Cours automatisme grafcet pdf

Grafcet Return Summary GRAFCET: Introduction Graft is the result of voluntary work of the Commission of the Associated, AFCET (French Association for Economic and Technical Cybernetics), ADEPA (Agency for the Development of Productization applied to industry) of industrialists and academics. That commission, set up on 26 November 2004, was conceived as a single system of expression which is not anyone's property. In 1978, graft entered the national education system. It is now a mainstay of the automation and industrial informatics program. Additional graft tools have been created, the Guide to studying walking and stopping modes (GEMMA - 1981), Technoguides and then functional chains. Since 1988, grafcet has been a standardized description tool (C.E.I. 848) that works in sequential logic. It is a simple but extremely powerful tool that enables functional, operational and technological representation of most industrial automatisms. In 1985, Siemens (Europe's leader in automation) adopted grafcet and promoted it in Germany. In 1986 ALLEN - BRADLEY (the world leader in programmable automata) adopted and developed grafcet, even for the American market. Note: The sequential function (SFC) or graph names used by certain software (PL7-2, Orpheus, S5, etc.) correspond to the graphene. Definitions and basics Abbreviation grafcet means: GRAphe Functional Command Step Transition. Graft is a graphical tool for describing the expected behavior of the command party. Describes relationships across the boundaries of the isolation of the command part and the operational part of the automated system. The creation of the graft presupposes the previous definition: - system, - po-pc boundary, determining the command part, - inputs and outputs of the command part. The description of the functioning of logical automatism can then be graphically represented by a set of: - ETAPES, to which actions are associated, - transitions with associated commites, - contact (or arcs) ORIENTEES, Such set (GRAPHE or DIAGRAMME) is called graphcet. Example of a GRAFCET creation rule Each oriented link joins a step to a transition or transition to a stage. Graft reads from top to bottom. If this syntax is not scrupulously respected, there will inevitably be an error in the application. The arrow can complete the link by marking the direction of the game if there is a risk of confusion. On the graph, you may encounter different types of steps: Active Step Active Step Step Macro-Phase Entry step (Macro-Phase) Phase Termination (Macro-Phase) Encapsuation Phase Encapsuation Step to a basic situation with generally stable behaviour. In principle, during the phase, the control authorities do not change their status. One step is active or inactive. The stage is represented by a square, which is spotted by an alphanumeric variable located in the center of the square. When a step is active, it can be determined by a single point. There are also resource steps and good steps. A step is called a source phase if it is not connected upstream to the gradient. Similarly, a step is called a good phase if it is not connected downstream to the transition. Examples: Well Stage Source Step Some steps are active at the beginning of automated system (SA) operation. These are the initial steps. They are represented by a double square. There may be several initial steps on the graft. These steps can then be placed anywhere on the graft. At one step of the graft, a high position will be preferred to make it more readable. On the graft, you can also meet the initial source stage. Macro-step is not strictly a step. This is a unique representation of a sequence of steps and transitions. This will be referred to as a macrophagous extension. Macro-phase is similar to a diversion program to interrupt. In graft, the macro step is unique. It can only be called once. There may be several macrocrosses in the graft. Diversion structure: Task This step differs from the macrophase in its uniqueness. A task is a subroutine and can be called repeatedly in the same chart. The job uses the terms front managed array front, which is a bit complicated to manipulate. Instead of the task we will use more flexible hierarchical working grafts. At the time of writing this article, the task is not standardized. Is encapsulating a set of steps, called encapsulated, a step, called encapsuled, only when this encapsuled step is active, at least one of the encapsulated steps is active. The encapsuling can be used to hierarchically structure the graphcet. Example operation: Encapsulipping step 67 has 2 encapsused. These two encapsuled are G1 and G2 partial grafts. Phase 67 activation causes phases X3:G1 and X4:G2 to be activated. Turning off step 67 will deactivate all phases of the G1 and G2 sub-grafts. We see encapsuled by a partial graft surrounded by a frame, where we place the top, the name of the encapsulage (in our example: 67), at the bottom the name of the partial graft (in our example: G1 and G2). In our example, we find that there is no initial step for partial grafts.

