



ECN: AN ADVANCED PRODUCTION PROGRAMMING AND CONTROLLING SYSTEM.

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Abstract

ECN has been studied to satisfy the increasing needs of the production costs controlling and in general to optimise the production process. It generates the optimisation of speeds and as consequence an increase of plant and a used equipment yield, a sensibly decrease of the refuses, and a good production planning. Furthermore, the data picking (visualization, printing and recording) allows the elaboration of statistics based on certain data in real time.

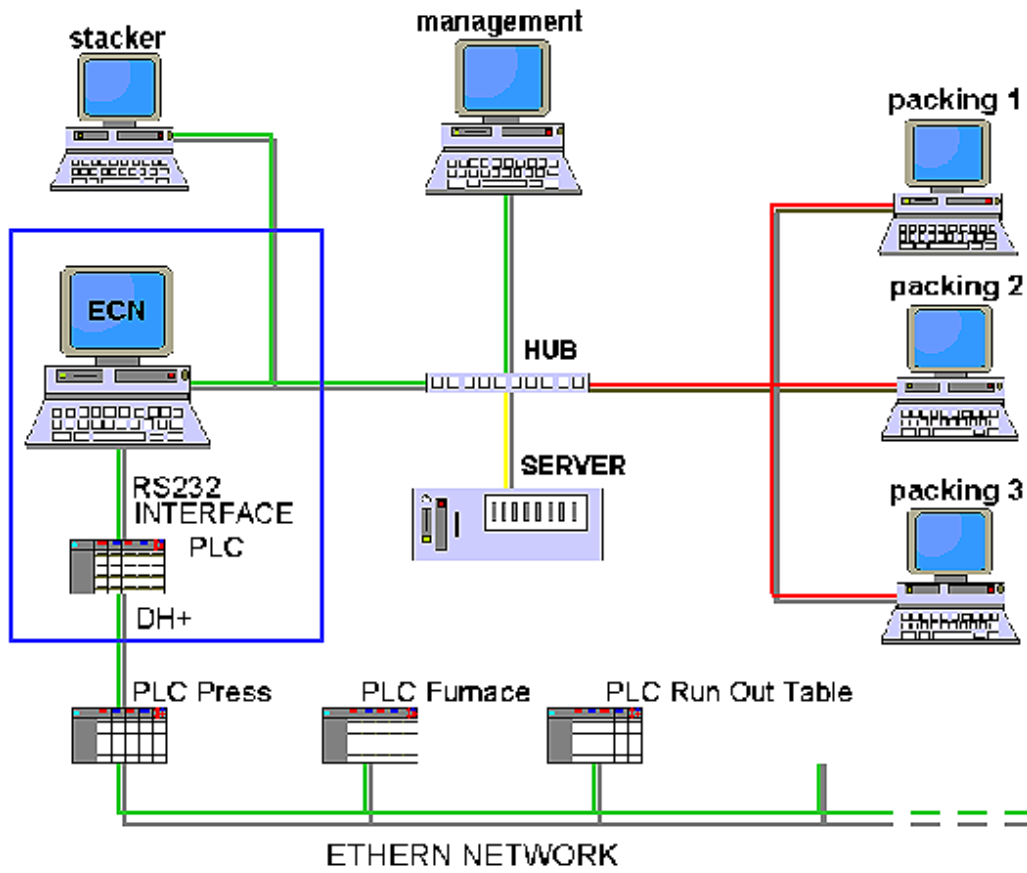
Thanks to the exchanges of information and the communication, ECN controls directly each machine parts through their PLC. In this way it is possible to optimize lengths and scraps allowing a better production management. PLC captures external data through the sensors placed on the machine and it sends them to the PC, which has the task of elaborating them. In this way the PLC can manage all parameters referred to the billet, profile, ans. necessary to the extrusion.

SAI (Industrial Automation Company) operates in the extrusion plant automation sector: from the foundry furnace to the presses, to the ageing, packing and production optimisation.

