

EXAMPLE PLATO APPLICATIONS

SURFACE FINISHING PROBLEM	PLATO-SUPPORTED SOLUTION	APPLICATION CASE EXAMPLE
Need to reduce process and facility energy costs	PLATO calculates energy used for rectifiers, process heating/cooling, ventilation and other user-defined energy demands. The energy calculations are a function of process-specific production throughput and tank-specific settings.	Modeling of automated-covers with variable ventilation shows payback in < 6 months from dramatically reduced ventilation and heating costs.
Engineers/managers don't know which processes are making money or which process factors are driving costs	PLATO provides production-based, activity-specific process costs with 17 itemized cost categories and annual cost, cost per square foot and cost per mill-square foot.	The PLATO Process Sequence Cost Report inside this brochure shows a PLATO report with annual costs itemized for nine process sequences showing: labor, materials, energy, environmental and miscellaneous other costs for an example aerospace facility.
Wastestream spikes from process solution dumps cause treated wastewater to exceed discharge limits	Modeling quantifies waste stream-specific impacts from production levels and tank bleeds/dumps providing for management of waste streams to consistently stay within limits	The PLATO Waste Stream Report inside this brochure shows flow, constituent concentrations and mass loadings for one of four waste streams modeled for an example aerospace overhaul and repair facility at the following production levels (for processes that contribute chrome to wastewater: hard chrome @ 250 sq ft/day; chromic anodize @ 500 sq ft/day, and aluminum and cadmium chromate each @ 1000 sq ft/day. For this scenario all process solutions were uniform bleeds – other modeled scenarios showed the impact of tank-specific dumps.
Need to define process improvement opportunities and priorities	Modeled energy, water, chemical and waste quantities and costs provide documentation to identify process improvement opportunities and cost savings.	PLATO modeling for a large aerospace overhaul and repair facility supports identification of over 70 process improvement opportunities. PLATO costs help reduce the process improvement options for implementation to 15.
Need to reduce water usage	PLATO allows users to model impacts of feed water quality, rinse tank configurations (i.e. countercurrent or parallel, immersion, spray or immersion and spray), final rinse water quality requirements, flow reduction, recovery and water reuse.	Modeling for one metal finishing facility showed converting to use of all DI water for rinses and process solution make-up, adding selected rinsewater recycle using ion exchange and adding selected rinsewater reuse in scrubber feed shows potential for a 80% to 90% water use reduction.
Need quick initial basis and costs for new surface finishing lines	PLATO allows users to quickly setup process lines and generates documentation to send for initial process line quotes and to estimate operating costs	PLATO exports tank schedules to MS EXCEL for each process line. The user data inputs to PLATO (e.g. -- tank dimensions and chemistry) plus PLATO calculated results (e.g. rectifier size, ventilation rates, heating and cooling loads, etc) provide data needed for preliminary vendor quotations.
Need to estimate air emissions	PLATO estimates production-based uncontrolled and controlled air emissions using referenced and user-supplied air emission factors.	PLATO estimated tank-specific push-pull ventilation rates specific to each process solution in a metal finishing facility. Selected tank-specific air emission rates were input allowing PLATO to calculate flow rates and concentrations into scrubbers. Constituent-specific scrubber efficiency factors were entered and PLATO calculated stack emissions.
Need to estimate chemical usage	PLATO estimates tank-specific chemical depletion from dragout, bleed/dumps, electroplating and other user-defined chemical depletion	For one metal finishing facility, PLATO-calculated chemical usages for different production levels were exported to MS Excel and used to create material usage reports and set minimum/maximum inventory levels for all chemicals

