FCS 2013
Finite Capacity Scheduling

USER’S MANUAL
Microsoft Dynamics NAV
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1. **Introduction to scheduling by using FCS 2013**

The result of the MPS and MRP activities is a list of articles to manufacture, in terms of products, quantity and time needed for their production.

FCS's aim is to plan manufacturing process activities and distribute workloads among the available and capable resources.

The result of this production “scheduling” is a new setting of the starting time and scheduled ending time for each production order. This will affect the components needed. Therefore, the availability of components will have to be synchronized with the new manufacturing times scheduled.

With Microsoft Dynamics NAV planning tools (including the Action Messages function) and FCS 2013 the planner has all the help he needs to carry out all his activities.
2. Integration with Microsoft Dynamics NAV

One of FCS 2013’s main features is to be a “perfect – complementary” product for Microsoft Dynamics NAV. In a well-structured implementation of NAV, the installation of FCS is as simple as “plug and play.”

Some of the common terms in Microsoft Dynamics NAV and in FCS are:

- Overlapping (send ahead quantity)
- Serial or parallel routing
- Internal or external resources (subcontracting)
- Tracking management
3. **Basic features of the scheduling program**

Finite Capacity Scheduling (FCS) takes into account some of the restrictions imposed by real conditions while scheduling production orders.

The basic planning parameters which FCS takes into account are:

- Set-up and run time for each operation.
- Move time between operations.
- Wait time.
- Overlapping between operations (“sent ahead quantity”).
- Serial or parallel routing.

The basic restrictions introduced by FCS are:

- Actions prior to the present cannot be scheduled.
- The work in process limits the real capacity of resources.
- An operation can only start when all required components are available.

FCS reads the follow-up information in Microsoft Dynamics NAV, linking orders with purchase orders and finished product orders with half-finished product orders. This relationship exists through the Routing Link Code field.

POs are considered in a consecutive order, mainly established by the due date, which means that the most urgent orders will be scheduled first.

When load restrictions by resource are in conflict with PO sequence restrictions a basic interference will be displayed as an inactivity time interval in the resource’s queue.

**Field Capacity**

When dealing with a value higher than “1” in the Machine Center card in NAV, the “capacity” minutes are multiplied by the value of the “capacity” field.

Hence, the scheduled operation period for the PO’s in this Machine Center is reduced proportionally.

Note: The concurrent capacities of all PO Routing Lines for these machines must have the same values.
3.1. Techniques to improve scheduling

Operations insert whenever possible.

The first thing FCS does is to locate the inactivity intervals (blank spaces) to place the operation being set, taking into account the corresponding resource saturation.

Using alternative resources (when defined).

The greatest potential for improved planning in plants lies in the use of alternative resources. FCS follows the criteria of load balancing between equivalent machine centers (EMC).

An EMC is a group of machines with the same quantitative and qualitative capacities.

In order to obtain well balanced planning a good definition of the EMC is very important.

Using these techniques FCS makes production plan proposals. Based on these proposals the planner can use the sophisticated graphic tools to make changes in the plan, tailoring it to the actual situation at the plant.
4. **The primary sequence**

The routes followed by POs are displayed in blocks. In each block the basic reading order is by starting date. The order and meaning of the blocks is as follows:

- **Started operations.** Operations with released orders and some output quantity. They are allocated to start from the last output journal time, and for the remaining quantity the same manufacturing rate is assumed. Usually there will be one operation per resource. However, the program accounts for the fact that one machine center can have several operations started and interrupted and only one of them actually in the manufacturing process.

- **Frozen operations.** Operations set by the planner in a previous plan. Setting an operation means that FCS will not change its Machine Center assignment, its queuing sequence or its starting time.

- **Stable operations.** Operations which have been set inside the stability horizon of a previous schedule. FCS marks these operations when saving the plan.

The following group is ordered by granule number, granule field (this will be explained in a following point), state and starting date & time.

- **Granulated operations.** Operations belonging to planned, firm planned and released orders, and not belonging to any of the previously mentioned groups.
5. **Job date and WIP planning**

The algorithm of FCS is developed in Visual Studio .NET and uses Microsoft Dynamics NAV job date as the current date.

