

SOFTTOOL ENGINEERING

Certificate
DC-3
STPS

TRAINING PROGRAM · SHEET METAL ENGINEERING

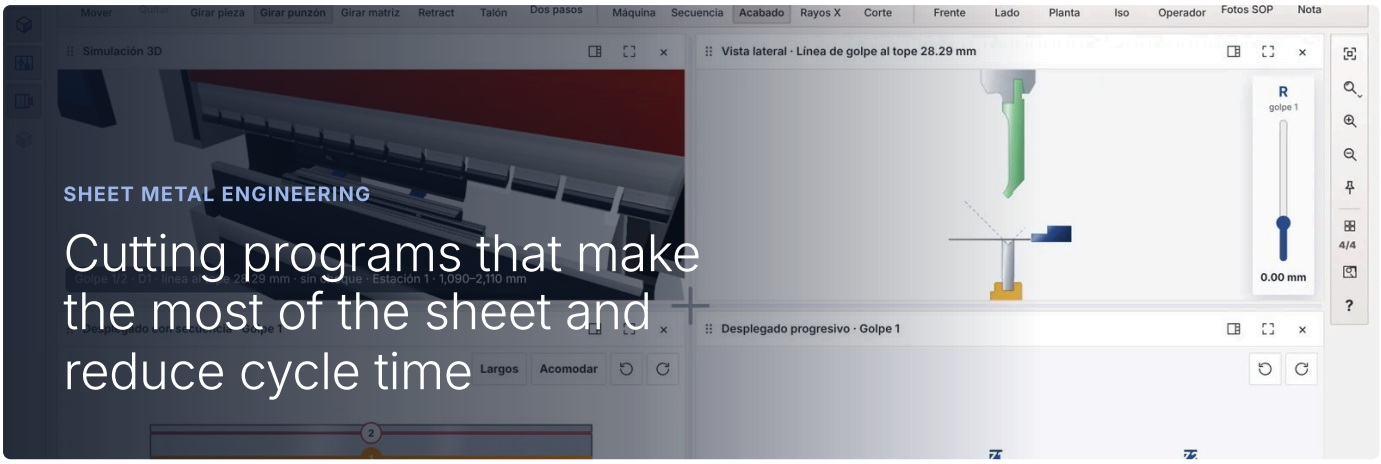
Expert programmer for cutting processes

Laser, punching and sheet metal in SolidWorks

From the 3D model to optimized CNC code: flat patterns, tooling, material usage and offline programming.

6	52	40 h	DC-3
modules	topics	duration	STPS certified

Soft Tool Engineering softooling.com info@softooling.com



OBJECTIVE

Train participants in the complete development of sheet metal processes: model parts in SolidWorks, calculate flat patterns accurately, optimize raw material usage and program laser cutting machines and CNC punch presses independently of any CAM software.

The course ends with two hands-on projects and an evaluation comparing cycle times and material utilization factor.

ON COMPLETION, PARTICIPANTS WILL BE ABLE TO

- Develop 3D models and 2D flat patterns (DXF/DWG) with DFM and process FMEA criteria.
- Calculate K factor, bend allowance and bend deduction by hand before production.
- Define, quote and register standard and special punching tooling.
- Calculate the primary blank and the material utilization factor (single part and nesting).
- Program laser and punching with common-line cutting, clamp clearance and shorter cycle time.
- Generate set-up sheets and shop-ready CNC code.

Course data sheet

DURATION

40 h

INTENDED FOR

CNC programmers, process and manufacturing engineers, sheet metal designers

FORMAT

On site, at your plant and with your machinery

APPROACH

Applied theory and machine practice

GROUP

By role and level of experience

EVALUATION

Theoretical and practical, with results for each participant

CERTIFICATE

DC-3 certificate recognized by the STPS

EQUIPMENT

SolidWorks and CAM cutting software

SYLLABUS

Course content

6 modules and 52 topics. The order and depth of each module are adjusted to the machinery and the group's level.