(follow...) Phase-related actions accurate for each step, inside the action rectangle, or actions to be performed when the step is active. A step-by-step action with multiple action actions can be of different nature, the rectangle can have arbitrary dimensions, and include several actions. Some actions associated with steps may be subject to external or internal constraints. The issued order may be: - subject to delay, with a rating of D (Delay), - with a limited duration, with an L rating (Limited), - a refugee, with a P rating (Ponctual) - kept active, with an S rating (Set) - disabled, with an R rating (Reset). For example, a standardized font transition and a standardized font indicates the ability to go from one step to the next. With each transition, one or more logical (logical) conditions that reflect the concept of nourishing. Receptivity is a combined function of boole information, such as: - sensor states, - pulse on the button; - the action of the timer, counter; - Active or inactive state of other steps, etc. examples: Perceptiveness is true when the value of c-counters deposit. GRAFCET (GRAphe Functional Command Etape-Transition) is a method of representation and analysis of automatism. This is a graphical tool for describing the behavior of a control. Describes informational interactions across the isolation boundary: the control part, the operating part of the isolated system. This method of representation is independent of the technology used in automatism and consistently translates the specification of automatism. GRAFCET was invented in 1977 in France by AFCET: The French Association for Economic and Technical Cybernetics. GRAFCET broadcasts ADEPA (National Agency for the Development of Applied Productivity according to industry standard IEC 1131.3)GraFCET is also called DFS (Functional Sequence Diagram) or in English, SFC (Sequential Functional Graph). WHY THE GRAFT? If certain specifications are expressed in a common language, there is a persistent risk of misunderstanding. Some words are vague, poorly defined, or have several meanings. A common language is not suitable for accurately describing sequential systems. Grafcet was therefore designed to symbolically and graphically represent the functioning of automatism. This allows for a better understanding of automatism by all stakeholders. Grafcet is created for each machine during its design and then used throughout its life: realization, focus, maintenance, modifications, modifications. Grafcet must therefore be known to all those involved in automatisms, from their conception to their operation.---GRAPHCET:1982 standards: GRAFCET is standardized in France by issuing NF C03-190.1988: GRAFCET is CIS/IEC 848.1993: IEC 1131-3 verifies five API programming languages including SFC (inspired by GRAFCET)2002: IEC 60848 is extensively modified, its French translation was published in September of the same year under the reference NF EN 60848---Formers of GRAPHEC: independent of technological materialisation; Consistently translates specifications; is suitable for automated systems. Page 2Page 3GrafCET consists of: 1. basic graphic elements: steps, transitions, oriented links connecting phases and transitions, structured into alternating mesh forming a graphic sequential (skeleton) frame. 2. an interpretation reflecting the control party's conduct with regard to its records and outputs, an interpretation characterised by: actions linked to actions, sensitivity associated with transitions 3. evolution rules formally defining the dynamic behaviour of the control part as described. Page 4A step is a situation in an automated system in which the behavior of the control part is stable against its inputs and outputs. The step is symbolized by a digitally mottled square. The step can be active or inactive at the moment t. This can be done by using the point below the number. The initial step, or any step that was originally activated, is identified by a double square. You can associate one or more elementary or complex actions with a step. The actions associated with the step reflect what needs to be done when the step is active. Actions that result from the logical processing of information by the command part can be:external and correspond to commands issued by operational parts or external elements.internal and relate to specific automatism functions such as: timing, counting, etc. Actions are specified in one or more rectangles:N.B: Infinitive verbs are always used in actions: turn on the lamp, but do not turn on lampPage 5A transition indicates the possibility of development from one step to the next step. The transition from one to the other is over the transition transition. The transition is validated or unredified. It is said to be validated when all immediately preceding steps related to this transition are completed. The transition between two phases is represented by a bar perpendicular to oriented links.NB: There is always only one and only one transition between the two phases, regardless of the path traveled. Each transition is associated with a logical menu called receptuvit, which can be true or false. Perceptiveness written in the form of a logical design is a combined function: external information from operational or operational positions, internal