The starting time of the planning will be defined in the fields “Planning date” and “Planning time”. If these fields are not set the system will use the NAV Work date. This point is important since it is one of the limits of the PO to be scheduled.

FCS always works with “moments.” The date, hour and minute define the moment. Times elapsed are, therefore, defined with to-the-minute precision.
6. **Resources without capacity limits & subcontracting**

FCS always programs the loads of machine centers.

All machine centers defined in the routing operations associated with POs are considered restrictive resources.

Non-critical resources for programming must be defined as work centers in routes and **must not have any machine** center associated with them.

One example of the above is subcontracting.

The most common subcontracting is the one with a non-known capacity, and the relationship is based on the lead-time (manufacturing time).

In this case neither the setup time nor the run time will be specified. Lead-time will be defined as move time.

FCS will consider the interference created by the PO in the plan sequence but not the capacity limitation of the resource. There won’t be a graphic bar to represent the work centers.

The rest of the non-critical internal resources must be defined in the routing and work center as well. And it will not have any associated machine center.
7. Equivalent machine center

Resources with the same qualitative and quantitative capacities are considered equivalent. FCS distributes the workload among them.

When defining a group of equivalent machines they should all be associated with the same “Work Center,” which should be codified on the routing line.

The operations assigned to a “Work Center” on the route will be distributed in a balanced way between all the Work Center machines at the time of sequencing.

The operations which are assigned to a Machine Center shall always remain in the work queue of this Machine Center, unless manually moved using the Drag & Drop feature.

When FCS locates a work center in the PO routing line it seeks to locate associated machine centers. If no associated machine center is found the work center is considered a resource without a workload limit.

If only one associated machine center is found that machine center is set exactly as if it had been defined directly on the routing line.

If several associated machine centers are found FCS distributes the workload among them.
8. **The work-in-process influence**

The system reserves capacity for work-in-process, taking into account that it involves a permanent connection with events taking place in the plant. Plant managers will have to complete production plans in terms of quantity, quality and time. However, things never happen at the exact time they were scheduled to. To plan the production in a consistent way with real conditions it is important to know the plant’s real status.

Therefore, the higher the frequency of data collection from the plant, the better plans will be. FCS reads the details of the production register entered through the NAV Output Journal.

In the WIP zone there are two the kinds of operations: started and non-started. Started ones have some output quantity registered. Non-started are released orders with no quantities registered.

The time for the remaining quantity of the started orders is calculated according to the rate of the quantity registered.

The time for the non-started operations is the time defined in the plan, taking into account the previous workload of the machine center.
9. The arrow of time

To explain the planning activity and the graphic representation of moments and elapses of time we need some conventions.

The set-up and running processes of an operation are continuous events. A horizontal line or bar can represent an operation start and ending. A confirmed or planned operation is a “moment event” and is represented by the left and right vertical lines outlining the bars of the operations.

The arrow of time must be drawn from left to the right. Moving a planned operation to the right means that the planned moments are moved up.

It is important that the system date and Microsoft Dynamics NAV working date be synchronized.
10. **Colors**

The color of the bars in the Gantt graphic can be defined on the group of products form. There are 93 colors defined, coded from 1 to 93, distributed as shown below. All POs related to the same item group will have the same color.

If no color is defined for a product group, FCS will assign one.
11. FCS Setup

In Microsoft Dynamics NAV, classic client, FCS Setup is integrated into the “manufacturing” menu.

In the role tailored client, FCS Setup is integrated into the menu: Departments -> Administration -> Application Setup -> Manufacturing.
The FCS Setup option opens the Setup window, which contains two tabs: General and Advanced.
In role tailored client:

The meaning of each of the parameters is:

**Planner**

FCS supports several concurrent planners, each one planning a work center group.

There cannot exist routings with operations belonging to work center groups associated with different planners.

