

## Cadmatic Cable Router

2015Q3

Cadmatic has powerful tools for electrical design. The Cable Router significantly saves man hours in cable routing and shortens the time needed for installation of pre-cut cables in plants. The Cable Router comes with a fully automated routing functionality that selects the optimized routes for cables, calculates their cut lengths and checks cable way fill rates and possible collisions in cable jumps between cable ways.

## Routing of cables

Cable ways can be routed with different types of components such as trays, ladders or cable conduits. The cable management tool creates a dynamic nodal network based on existing cable ways and penetrations in the model.

This nodal network represents all possible routes for cables in the plant. The system uses the nodal network to find the most optimal routes for cables between equipment and other objects. Component connection nodes are automatically generated. It is also possible to define new connection nodes to optimize the required length for larger pieces of equipment.

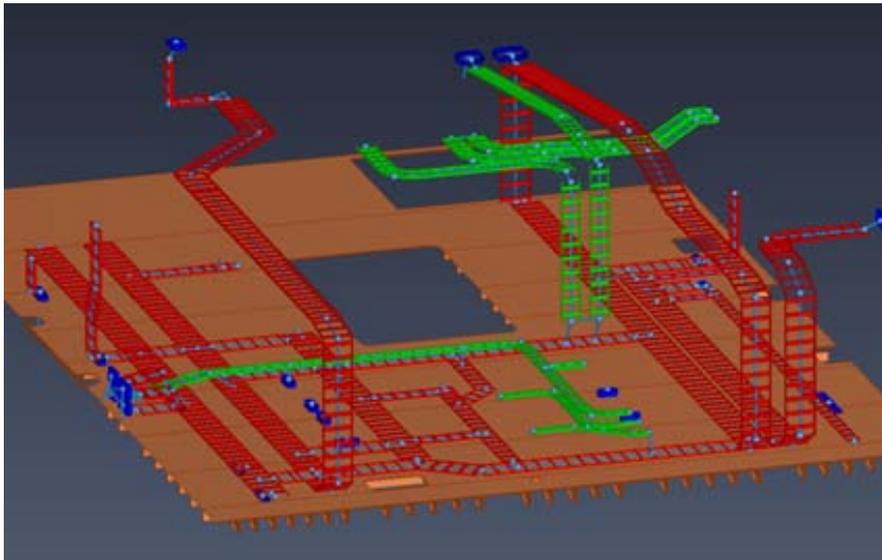
Due to the dynamic nodal network it is possible to start cable routing when the design of cable ways is still ongoing, or if modifications to existing cable ways need to be made. The user can modify existing cable way objects at any time, even if some cables are already routed through the cable ways.

The cable network changes automatically according to the changes made to cable ways. If the original route is no longer possible, the tool reroutes the cable automatically.

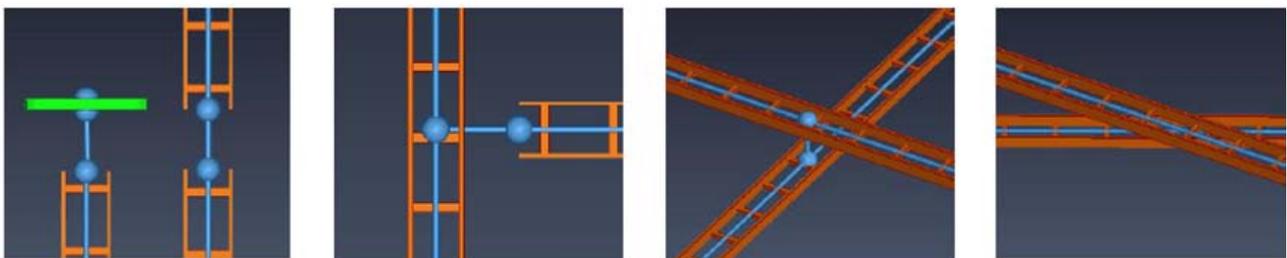
The system controls the status of cables and makes it easy for the user to manage which cables are routed, not routed or for which cables the route has changed. If rerouting is not possible the route status of the cable is marked as "broken" and can be routed again when possible.