information related to specific automatism functions (temporization, counting) or active or inactive states of other steps. EXEMPLE :P time into perceptiveness, it is enough to indicate its origin and duration after the marker. EXEMPLE:t/1/10s: move to phase 2 if 10s have passed since the last activation phase 1.t/1/15s: go to phase 3 if 15s have passed since the last activation of step 1.Page 6Leeds links attach steps to transitions and vice versa. The overall meaning of the course is from top to bottom. When the course different arrows are needed. Example: Page referralsfor complex systems, it is sometimes necessary to draw grafcet over several pages. In this case, very readable marks indicating the original or destination step or transition, as well as the page numberFor better readability, they will be cut off to highlight all gradients validated by the same step. Page 7Page 8Seeed rules are added to evolution rules to specify conditions for which they are active or inactive. Page 9 The initial situation characterizes the initial behaviour of the control part towards the operating part and corresponds to the active phase at the beginning of operation. Usually reflects the calm behaviorMm symbol is a double square:Page 10Crosses transition takes place if:the previous step is active related sensitivity is trueWhen these two conditions are met, the transition becomes passable and is necessarily crossed. Page 11Gradient Rollover simultaneously activates all immediately following steps and deactivates all previous steps immediately. Example:Case 1: Transition 1-2 is not specified, phase 2 is inactive. Case 2: As step 1 is active, 1-2 transition is verified, but it cannot be achieved because the sensitivity is not true: b-0. Cas 3: Transition 1-2 is made because the receptivity is true: b-1. In this case, step 2 is activated and step 1 is disabled. Page 12Severally cross-crossed gradients are crossed out at the same timeThis crossing rule allows you to split a graft into several independent diagrams. Example:Note:X1:Logical variable for step 1: If step 1 is active X1-1 If step 1 is inactive X1-0Page 13Si during automation operation, the same step must be turned on and disabled at the same time, it will remain on. The :P 14Page 15The beginning of Grafcet consists of a series of steps that can be activated one by one. This sequence of steps is called a single sequence. Each step is followed only by and each of them is verified in one step. The sequence is said to be active when at least one of the steps is active. They say it is inactive when all steps are inactive. Page 16When a transition leads to the activation of several sequences at the same time, these sequences are called simultaneous sequences. After simultaneous activation of these sequences, the development of active phases in each sequence becomes independent.NB :P, in order to synchronize the deactivation of several sequences at the same time, reciprocal waiting phases are usually planned. Page 17Stelection or choice of development between multiple stages or sequences is represented, from one or more phases, as many validated transitions as possible changes.from step 1 two possible development (10 OR/ET 20) to get an exclusive choice between several stages: sensitivity must be exclusive. Example:In this case, the recipe is not exclusive: and contemporary evolution is possible:Explanation:a a.b are not exclusive! If true A B is false then 20 is active and 50 is inactive, if b is true and becomes true, then 30 and 40 are active -- > for synchronization step 4 (wait phase) receptivity is available: (step 20 and 30 disabled)Page 18Page 19Na call source stage step is not related to upstream transition. It can only be activated if it is initial or subject to higher-level graft enforcement. A well stage is a step that is not associated with a subsequent transition (step well 10). Only a forced order can change its status. The source transition is not attached to the parent stage. By convention, it is always verified and becomes passable when the recipe is true. The well transition is not attached to the subsequent step.---commally:Macro-step (ME) is a unique representation of a set of steps and a transition called Step Expansion, the macrophase replaces the graFCET phase. The ME extension includes the input step and the output phase specified by e and s. Any transition of the previous macrophase triggers phase E of its expansion. The exit phase helps validate subsequent macrophase transitions. The macro-step transition is validated only if the last phase of the macro phase extension is active. SYMBOLE: When step 9 is active and e1 sensitivity is true, then the ME is activated, the extension input phase is activated simultaneously, and the cycle described in the expansion leads up to the S10 output phase. Once phase S10 is active, if s1 sensitivity to ME is true, the next step is activated.NB: Best is do not associate actions with the input and output phases of macro-stepPage 20Page 21 Example: Action - X1This action 1 continues as long as the step is active! Page 22Loo:P 23Ty is a conditional action in which time is a logical condition. Page 24Tha is an action that will be preserved in successive stages. Action A is preserved in both stages 1 and 2Page 25Page 26 26