To add a new planner, go to the “User Setup” table, select a user and enter a value into the “Work Center Group Code Filter” field. For example “1”, “1|2|3” or “<>4”. Log into Microsoft Dynamics NAV with this user and a setup register will be created for the planner.

If a planner is not assigned to a work center group it means that it is possible to plan all the work centers.

**Operation adjustment**

There are three options:

- No adjustment
- Final operation adjustment
- Due date adjustment
**Final operation adjustment** and **Due date adjustment** prevent waiting times among operations on the same PO in an effort to synchronize all the operations in the bottleneck.

The logic of the program at this point is:

- The POs are programmed one by one.
- When all the operations of the PO have been located in a work center, as per the criteria of resource saturation, the operation adjustment parameter must be checked.
- If any adjustment is selected the operations are moved to the right in order to adjust each one to the following one, as per the PO sequence.
- If **Due date adjustment** is selected, the ending time of the last operation will be adjusted to the PO due date.
- The “adjustment to last operation” option causes “blank spaces of time” in the machine centers that are placed before a machine center, which causes bottlenecks. Operations are better synchronized and the level of stock of intermediate products decreases.
- The “Due date adjustment” option is used when an order is planned to be finished before the due date. Every operation in the current order is moved up to be adjusted to the due date. In some cases this action cannot be done because an existing order is placed at the same time and does not allow an exact adjustment. This option causes a decrease in the inventory level of finished goods.
- It must be taken into account that a Safety Lead time can be defined in the item card. This will make it possible to move up the order planning in order to finish earlier (Due date – Safety lead time). If the product has been assigned with stock keeping units the system will take as the Safety lead time that defined in the Stock keeping Unit Card.

Note: the “Fix PO” function is not available when using “Due Date Adjustment.”

- If the “no adjustment” option is selected all machines will be programmed saturating resources criteria.
- **FCS Path (only classic client)**

Before starting FCS for the first time the exact location of the FCS.exe file must be written. The last word of this path must be the “FCS.exe” itself.

**Planning horizon (days)**

FCS will only plan production orders that are supposed to start within this horizon. The horizon is calculated in calendar days from the Microsoft Dynamics NAV current work date.
Stability horizon

FCS calculates the plan trying to meet every PO due date. If the planner makes manual changes to the plan the next time that FCS calculates the plan the previous manual changes will be ignored.

To keep the manual changes in the plan a stable horizon must be defined. FCS will respect the sequence and resource assignment of the operations that fall into this stable horizon.

Outside the stable horizon FCS will evaluate alternative machines for each new or existing operation. **It makes no sense to make manual changes outside the stable horizon unless the PO is manually fixed.**

When FCS is started and has stable orders from a previous plan, the new incoming orders will only merge with the current non-stable orders. However, the new operations can merge with the stable ones if they do not affect the planning moments of the stable operations.

A sequence of stable orders means that the program will not change the sequence or its assigned machine center. But the planned moments of those orders will “float” depending on the execution time of the released orders.

Capacity horizon, starting hours and ending of shift

FCS uses the same calendar as Microsoft Dynamics NAV. The extension of this calendar is defined by the Capacity horizon.

Sometimes when programming forward there are operations that must start or end beyond the capacity horizon. For these operations FCS considers the capacity defined by the **shift starting time** and **shift ending time**, seven days per week.

Security Margin (days)

FCS displays the status of production orders by their due date.

If the planned ending time is later than the due date operations are shown in red. If it is within the security margin operations are shown in green. If it is exceeds the security margin, but is still before the due date, operations are shown in yellow.

Only Firm Planned

If selected, only firmly planned production orders are included in the plan. Otherwise both planned and firmly planned POs are included.
Alternatives by route

There could be situations in which for every product there exists a different subset of machines available in the same work center.

This is defined in the standard route, allowing FCS to select the best machine for every PO.

Each machine can have different setup and run times for the same product.

Infinite capacity

This mode calculates the plan without restrictions per resource. Once calculated the required saturation and required capacity for the period of time are displayed. The concept is similar to the machine centers load form in Microsoft Dynamics NAV. The advantages are the graphical display and the fact that FCS studies the saturation per machine after the system has balanced the machines of each work center.