The user doesn't need to do manual work or create definitions for air jumps if the cable way element is not directly connected. The tool automatically creates air jump segments to be connected if they are close to each other and not directly connected via a tray element. The user can modify the nodal network by adding, removing and disabling nodes or segments.

*Pic. 1. Nodal network represents possible routes for cables*



*Pic. 2. Air jumps are created automatically to connect separate cable ways*



## Cable router management

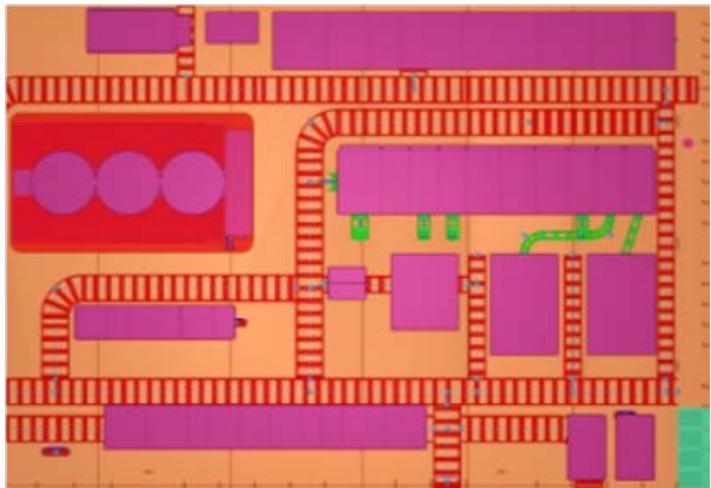
Once the nodal network for cables has been generated the user can continue to define different cable types. The cable definition contains information regarding the properties of cables such as: cable IDs, cable type, the head equipment with a cable node and the tail equipment with a cable node. After this the cable is created and it is shown in the "not routed" list of cables.

Cable definitions can be imported easily from MS Excel for instance via the XML link from which the Cable Management tool automatically creates cables. This saves a lot of time as there is no need to define cables manually. If required cables can be defined manually as well.

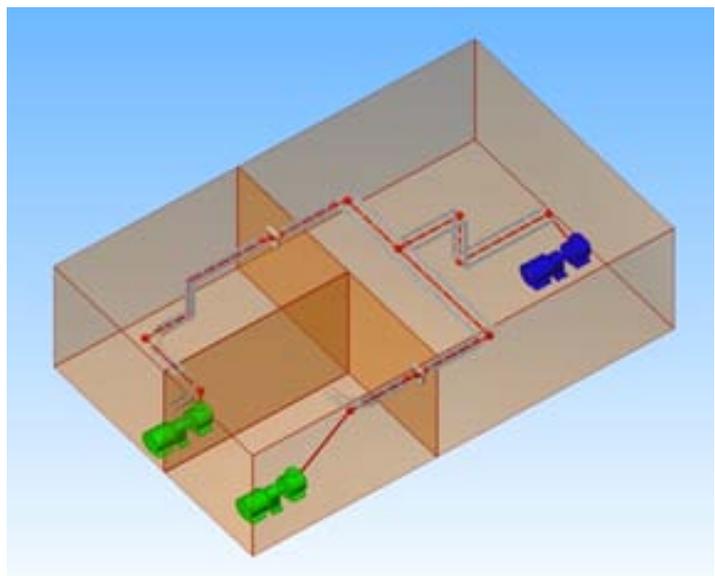
Cable routing starts by defining which cables should be routed. The user selects one or multiple cables after which automatic routing selects the best route for all the selected cables in a few seconds. The route length and fill rate of the cable ways and penetrations are prioritized when evaluating the most optimal routes for cables. The fill rate control system ensures that cable ways are not filled up in excess of the permitted amount. Collision detection is also involved when penetrating walls, floors or other structural parts as well as in the air jumps between cable ways.