VISUALIZE

ANALYZE

OPTIMIZE

Surface Finishing Processes

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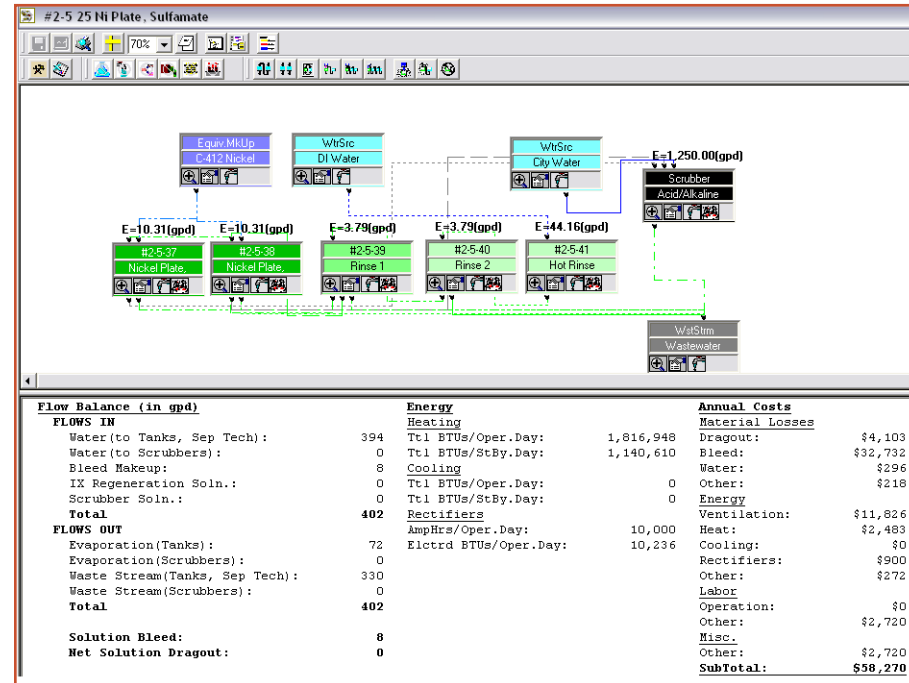


Plato's

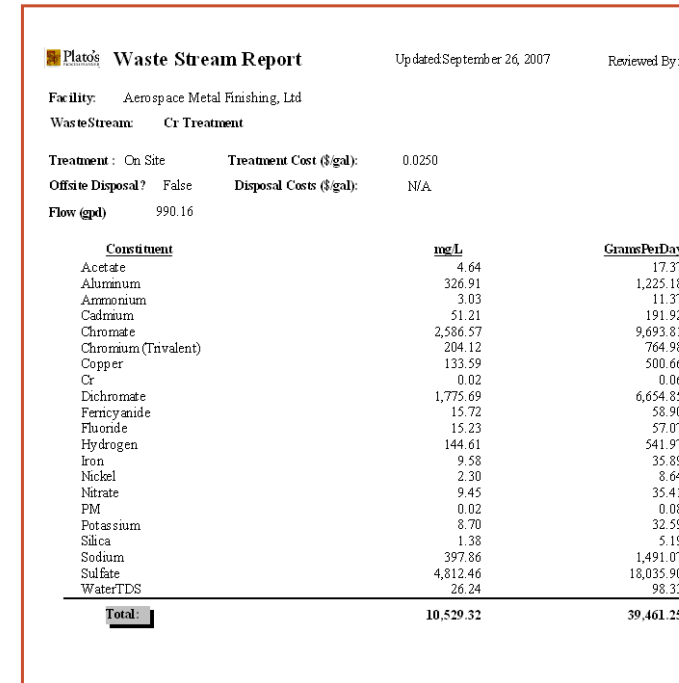
PROCESS PLANNER™

PLATO HELPS VISUALIZE AND QUANTIFY SURFACE FINISHING PROCESSES

PLATO creates process diagrams and calculates material and energy consumption data and costs. Evaluation of this information provides users with better understanding and documentation of current processes and process improvement options.



THE WASTE STREAM REPORT SHOWS FLOW, CONSTITUENT CONCENTRATION AND MASS LOADING FOR EACH SEGREGATED WASTE STREAM.