Update from FCS (only classic client)

It can be done automatically or manually.

If done manually each time the plan is saved from FCS one must go to “FCS plan update” in the manufacturing menu.

If done automatically a dialog is displayed in Microsoft Dynamics NAV while FCS is running. Every time the plan is saved from FCS changes will be applied automatically. When closing FCS the dialog box closes itself. However, the dialog box can be closed at any time, which triggers a shift into manual mode.

Restriction field and name of restriction field

This parameter allows the user to add a restriction to the system. The restriction can be the worker, a mold, a tool, etc.

This is a simple restriction because this criterion has no calendar or capacity numbers. What the system does it to check that there are no two orders using the same resource simultaneously.
Grouping field, grouping field name, grouping granularity (days) and group ending time granularity

Orders can be classified or grouped by technical feature. Also, a calibrator of impact for these groupings (grouping granularity) can be established.

The grouping techniques for the orders allow for improved productivity by optimizing change times. However, these techniques have a negative effect on the delivery lead date and the “in progress” products stock. The calibrator is the tool that the planner uses to increase or decrease the grouping and its impact.

The advisability or not of using alternative resources inside the groupings (group ending time granularity) can be calibrated. The planner can decide not to break a group even if there are alternative machines available (high granularity). The use of the alternative machines can also be maximized (low granularity), obtaining parallel sequences of grouped operations.

When this type of programming is used some tools are added to display the resultant groups.

Planning Date and Time

With these two parameters it is possible to create a schedule with the minimum starting moment in the past or in the future.

Ending time granularity (minutes)

This parameter affects the evaluation of alternative machines. FCS will assign the operation to the machine which will finish soonest. If the difference between two alternative machines is less than the ending time granularity the operation will be planned on the machine with greater priority.

Due Date Simulation

When this flag is set information related to all manufacturing items, routings and material billing is sent to FCS. This activates the “due date simulation” function in the FCS menu.

If the flag is not set only the data on those items involved in production orders is sent to FCS. Material billing is not sent to FCS. This will speed up the start-up of FCS 2013, especially if the database contains a high number of items and billing for materials.
12. Starting FCS

In Classic Client, select the FCS 2013 label from the manufacturing menu. In RTC (Role Tailored Client) select FCS 2013 from the menu Departments -> Manufacturing -> Execution.

At this point the system checks the consistency of the data. FCS can't be run if there are PO routing lines with missing work or a missing machine center. Nor can it be run if there are operations missing in the routing.

After verifying these conditions the system writes to a file ("Fcs.in") the FCS data needs and starts up the application. Then a series of functions are performed automatically. These functions load the calendar in the computer memory and the plan is recalculated and ready to be displayed. This process is performed once per session.
13. **Session start-up**

When FCS is started it performs the following processes:

1. **Reading of capacities**

   It creates the calendar of every machine center defined in Microsoft Dynamics NAV. It creates a map of the future capacity in the memory of the client computer.

2. **Restoring the plan**

   This function loads and calculates the plan and builds an image of the plan in the local memory.

   It reads the selected production order operations with their previously planned dates.

   The selection of the operations depends on the only FP parameter (firmly planned) and on the Planning Horizon (days) parameter.

   If the option *Only FP* is not activated then both planned and firmly planned orders are read. If the option is active the planned orders are not processed.

   Only the orders with starting times before the planning horizon are selected.

   The sorting order when reading the operations is explained in “Overview: The primary sequence.”

3. **Re-calculating times**

   This function adjusts the planned starting and ending times of the operations taking into account the current situation of the plant (released orders) and manufacturing conditions.

   When this process ends the program is ready to show the plan and the user can begin working with it.
14. **Information flow**

Before accepting a plan, a simulation can be done. Every change made in the plan affects only the image of the plan that remains in the memory. It will only have an impact on the data in NAV's database when it is saved.

If the result of the change is not satisfactory the plan can be restored from the Fcs.in file. This Fcs.in file is created when running FCS from the menu in Microsoft Dynamics NAV.