The segregation control of cables makes cable routing even more efficient. Segregation is managed according to two types of main rules: The user can define dedicated cable ways for certain kinds of cables or minimum

*Pic. 3. The Cable Router management tool makes it easy to control the work flow of creating cable networks and routing cables*



*Pic. 4. Example visualization for a nodal network in a 3D model*



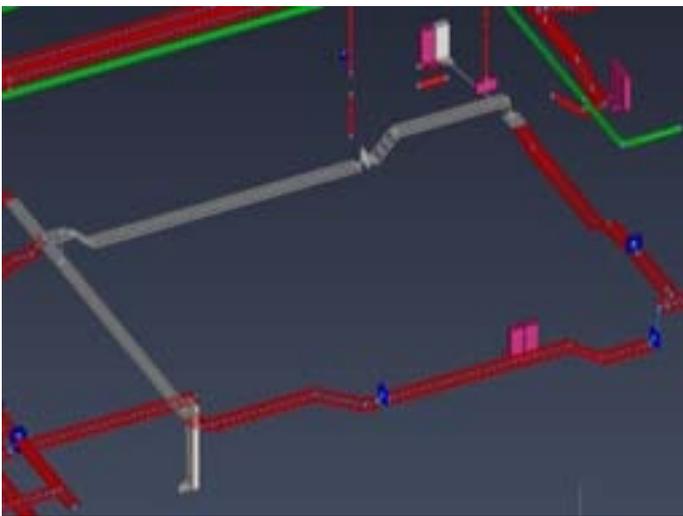
distances between different segregation classes when cables are routed using the same cable way.

Manual cable routing provides the user with several alternatives. The user can simply pick existing nodes from the model or create new ones. The new route is automatically computed to go through the selected nodes. This is a very useful function when the user

wants the cable to be routed on only one side of a plant for example.

Many options are available to check and visualize the result of cable routes. The user can select node points in the model and visualize all cables that go through the selected points or simply visualize the route for individual cables.

Pic. 5. Example visualization of the used route for an individual cable in the 3D model



Cable ID	Order/Source (class)	Cable head at	Connector	Cable tail at	Component	Length	DE	Size	Cable head status	Cable tail status	Cables
942H-1-01	Run cables	942H-01	CR00H_9362204	942H-01	CR00H_9362204	333.3 m	TOUGH-CAT 1-PT9	1	OK	OK	-----
942H-1-02	Run cables	942H-01	CR00H_9362204	942H-01	CR00H_9362204	86.9 m	PMSU 104-06	1	OK	OK	-----
942H-1-03	Run cables	942H-01	CR00H_9362204	942H-02	CR00H_9362204	179.2 m	PMSU 104-06	1	OK	OK	-----
942H-1-04	Run cables	942H-01	CR00H_9362204	942H-01	CR00H_9362204	80.3 m	TOUGH-CAT 1-PT9	1	OK	OK	-----
942H-1-05	Run cables	942H-01	CR00H_9362204	942H-01	CR00H_9362204	80.3 m	TOUGH-CAT 1-PT9	1	OK	OK	-----
942H-1-06	Run cables	942H-01	CR00H_9362204	942H-01	CR00H_9362204	80.3 m	TOUGH-CAT 1-PT9	1	OK	OK	-----
942H-1-07	Run cables	942H-01	CR00H_9362204	942H-01	CR00H_9362204	80.3 m	TOUGH-CAT 1-PT9	1	OK	OK	-----
942H-1-08	Run cables	942H-01	CR00H_9362204	942H-01	CR00H_9362204	80.3 m	TOUGH-CAT 1-PT9	1	OK	OK	-----
942H-1-09	Run cables	942H-01	CR00H_9362204	942H-01	CR00H_9362204	80.3 m	TOUGH-CAT 1-PT9	1	OK	OK	-----
942H-1-10	Run cables	942H-01	CR00H_9362204	942H-01	CR00H_9362204	80.3 m	TOUGH-CAT 1-PT9	1	OK	OK	-----

## Cable route drawings and lists

The spatial information is automatically included for all cables, which makes it easy to visualize and list all the 3D spaces and areas that a cable has traversed.

The diagram creates labels for all intersections, bends, air jumps, etc. according to the named nodes, which are generated automatically.

