

RDCPM™ — Relationship Driven CPM

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Introduction

The new format of the Relationship Diagramming Method (RDM) variant of Critical Path Methodology (CPM) of Planning and Scheduling was introduced in 2005 in the sixth edition of the industry manual, *CPM in Construction Management*. Certification of proper usage is attested to by the RDCPM™ compliance certification symbol.



The original format for CPM, which was developed 50 years ago, has since been renamed as Arrow Diagramming Method (ADM) to distinguish it from the Precedence Diagramming Method (PDM) variant which was first implemented in 1964. ADM is also known as AOA or Activity-on-Arrow, while PDM is also known as AON or Activity-on-Node. Another variant of the same era was Program Evaluation Review Technique (PERT), which was developed by the U.S. Navy for the creation of the Polaris Missile System. PERT focused more upon defined milestones, instead of the loosely defined activities between such milestones.

All three formats included weaknesses due to technology limitations.

The original ADM and PERT formats were designed to operate on computers which lacked RAM and were limited to linear access memory. Old cartoons illustrating computers with large reel-to-reel magnetic tape provide an

indication of the limitations that early software designers had to overcome. Similarly, PDM software was designed with fewer features, storing less information and requiring less memory than had been envisioned by theorists. Many of these issues and much of the promise of CPM that has been not fulfilled, are rooted in this failure to record information known by the planner/scheduler. RDM attempts to address these issues.

Just as CPM and PERT were distinguished from barcharts and milestone charts by the recording of additional information used to create those charts, RDM is distinguished from the older versions of CPM and PERT by recording more of that information. This information, as implemented by Primavera Pertmaster®, may be generally classified into several additional of code fields:

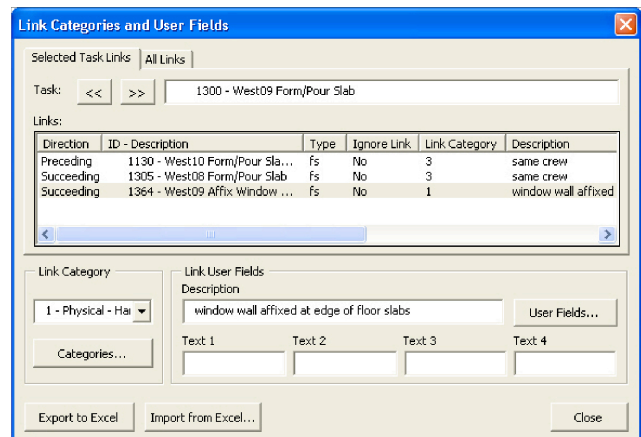
- Reason/Why codes and description fields
- Events and additional and expanded types of restraints between activities
- Relationship codes to further indicate the relationship between two activities

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Reason/Why codes and description fields

The Reason/Why code provides additional description as to the reason why a restraint or link has been placed between two activities. This is an intelligent code. It can be entered based upon the thought process of the project team or may be calculated from other information about the activities. This code may also be used for further calculations, such as better diagnostics for validation of plan logic, more robust resource leveling algorithms, acceleration/crashing studies, and for other “what if” scenarios. The Reason/Why code is supplemented by additional text fields to record such information in free-form descriptive formats.

The Reason/Why code is supported in Pertmaster (version 8.2) by clicking Plan, Links, Link Categories and User Fields. The default Reason/Why codes, or in Pertmaster’s implementation Link Category Codes, are (0) undesignated, (1) physical, (2) just-in-time and (3) resource. Additional code designations, such as by individual resource, may be assigned from (4) through (255).



In the example shown above, the Link Category is augmented by user entered descriptions of “same crew” and “window wall affixed at edge of floor slabs.” Four text fields are also available for additional descriptions or special coding to be assigned to this restraint or link between activities.

with three days lag, may lead from the start of Activity A to the start of Activity B. Or the RDM Progressed-to-Start restraint may lead from the end of a three day sub-task of Activity A, with zero days lag, to the start of Activity B. Both usages will result in the same initial bar-chart, but they will result in different bar-charts if Activity A starts and stalls on day two.

Relationship Codes

Relationship Codes allow the user to program the computer to view the relationship of activities connected by a restraint or link, and to perform various diagnostic or global changes based upon such review.

As an example, one desires to transfer a CPM from PDM to RDM. The PDM has codes assigned to activities indicating the resource used as well as the location of the work being performed. As a

RDM has events, at the beginning of an activity, at the end of an activity, and embedded within an activity whenever completion of some portion of an activity is required to start or finish another.

result, rules may be written to set the Link Category to Physical for a transfer from one craft resource to another at the same location, and to Resource for a transfer from one location to another utilizing the same resource. Reports can be prepared highlighting a hand-off from one subcontractor to another, and thus calling for additional supervision by the general contractor, engineer and owner. The user may implement a global change setting a two day lag for each Finish-to-Start restraint, whenever the masonry subcontractor changes location to account for the tearing down and rebuilding of scaffolds. The uses of this new feature are infinite.

RDCPM™ compliance certified Pertmaster allows the user preparing a CPM to better model the real world. It allows the user reviewing the CPM submitted by another to perform a much more in-depth evaluation. Pertmaster (version 8.2) allows the project team to better monitor the progress of a project, and to make mid-course corrections when needed.

About Primavera

Primavera is a software company who provides business solutions for a project-driven world. The company helps organizations identify which projects are most important, and makes it easy for people to work collaboratively on those projects and deliver them successfully. Primavera solutions are industry specific and highly scalable, with the power to support global enterprises. Primavera solutions have ensured the success of projects collectively worth more than \$6 trillion, including the management of IT projects that span the globe, the complex manufacturing of high tech products, construction of the world's tallest buildings, ongoing multi-billion dollar oil discovery projects, and space exploration. For more information, visit www.primavera.com or call + 1.800.423.0245.

Example of Just-In-Time Bar Chart

Code value two is reserved for a special type of link category, the Just-in-Time Reason/Why code. This code represents a physical relationship between activities, but one where the predecessor is desired to be provided just-in-time to support the early start of the successor activity. A typical usage is between the end of a string of procurement (submit, approve, fabricate and deliver) and a production activity, such as rig/set the procured item to a foundation as soon as possible after the foundation is poured and cured. The calculation of the Just-in-Time Dates for an activity is similar to that of the Late Dates; starting at the last activity's Late Finish and flowing toward the start of the project. The Just-in-Time finish and start for each activity is the same as the Late finish and start. However, at the link set to link category 2, the Just-in-Time finish of the predecessor activity to the link is set to the Early Start of its successor. Further processing continues as previously noted. Users of this feature may choose to display the Late start and finish of latest dates before causing delay to the project, or Just-in-Time start and finish of latest dates before causing a disruption to progress by the production crew.

RDM Events

Another hallmark of RDM is the re-establishment of the concept of events, which is generally lost in the transition from ADM and PERT to PDM. RDM has events at the beginning of an activity, at the end of an activity, and embedded within an activity, whenever completion of some portion of an activity is required to start or finish another. RDM also permits tags, descriptions and user-defined codes to be assigned to these events. This way users can record exactly what 30% of an activity is required to be complete before another may start. Pertmaster (version 8.2) implements this requirement of RDM by permitting activities to be split, placing the partial activity descriptions on the individual sub-tasks within the activity.

RDM also permits the user to distinguish between whether activity B can start three days after a ten day activity A has started – without reference to whether any progress was made on day two or three – and an activity B that may start when three days (or 30%) of ten day activity A have been completed. This is accomplished in Pertmaster by use of the split activities function. A traditional Start-to-Start restraint,



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