These are the information flow details:

- **Start FCS from NAV:** creates new Fcs.in file, overwriting the existing one if any. Fcs.in contains all data required for FCS order to calculate the plan in the local memory.

- **Save the plan:** creates a new Fcs.out file, overwriting the existing one, if any. Fcs.out contains machine assignation and calculated plan times, operations segments (if this functionality has been used), and calendar movements modified inside FCS. There is also a mark for stable operations (the ones inside the stable horizon)

- **Restore the plan:** calculates the plan again in the local memory from the original Fcs.in file. This is useful if the planner wants to discard the changes and start again.

- **Update FCS (periodic activities):** updates the data of the plan saved by Fcs as per the file FCS.out
15. **The programming window**

- Introduction to Gantt graphic
- Operation data
- Production Order data
- Right button functions
- Drag and drop feature
- Most delayed orders area
- Resources saturation area

15.1. **Gantt Graphic**

The window is divided into three areas: Gantt graphic, most delayed operations area, and load by resources area.

The Gantt is the working zone for the planner. It displays the workload in each machine center, the production orders to be processed, the interferences and the gaps between operations.

This area allows drag-and-drop.

One can drag the graphic to the right and left to see a period of time before or since, and use the wheel button to zoom.

On the left side of the Gantt graphic area the code of the machine center is shown, which is used as an identification of the graphic’s lines.

Looking at the graphic itself, there can be blocks/bars limited by two small, red triangles, which denote that there is some work in process in those machine centers.

The color is defined in Dynamics NAV in the form of product groups.

To the right there color blocks. Each block represents an operation of a production order.

The color is set up in the item form. To see a label with the PO codes and the operation in each bar, go to the “View” box at the bottom of the window and select “View POs.” Otherwise, select the item, or nothing.

In the bottom left corner of the window you get a period selector in NAV’s style.
15.2. **Operation data**

You can see the operation data by clicking on bars.

![Operation data window](image)

This window can also be opened through the options when right clicking on a Gantt bar. (Option data operation).

The meaning of most of the tabs in the window of the operation data is the same as in the Microsoft Dynamics NAV program.

Find herewith explanations of new fields.

**General tab**

**State**

**PL:** PLANNED. Operations belonging to planned orders.

**FP:** FIRM PLANNED. Operations belonging to firm planned orders.

**RL:** RELEASED. Operations belonging to released orders.

**Machine load order**

This is an internal field to maintain the sequence in each resource.
Elapse time

“Total programmed time” means the working time only. “Elapse time” includes night, weekend, and also other non-productive times.

Time (moments) Tab

Start/end on release

These two new fields are prepared to keep track of the planned time at the moment when the order status is changed to “released.”

Once released the scheduled times (moments) will change every time FCS recalculates the plan. The planner might like to save the times scheduled for the manufacturing of the orders.
There is also information indicating if the operation is fixed or not.

**Restrictions tab**

This tab shows the reason why the operation cannot begin earlier.

The meaning of **current time** (or present time) is obvious.

The **Minimum Start by Order** refers to the restriction imposed by the sequence in the routing order.

The **Minimum Start by Resource** refers to the restriction imposed by the current load of the machine center.

**Microsoft Dynamics NAV’s Minimum Start time** indicates the restriction imposed by this new field on the routing line. Its meaning depends on the criteria used on its manual or automatic update.

**NOTE:** The fields “Minimum Starting Date” and “Minimum Starting Time” on the “Production Order Routing Line” table allow for the setting of restrictions at the start of operations. These fields can be manually set up by end users or can be written by C/AL code into Microsoft Dynamics NAV.

The **Minimum Starting By** restriction informs us about the restriction imposed by the current load of this restriction. This field will inform if the operation has a restriction assigned, and, if this is the case, it will show which one.

**Subassembly end time** means the date when all subassemblies (produced or purchased) are available to start the PO.
15.3. Production order data

By double clicking on bars (or through the menu that appears when right clicking), the data of a production order can be seen.