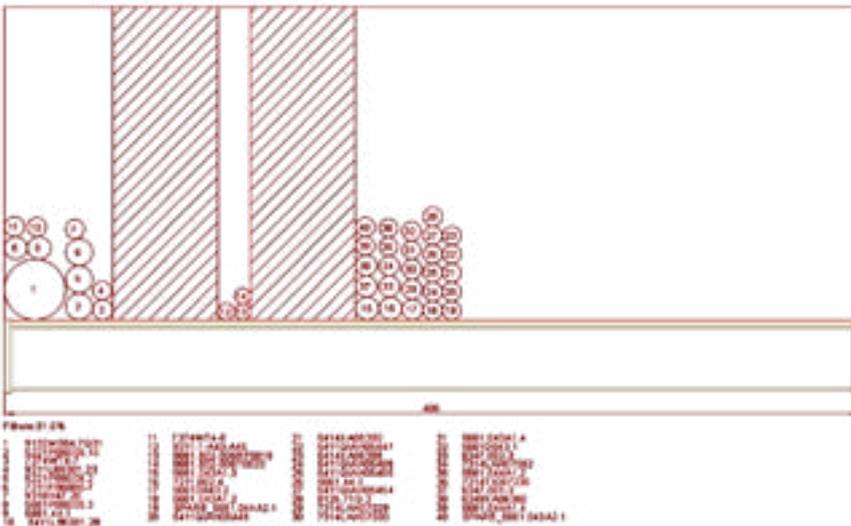
**Cross section views** can be generated for cable ways at the selected segment and selected penetrations (including sealed penetrations, for example Roxtec type).

It can be used for inspecting fill rates, cable assignment in segregation on the cable way or in penetrations.

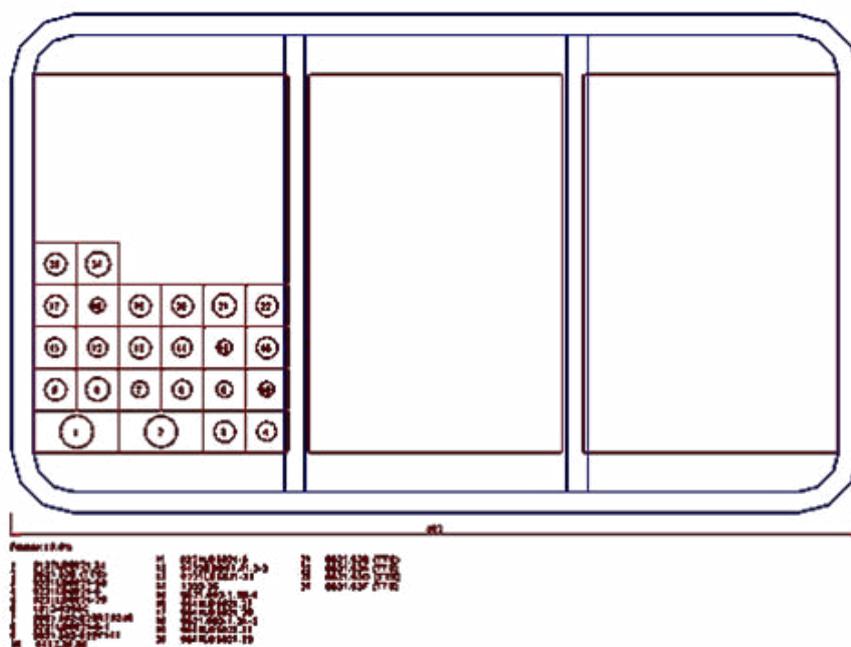
It is possible to attach the cross section views to Plant Modeller drawings to provide additional information for installation on site.

The system automatically produces cut length lists for cable pre-cut. The cable router also produces a floor-specific Cable Route Code Diagram that visualizes the cable ways and nodes in the nodal network on top of the plant layout. It can be used to help installation staff find the correct routes for pre-cut cables easily.

