programmable Logic Controllers (PLC) for robot control
IO	Input/Output and data transfer
Switchboard	Electrical power circuit device
Electricity connection	Cost of implementing electricity supply to robot systems
Ethernet	Cost of implementing ethernet for data transfer
Programmer	Work wage of programmer
HMI (display)	A dashboard that connects operator to robot
Dispensers	Material dispensers for robots
Robot safety barriers	Minimum necessary safety barriers for collaborative robots
Robot constructions	Cost of constructions of robot to workspace (upside down installation counts as one extra cost)
Rotation drive	A rotation drive for window rotation corrections on the line
Window transfer drive	Transfer drive for window manipulation between worker and robot
Sensors	Sensors for robots and their workspaces (safety sensors included)
Safety cages	Safety cages for robot workspaces, including limited access from side by maintenance
Safety locks	Locks for safety cages
Line mechanics	Cost of window line rebuilding for new robotic workspaces
Parts conveyor	Building costs of parts conveyor extension

Financial Calculation

Version 1 - Two Robots, no Line Change			
Parts	Count	Cost per one piece	Cost
Robot	2	1 000 000,00 CZK	2 000 000,00 CZK
Gripper	2	500 000,00 CZK	1 000 000,00 CZK
PLC	1	50 000,00 CZK	50 000,00 CZK
IO	1	20 000,00 CZK	20 000,00 CZK
Switchboard	1	400 000,00 CZK	400 000,00 CZK
Electricity connection	1	70 000,00 CZK	70 000,00 CZK
Ethernet	2	7 000,00 CZK	14 000,00 CZK
Programmer	1	1 000 000,00 CZK	1 000 000,00 CZK
HMI (display)	1	60 000,00 CZK	60 000,00 CZK
Dispensers	3	300 000,00 CZK	900 000,00 CZK
Robot safety barriers	2	30 000,00 CZK	60 000,00 CZK
Robot constructions	2	100 000,00 CZK	200 000,00 CZK
Rotation drive (450W)	2	25 000,00 CZK	50 000,00 CZK
Window transfer drive	2	20 000,00 CZK	40 000,00 CZK
Sensors	10	1 000,00 CZK	10 000,00 CZK
Safety cages	1	350 000,00 CZK	350 000,00 CZK
Safety locks	2	6 000,00 CZK	12 000,00 CZK
Line mechanics	6	100 000,00 CZK	600 000,00 CZK
Total			6 836 000,00 CZK

Version 2 - Two Robots, with Line Change			
Parts	Count	Cost per one piece	Cost
Robot	2	1 000 000,00 CZK	2 000 000,00 CZK
Gripper	2	500 000,00 CZK	1 000 000,00 CZK
PLC	1	50 000,00 CZK	50 000,00 CZK
IO	1	20 000,00 CZK	20 000,00 CZK
Switchboard	1	400 000,00 CZK	400 000,00 CZK
Electricity connection	1	70 000,00 CZK	70 000,00 CZK
Ethernet	2	7 000,00 CZK	14 000,00 CZK
Programmer	1	1 000 000,00 CZK	1 000 000,00 CZK
HMI (display)	1	60 000,00 CZK	60 000,00 CZK
Dispensers	3	300 000,00 CZK	900 000,00 CZK
Robot safety barriers	2	30 000,00 CZK	60 000,00 CZK
Robot constructions	2	100 000,00 CZK	200 000,00 CZK
Rotation drive (450W)	2	25 000,00 CZK	50 000,00 CZK
Window tranfer drive	2	20 000,00 CZK	40 000,00 CZK
Sensors	10	1 000,00 CZK	10 000,00 CZK
Safety cages	1	350 000,00 CZK	350 000,00 CZK
Safety locks	2	6 000,00 CZK	12 000,00 CZK
Line reconstruction	1	500 000,00 CZK	500 000,00 CZK
Line mechanics	6	100 000,00 CZK	600 000,00 CZK
Total			7 336 000,00 CZK

Version 3 - Three Robots, Automated IPA Cleaning			
Parts	Count	Cost per one piece	Cost
Robot	3	1 000 000,00 CZK	3 000 000,00 CZK
Gripper	3	500 000,00 CZK	1 500 000,00 CZK
PLC	1	50 000,00 CZK	50 000,00 CZK
IO	1	20 000,00 CZK	20 000,00 CZK
Switchboard	1	400 000,00 CZK	400 000,00 CZK
Electricity connection	1	70 000,00 CZK	70 000,00 CZK
Ethernet	3	7 000,00 CZK	21 000,00 CZK
Programmer	1	1 000 000,00 CZK	1 000 000,00 CZK
HMI (display)	1	60 000,00 CZK	60 000,00 CZK
Dispensers	3	300 000,00 CZK	900 000,00 CZK
Robot safety barriers	3	30 000,00 CZK	90 000,00 CZK
Robot constructions	3	100 000,00 CZK	300 000,00 CZK
Rotation drive (450W)	3	25 000,00 CZK	75 000,00 CZK
Window transfer drive	3	20 000,00 CZK	60 000,00 CZK
Sensors	10	1 000,00 CZK	10 000,00 CZK
Safety cages	1	500 000,00 CZK	500 000,00 CZK
Safety locks	3	6 000,00 CZK	18 000,00 CZK
Line mechanics	6	100 000,00 CZK	600 000,00 CZK
Parts conveyor	1	300 000,00 CZK	300 000,00 CZK
Total			8 974 000,00 CZK

Version 4 - Two Robots, Automated IPA Cleaning			
Parts	Count	Cost per one piece	Cost
Robot	2	1 000 000,00 CZK	2 000 000,00 CZK
Gripper	3	500 000,00 CZK	1 500 000,00 CZK
PLC	1	50 000,00 CZK	50 000,00 CZK
IO	1	20 000,00 CZK	20 000,00 CZK
Switchboard	1	400 000,00 CZK	400 000,00 CZK
Electricity connection	1	70 000,00 CZK	70 000,00 CZK
Ethernet	3	7 000,00 CZK	21 000,00 CZK
Programmer	1	1 000 000,00 CZK	1 000 000,00 CZK
HMI (display)	1	60 000,00 CZK	60 000,00 CZK
Dispensers	3	300 000,00 CZK	900 000,00 CZK
Robot safety barriers	3	30 000,00 CZK	90 000,00 CZK
Robot constructions	3	100 000,00 CZK	300 000,00 CZK
Rotation drive (450W)	2	25 000,00 CZK	50 000,00 CZK
Window transfer drive	3	20 000,00 CZK	60 000,00 CZK
Sensors	10	1 000,00 CZK	10 000,00 CZK
Safety cages	1	500 000,00 CZK	500 000,00 CZK
Safety locks	3	6 000,00 CZK	18 000,00 CZK
Line mechanics	6	100 000,00 CZK	600 000,00 CZK
Parts conveyor	1	300 000,00 CZK	300 000,00 CZK
Total			7 949 000,00 CZK