The meaning of the data in the general tab is evident. The operations tab shows the scheduling details of each operation of the order:

(TOT) Total process time. It is calculated as the preparation time plus the running time. It may not be equal to the difference between the starting and ending times because the system takes into account the efficiency defined in the machine center card and the non-working time.

15.4. Right button functions

15.4.1. Mark PO

By placing the cursor on a certain bar, right clicking and selecting the Mark PO option, every operation of the production order selected is highlighted and labeled.

The tracking of the sequence of each PO can be done by using the option “preceding operation by number” and the “next operation by number”.
The Select tool placed in the bottom of the screen will quickly find a specific PO or operation. The selected bar or bars in the graphic become highlighted.

15.4.2. Setting a PO

Setting an operation

Upon running this command the operation selected is “set” for a determined date and time which the user may modify in a dialog box.

The assignment of the operation selected is also attached to a machine center.

There is a function to eliminate this action.

This function is not available when using “Adjust to due date” or when using the “Plan-in-sequence” mode.

When executing this action the operation will start on a certain day at a certain hour, also setting the machine. All the previous operations will also be set in the PO.

Consequently, if the selected operation was already set, the inverse action will be carried out, that is, the operation will be unset and all the following operations in the PO will also be unset.

15.4.3. Go forward to the maximum

The selected PO is scheduled to be executed as soon as possible.

This means that this PO is scheduled after the moments that its subassemblies constraints impose, after the Microsoft Dynamics NAV min. start time, and never before the Work Date.

The launched POs whose beginnings are scheduled for before the Working Date are not affected by this action. It must be taken into account that the whole PO is brought forward, not only the selected operation.
15.4.4. **Split/Group PO**

The Split PO action is used to repeat the quantity of an operation in “n” operations. Each of the “n” operations will process a partial quantity of the PO. At the same time it is possible to indicate the overlapping quantity for each of the sub-operations.

If an operation is already split, it is possible to group it again.

It is also possible to fix the resultant sub-operations.

15.4.5. **Change Operation Times**

This option allows the planner to manually change the preparation, execution and overlapping times.

This is very useful when several operations of the same item are together in such a way that it is possible to decrease or to delete some of the preparation times.

15.4.6. **Adjust to ending operation and adjust to due date**

These options allow one to adjust a PO to either the “ending operation” or the “due date.”

15.4.7. **Reset sequence**

For a resource being planned in sequence by a characteristic, this option allows one to reset the sequence and start from that one.
15.4.8. **Eliminate restriction**

There are three options:

<table>
<thead>
<tr>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>PO date</td>
</tr>
<tr>
<td>Operation data</td>
</tr>
<tr>
<td>Mark PO</td>
</tr>
<tr>
<td>Fix PO</td>
</tr>
<tr>
<td>Split PO</td>
</tr>
<tr>
<td>Modify times</td>
</tr>
<tr>
<td>Adjust to ending operation</td>
</tr>
<tr>
<td>Adjust to due date</td>
</tr>
<tr>
<td>Reset train sequence</td>
</tr>
<tr>
<td>Bring forward to the maximum</td>
</tr>
</tbody>
</table>

- **Eliminate restriction**
- By components
  - By minimum start
  - By restriction
- Preceding operation by number
- Next operation by number

By selecting any of them the restriction will disappear for the selected operation.

15.5. **The drag-and-drop tool**

This tool is for the planner to make changes to the plan manually while keeping its consistency. Therefore, some changes are not permitted.

![Gantt chart](image)

The order in the sequence of a machine center can be changed. Also, an operation can be changed from one machine center to another one if both machine centers belong to the same work center.

When left clicking with the cursor on one bar, the system looks for alternative machine centers. The color of the labels in the left column of the graphic are changed to yellow. The user can then see the alternative machines to which an operation can be moved.

Two new labels show the scheduled start and end times for the operation. While dragging the bar the system calculates these times "on the fly."

After releasing the mouse button the program checks whether the proposed change is possible. If it is not a warning message appears.

If the change is accepted the plan is recalculated, this process taking just seconds.
An operation cannot be moved to make its start prior to its preceding operation in the same production order.