01 Flat pattern principles and calculation

02 Design and unfolding in SolidWorks

03 Laser cutting process

04 CNC punching and tooling

05 Offline CAM programming and optimization

06 Hands-on workshop and projects

01 Flat pattern principles and calculation

1.1	Mechanical properties and cold behavior of metal
1.2	Grain direction and minimum bend radius
1.3	K factor, neutral axis and plastic flow
1.4	Bend allowance (BA) and bend deduction (BD)
1.5	Manual flat pattern calculation
1.6	Flat patterns for 90°, obtuse and acute bends
1.7	Flat patterns for hems and jogs

02 Design and unfolding in SolidWorks

2.1	Global parameters and bend tables
2.2	Base flange / tab
2.3	Edge flange and material position
2.4	Miter flange and corner treatment
2.5	Hem, sketched bend and jog
2.6	Lofted bends and swept flange
2.7	Corners, chamfers and relief cuts
2.8	Forming tools: louvers, lances, countersinks and draws
2.9	Converting solids to sheet metal and the rip feature
2.10	Flat pattern and clean DXF / DWG export

03 Laser cutting process

3.1	Fiber and CO_2 laser cutting fundamentals
3.2	Components: resonator, head, fiber and chiller
3.3	Assist gases (O_2, N_2, air) and pressures
3.4	Parameters: speed, power, frequency, focus, height and nozzles
3.5	DFM analysis for laser-cut parts
3.6	Set-up and beam centering routine
3.7	Failure analysis: dross, burr, piercing and inspection
3.8	FMEA and control plan for laser cutting

04 CNC punching and tooling

4.1	Punching theory and shearing phases
4.2	Die clearance calculation
4.3	Components: RAM, turret, clamps and table
4.4	DFM analysis for punched parts
4.5	Standard tools: round, rectangular and square
4.6	Special tools: tapping, louvers, countersinks and forms
4.7	Criteria for defining standard and special tools
4.8	Information and drawings for quoting special tooling
4.9	Cosmetic care of the sheet, sharpening and tool care
4.10	FMEA and control plan for punching

05 Offline CAM programming and optimization

5.1	Importing, cleaning geometry and layers
5.2	Standard tool libraries
5.3	Special tools and 3D forms in the software
5.4	Turret layout and auto-index stations
5.5	Primary blank size
5.6	Material utilization factor for a single part

05 Offline CAM programming and optimization (continued)

5.7	Utilization factor and yield in nesting
5.8	Scrap reduction and remnant management
5.9	Common-line cutting for laser and punching
5.10	Lead-ins and lead-outs, kerf compensation and micro-joints
5.11	Path directions and sequences to reduce cycle time
5.12	Avoiding distortion and collisions (clamp avoidance)
5.13	Automatic and manual nesting
5.14	G/M code and set-up sheets

06 Hands-on workshop and projects

6.1	Project 1: optimized offline programming of a complex part on the laser
6.2	Project 2: special tooling, quotation and programming on the punch press
6.3	Final evaluation: cycle times and utilization factor (single part vs. nesting)

METHODOLOGY

You learn by doing, not by watching slides

01
Assessment

We review your machinery, materials, parts and the group's level to adjust the program.

02
Applied theory

Fundamentals with examples from your own production.

03
Hands-on practice

Exercises on your equipment and with your parts, in small groups.

04
Evaluation

Theoretical and practical exam with results for each participant.

05
Certificate and report

DC-3 certificate and improvement recommendations for the area.



Training group receiving their certificates.



INSTRUCTORS

People who started on the shop floor

More than 20 years in sheet metal fabrication: cutting, punching, bending and welding at manufacturing companies. The Soft Tool Engineering team also authored technical books on cost engineering and flat pattern development that are used as support material.

Includes

- Program adjusted to your plant
- Course material for each participant
- Theoretical and practical evaluation
- DC-3 certificate (STPS)
- Results report and recommendations

SOFTTOOL ENGINEERING

TRAINING PROGRAM

Bring this course to your plant

Send us your machinery, the materials you process and the number of participants. We'll propose the program, duration and dates.

EMAIL

info@softooling.com

WEBSITE

softooling.com

OTHER COURSES

Sheet and tube laser cutting · Complete laser cutting process · Complete CNC punching process · CNC sheet metal bending processes · CNC Bending Application Engineer · Sheet metal flat pattern calculation · Blueprint reading · Sheet metal process expert · Sheet metal cost engineering · Welding training · Fiber laser welding · Laser Welding Application Engineer

Content can be adjusted to the machinery and the group's level. Images for reference only.