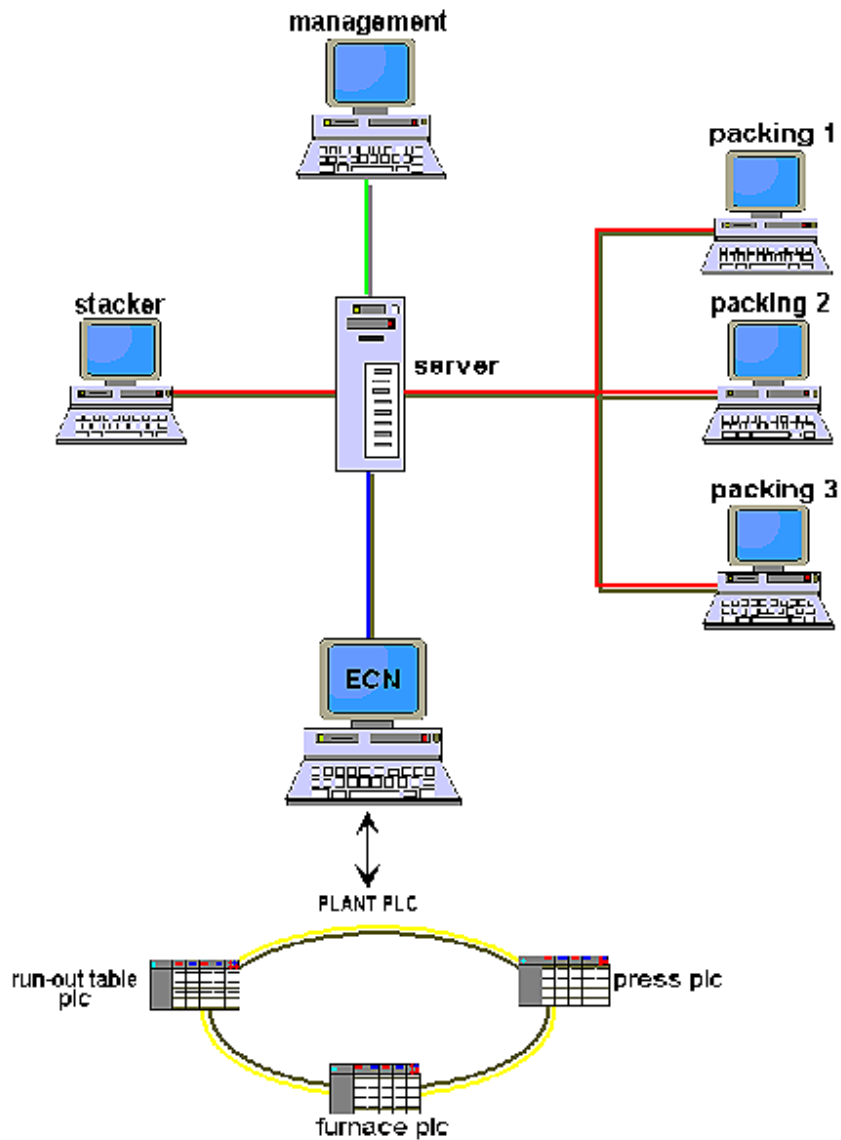
Thanks to an highly qualified staff with over twenty years of experience and also to a steady care on the new scientific technological and software developments, SAI has created innovative electrical/electronic automation products of collection and analysis of data process.

With ECN it will be possible to obtain a sensibly increase of the production and a decrease of the refuses, and the plant maintenance operations will be easier.

It can be reduced or amplify according to the necessities.



DATA FLOW ECN - PRODUCTION CONTROL



PRESENTATION

ECN has been studied to satisfy the increasing needs of the production costs controlling and in general to optimise the production process. It generates the optimisation of speeds and as consequence an increase of plant and a used equipment yield, a sensibly decrease of the refuses, and a good production planning. Furthermore, the data picking (the visualization, the printing and the recording) allows the elaboration of statistics based on certain data in real time.