PLATO'S PROCESS PLANNER™ helps identify and quantify process improvement opportunities and generates documentation to support decision-making. PLATO applications include:

- Reduce energy usage/cost
- Reduce water usage/cost
- Reduce material usage/cost
- Reduce hazardous waste generation
- Reduce total process cost
- Improve process rinsing
- Improve material utilization
- Improve wastewater treatment
- Evaluate process/facility changes
- Evaluate production increase/decrease
- Evaluate process chemistry changes
- Evaluate wastestream recycling
- Evaluate water quality cost impact
- Evaluate agitation type cost impact
- Model/visualize facility water balance
- Model/visualize wastestream characteristics
- Model/visualize air emissions
- Model/visualize process rinsing
- Model/visualize process recovery
- Determine activity based cost by process, process sequence, line, facility
- Prioritize process/facility improvements

THE PROCESS SEQUENCE COST REPORT PROVIDES A BREAKDOWN OF ANNUAL COSTS

PLATO's Process Planner (PLATO) calculates energy, water, waste streams, chemical usage, air emissions, and costs – all at tank, process, line, and overall wet process facility levels. PLATO is an excellent tool to support continuous process improvement – it provides the cost and quantity data needed to significantly enhance identification, quantification/prioritization, justification, and documentation of process improvements.

PROCESS SEQUENCE (Annual Cost)	Production		Labor		Materials					Misc.	Energy					Environment				Annual Costs Summary		
	Avg. Mils	Sq. Ft. Per Day	Operations	Other	Water	Dragout	Bleed	Coating	Other	Other	Vent	Rectifier	Heat	Cool	Other	Effluent	On Site Trt	Sludge	Disposal	Total	\$/Sq Ft	\$ per mil-sqft
Nickel Plate	2.00	250	\$95,062	\$9,249	\$447	\$5,501	\$38,564	\$81,304	\$739	\$9,249	\$20,367	\$912	\$2,667	\$0	\$924	\$394	\$1,973	\$3,819	\$0	\$271,177	\$3.04	\$1.52
Sulfuric Acid Anodize	0.50	250	\$24,375	\$16,322	\$313	\$1,527	\$20,005	\$0	\$1,305	\$16,322	\$13,932	\$1,125	\$1,855	\$1,192	\$1,632	\$283	\$1,867	\$857	\$0	\$102,917	\$1.65	\$3.29
Electroless Ni	0.70	250	\$162,500	\$9,521	\$324	\$3,273	\$125,383	\$29,891	\$761	\$9,521	\$23,546	\$15	\$3,815	\$0	\$952	\$179	\$942	\$569	\$17,952	\$389,150	\$5.75	\$8.21
Hardcoat Anodize	2.00	1,000	\$260,000	\$54,406	\$285	\$5,660	\$10,135	\$0	\$4,352	\$54,406	\$5,449	\$60,000	\$2,088	\$66,020	\$5,440	\$220	\$1,389	\$2,698	\$0	\$532,555	\$2.13	\$1.07
Cadmium Plate	1.00	1,000	\$178,750	\$43,525	\$377	\$15,484	\$22,202	\$67,401	\$3,482	\$43,525	\$29,565	\$648	\$432	\$0	\$4,352	\$364	\$2,293	\$1,861	\$0	\$414,267	\$1.39	\$1.39
Chrome Anodize	0.50	500	\$40,625	\$21,762	\$134	\$1,750	\$14,390	\$0	\$1,741	\$21,762	\$12,614	\$1,500	\$714	\$0	\$2,176	\$131	\$903	\$3,344	\$0	\$123,550	\$0.99	\$1.98
Cadmium Chromate	0.00	1,000	\$81,250	\$43,525	\$269	\$3,660	\$16,797	\$0	\$3,482	\$43,525	\$13,402	\$0	\$1,438	\$0	\$4,352	\$263	\$1,806	\$6,688	\$0	\$220,461	\$0.88	N/A
Hard Chrome Plate	5.00	250	\$130,000	\$8,161	\$286	\$5,973	\$12,582	\$58,437	\$652	\$8,161	\$30,747	\$10,406	\$4,936	\$0	\$816	\$118	\$844	\$4,152	\$0	\$276,277	\$3.49	\$0.70
Aluminum Chromate	0.00	1,000	\$65,000	\$43,525	\$269	\$3,660	\$16,797	\$0	\$3,482	\$43,525	\$13,402	\$0	\$1,438	\$0	\$4,352	\$263	\$1,806	\$6,688	\$0	\$204,211	\$0.82	N/A