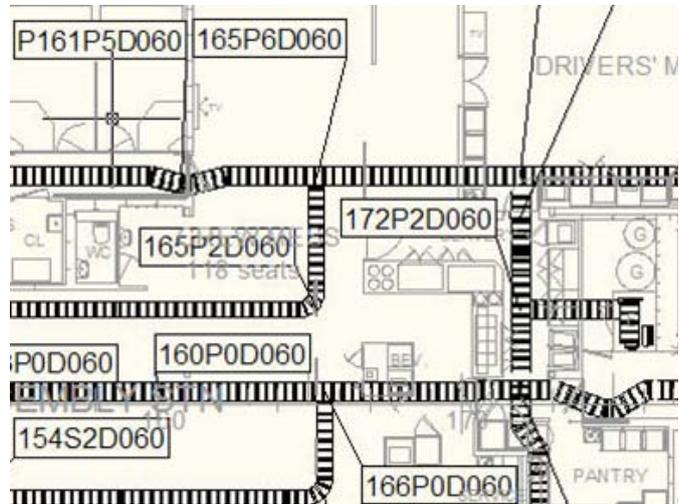
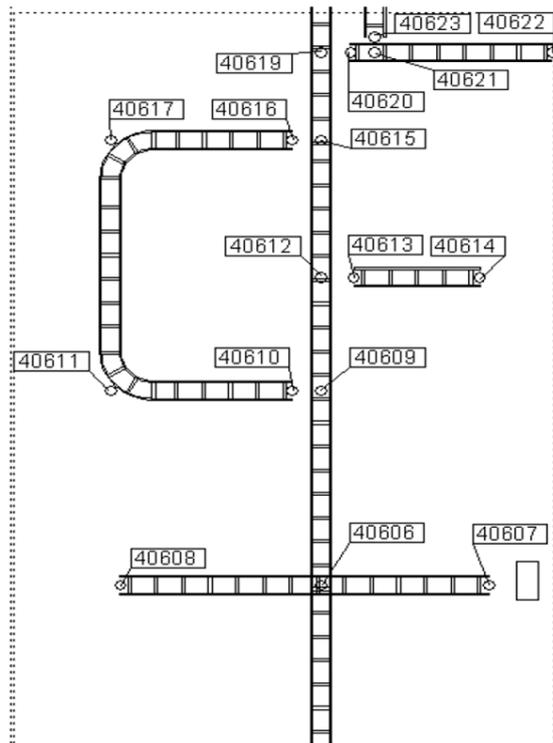
*Pic. 6. Example of a cross section view of a cable way*



*Pic. 7. Example of cross section view of a penetration*



Pic. 8. Examples of output installation drawings and listings for cable data



1	Head area	Tail eq	Tail compartment	Tail area	Length/m	Head length/m	Tail length/m	Head length from	Tail length on penetrati	Route compartments	Routepoints	R
2	022S	6222PCU1	R060204	022S	17	7	7	2	2	R060204	79S7D020	0
3	022S	9311A13	R060204	022S	19	7	5	2	2		not routed	
4	022S	9311A13	R060204	022S	19	7	5	2	2		not routed	
5	022S	6221PM1	R070101	013X	48	4	3	4	22	0101	74S7D010 72S7D010	0
6	022S	6222PCU1	R060204	022S	17	7	7	2	2	R060204	79S7D020	0
7	022S	9311A13	R060204	022S	19	7	5	2	2		not routed	
8	022S	9311A13	R060204	022S	19	7	5	2	2		not routed	
9	022S	6221PM1	R070101	013X	38	4	3	4	12	R060204:R060101:R07	P74S5D020 74S5D010	0
10	022S	6621.105S	R060101	013X	30	5	3	5	2	R060204:R060101	P74S5D020 74S5D010	0
11	022S	9311A11	R060101	013X	23	4	4	4	2	R060204:R060101	P74S4D020 71P3D010	0
12	022S	9311A11	R060101	013X	23	4	4	4	2	R060204:R060101	P74S4D020 71P3D010	0
13	022S	6221PM1	R070101	013X	38	4	3	4	12	0101	74S7D010 72S7D010	0
14	022S	6222PCU1	R060204	022S	17	7	7	2	2	R060204	79S7D020	0
15	022S	9311A13	R060204	022S	19	7	5	2	2		not routed	