CONFIGURATION

ECN is composed by a PC, a membrane keyboard and by a combination of software package, which gives to the system flexibility and affability. Flexibility because it can be adapted to the needs of different plants; affability because the error percentage of

collected data is less than 1%. It can work as "STAND ALONE" with only 1 press terminal: this is the heart of the system, but it is arranged to communicate with the most known nets with management system as AS400 and software package as EPICS.

DATA COLLECTION

Thanks to the exchanges of information and the communication, ECN controls directly each machine parts through their PLC. In this way it is possible to optimise lengths and scraps allowing a better production management. PLC captures external data through the sensors placed on the machine and it sends them to the PC, which has the task of elaborating them. In this way the PLC can manage all parameters referred to the billet, profile, ans. necessary to the extrusion.

PARAMETERS MANAGEMENT

The operator has the task of introducing data referred to the dies (technological parameters) and their extrusion order (commercial data). This list is flexible and it can be modified about data and order in every moment. Technological parameters are inserted only one time, at new die use. Then it is archived and kept in memory. Working page visualizes all data about the current extrusion updated in real time (production data and main press variables)

FAILURE MANAGEMENT

Another important function of ECN is about the management of failures. Through an exchange of PLC and ECN information from the machine, every time an alarm occurs, it is pointed out on the work page. The operator can open an alarm page to visualize the actual alarms. In this way the ECN has a press supervisor task too.

DIE LIFE MANAGEMENT

The new function of ECN is the die life management based on historical values, current values, exhausted dies and dies in nitration.

REPORTS

At each die change data is printed (production report) or archived in the management office. Further data is divided into gross and net production, thanks to the data which come from other terminals (packing, stacker). Consequently it is easy to do an analyse based on certain data, of yield, quality and productivity of plant. In addition to all mentioned above, ECN can print 17 different variables about the billet just produced or it can archive them on management workstation. They for example can be the profile length, the billet weight, the extrusion time, the down time... It allows to obtain a real and actual radiograph of the production.

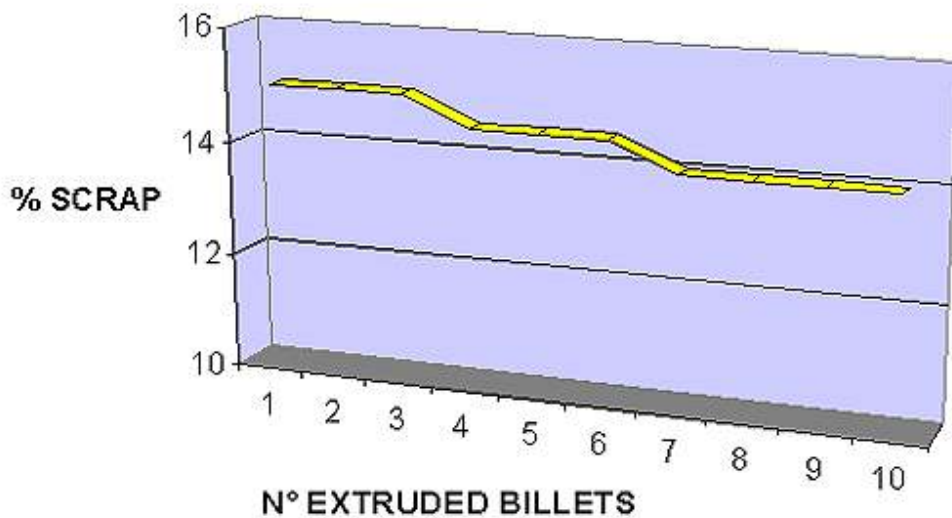
Daily report		ESC to exit FOLLOW PAGE: F4 + page number						
Date:	09/02/00							
Die Code	Job number	Extruded billets	Extruded bars	Kg Extruded profile	Kg Extruded billets	Scrapped bars	Extruded Kg/hour	% press scrap
0000009439/00	1	55	325	1297	1479	22	1066	12
0000008889/02	2	40	1098	831	999	80	1174	14
0000003653/01	3	45	890	1095	1222	53	1217	10
0000001493/00	4	102	4054	2094	2457	350	1232	15
0000003431/00	5	17	84	392	424	5	937	10

