

ANALYSIS OF THE NEEDS AND OF THE EXPECTATIONS

We must start from the assumption that the automation of a welding process is not as easy as the automation of a mechanical work. In welding in fact the motion parameters are strictly connected to the welding ones and often to the pre-heating , operation that interacts with the current quantity requested to deposit the needed layer.

It's important to determin clearly the productivity level expected from the automation, the quality of the outcome and the cost/quality ratio.

CHOICE OF THE PROCESS

Once you have fixed what you want to obtain and before choosing the plant, you must make a careful choice of the welding process.

It's essential to gather information on the features of the different processes: GMAW/ FCAW (welding with solid or flux-cored wire), GTAW (with solid wire), SAW (with solid wire or strip), PTA (with powder or solid wire), OAW (flame spray projection of powder or wire), HWOFF or plasma spray.

The proper choice of the process is basical to fulfil the expected productivity and the savings on the welding costs.

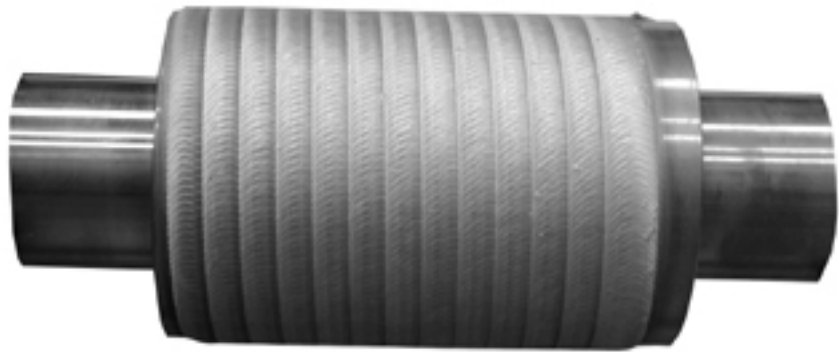
Among the welding processes with high metallurgical quality, with thickness in single pass between 2 and 5 mm, the **Commersald PTA powder process** emerges thanks to its features of:

- High power efficiency
(12 Kw to deposit 4 Kg/h)
- Wide choice of filler materials
(for the flexibility of the process)
- Easy automation
(cylindrical torch with central feeding)
- High deposition speed
(4 Kg/h with 200 A)
- Reduced pollution
(certificates available)

P.T.A. AUTOMATION

A "universal automation" is often too expensive and it is seldom adapted later to jobs different from the ones for which it was originally purchased; therefore the system must be chosen on the basis of the real production needs.

If covering all production needs is too expensive, then it's better to concentrate the resources on the kind of workpiece that represents the main part of the production, while the remaining part will be still produced with the former methods. The use of this

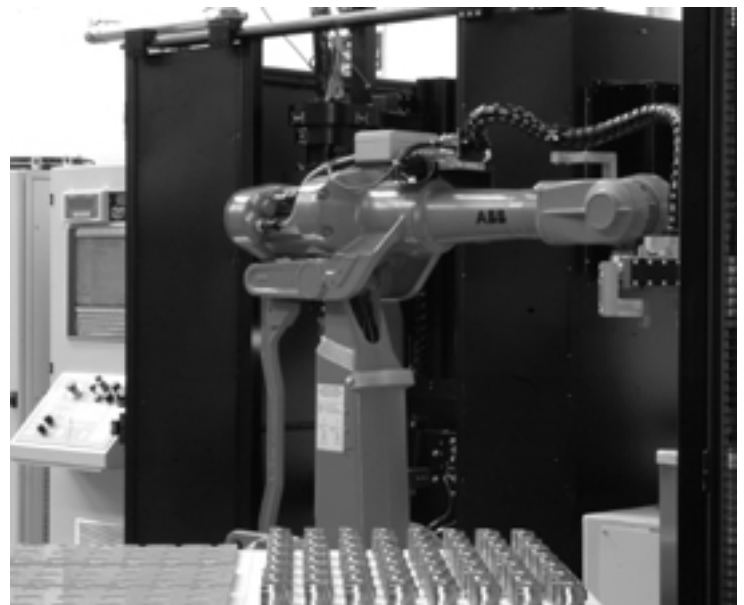


simple suggestion allows to buy a cheaper but efficient plant.

Another important choice is the kind of control: NC, PLC or manual management.

The choice must be done also in consideration of the available staff. In fact some installations are underutilized because there is not the suitable staff to make them work.

For mass-productions Commersald offers different **pick and place** solutions.



COSTS COMPARISON

Here below you can find a table showing the costs of the filler materials for the different processes (Commersald list price 2007)

KIND OF ALLOY	PTA powder Euro/Kg	GMAW solid wire Euro/Kg	FCAW cored wire Euro/Kg	SAW wire/strip Euro/Kg
Stainless steel AISI 300/400	15	7,5	12	12
High speed steel S / HSS	18	15	18	NA
Cobalt base alloys	75	135	105	115
Nickel base alloys	75	90	90	105
NiCrBSi alloys	60	NA	NA	NA
Nickel base alloys with carbides	90	NA	135	NA

Now we show the results of a costs comparison for the hardfacing on a cylinder made of steel Fe430 with cobalt base alloy, using the automatic processes PTA, GMAW, FCAW, SAW.

The labour cost is calculated at Euro 25 per hour, while we have left out the costs of electric power and gas, since they are basically irrelevant.

Cylinder Ø	250 mm	Coated volume	0,824 dm ³
Height	300 mm	Specific weight	8,4 kg/dm ³
Coating thickness	3,5 mm	Deposit weight	6,9 kg
Coated area	235600 mm ²		

WELDING PROCESS	u.m.	Plasma powder PTA	Solid wire GMAW	Cored wire FCAW	Subm. arc SAW
Efficiency	%	95	100	85	100
Q.ty of filler material	kg	7,3	6,9	8,1	6,9
Unit cost of filler material	Euro/kg	75	135	105	115
Total cost of deposited material	Euro	548	932	850	794
Deposition speed	Kg/h	4	3	3	5
Time with arc on	min	110	138	162	83
Dead time	%	15	15	15	15
Welding time	min	127	159	190	95
Labour cost	Euro	52,8	66,1	79,0	39,5
Total cost of the coating	Euro	601	998	929	834
Cost comparison	%	100	166	154	138

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