Die report		ESC to exit FOLLOW PAGE: F5 + page number																		
Die code:		0000011695/00																		
Job number:		/																		
Date:		08/02/00																		
Time	Extr. billet	Last oil length	Profile length	Prof. lo for ord	Total extr. ca	Billet w for ord	Kg Extr for ord	Shear billet	Scrapp billet	Butt on	Real pr weight	Extrusi time	Plant stop du	Billet Set	Billet Temp.	Profile Temp.	Procs. Peek	Aver. Press.	Averag Speed	
09:16	1	600	52,31	26	4	48	36	60	0	40	1100	75	0	47C	472	54C	222	104	10	
09:20	2	712	52,31	86	23	109	92	142	17	43	1089	152	1	45C	45C	54E	219	168	21	
09:23	3	712	52,31	107	33	170	148	210	17	47	1094	148	1	45C	44E	547	198	151	21	
09:25	4	712	52,25	188	43	231	204	284	17	53	1097	148	1	45C	451	54F	194	153	21	
09:28	5	712	59,94	227	50	277	247	356	17	39	1097	122	1	45C	452	552	188	147	19	
09:31	6	712	52,33	278	60	338	303	427	17	49	1093	148	1	45C	45C	55C	201	156	21	
09:44	10	712	38,27	318	67	414	344	498	17	24	1083	11C	1	45C	45C	553	198	158	21	

COURSE OF THE SCRAP ON THE BASIS OF 3 DIFFERENT CONTROL SITUATION

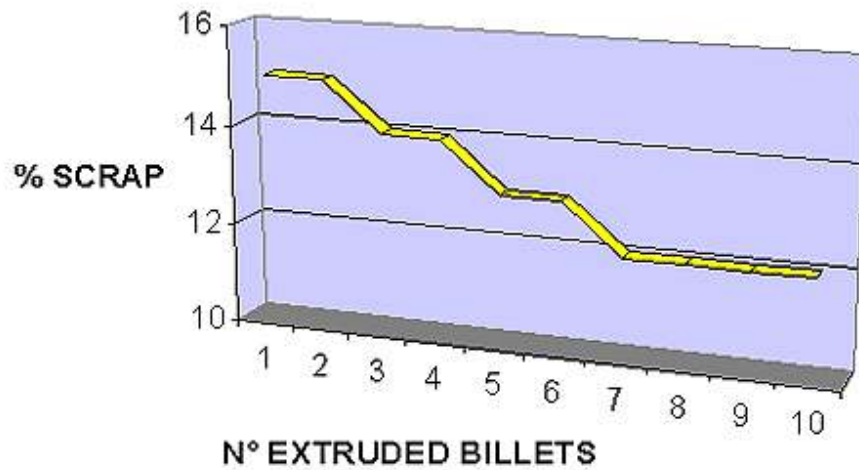
Standard course referred to the scrap which normally is obtained working in manual conditions, that is adjusting the length of the billet for following approximations.

SYSTEM WITHOUT CORRECTIONS AND WITHOUT HISTORICAL DATA



Representation of the scrap course using the system of automatic calculus of the lengths. This resolution corrects in automatic way the billet length in function of the profile length and of the remaining butt-end length.

SYSTEM WITH CORRECTION OF THE BILLET SHARE IN AUTOMATIC WITHOUT HISTORICAL DATA



This solution uses data of billet's length and of historical profiles' length which are memorized during the last production with the same kind of die. In this case the length of billet is of adequate value since the first extrusion. As result you obtain a scrap reduced to the essential minimum.

SYSTEM WITH CORRECTION OF BILLET SHARE IN AUTOMATIC AND HISTORICAL DATA