An operation cannot be moved to a machine center which is not alternative.

There are two options for the Drag & Drop operation:

If an operation which is not the last in the production order is moved, the following ones are also moved in order to keep the order in the sequence. This happens only if the stated PO is selected in the combo-box in the lower part of the screen. If the PO is not selected in the combo-box the first move will be independent from the move of the following ones.

On the other hand, if one keeps the CTRL key pressed when making the movement the system won’t recalculate the best starting and ending time of the operation. Rather, it will leave it at the same place where the user dropped it, provided it does not violate any basic criteria.

There is also the possibility of using drag & drop over the lines of the “Operations in the resource” form.

15.6. **Most delayed area**

There is a menu option that provides details on the scheduled ending dates and also the delays. These are global ratios which make it possible to generally evaluate the plan.

But what the planner needs is to see at a glance how the manual changes affect those delays.

This is the delayed graphic function.

There is a check box at the bottom (View rates) to switch between the numerical view of the data on delays and the graphic view. Each red colored vertical bar has a label at the bottom which corresponds to a PO code, and the days of delay are displayed in the vertical axis of the graphic.

The scheduled delay is the difference between the due date and the scheduled ending time.

15.7. **Load by resource area**

This displays the saturation of the selected resource in regard to the selected time scale.
15.8. Additional information in the graphic window

There are two new information areas in the status bar:

Date and time of the current position of the cursor, and information regarding the operation to which the cursor is pointing.
16. **Menu options**

- View Plan
- Edit Menu

16.1. **View Plan**

16.1.1. **Individualized GANTT**

It is possible to select the view of the Gantt diagram by choosing one or several production orders, items or machine centers. The following window will open:

In the Gantt diagram only the selected operations appear colored. The rest are displayed in grey. It is possible to click on any block of the diagram. Then a dialog box
will open with all the information concerning the selected block. Therefore, it is possible to analyze only certain areas of the plan.

By clicking the Gantt button it is possible to change to a full view of the graphic.

16.1.2. **Gantt by restriction**

With this function we obtain a GANTT where we can see the operations distributed by restriction instead of by resource.

All the options that exist in this Gantt work in the same way as with the Gantt by resources.

16.1.3. **Analyzing the changes (Show changes/Compare Plan)**

This action displays a comparison between two different plans. In “Show changes” it is possible to compare the current plan with any previous plan prior to the last five changes (movement, individual adjustment of one operation…).

The second option is to compare the current plan with some other which has been saved previously (in a .pl file format) by means of “Save as...” from the “Update” menu.

On this screen there are three different tabs: one for the current plan, another one for the plan we use for comparing, and a last one for the comparison between both. There we can see the previous and current advances and delays. Finally, we can undo changes by means of the “Undo” button.

There is another possibility to undo the last change done without going through this intermediate screen, which can be done by pressing the “CTRL + z” keys at once.
16.1.4. Modifying the calendar capacity

There are two ways to modify the capacity: one graphic and the other with a dialog box.

The graphic is very intuitive; it is just a question of stretching towards the right or left side any of the (blue) existing capacity bars in the Gantt.

Through the menu option we obtain a table in which all the existing capacity intervals for the machine center and day selected appear. An existing capacity can be modified, eliminated or a new one inserted. Through the “copy” function it is possible to repeat "n" times the modification of capacity, for "n" days in the same machine, or on different machines.

16.1.5. Due date

This window is to analyze the results of the plan in terms of customer service. Usually this is the first window opened by the planner after the system calculates a plan.
The user can change the size of the form as well as the size of the columns. It is possible to exchange or hide the ones not needed at a given moment. FCS will save the visual configuration for successive executions. The information can be cut and pasted to external applications (i.e. Excel).

The meaning of most columns is obvious. FPT and DIF mean:

- **FPT.** This is the final scheduled time. It corresponds to the final moment of the last operation to process in every line of the production order.
- **DIF.** It is the difference between the FPT value and the due date.

### 16.1.6. Available to promise simulation

This option allows one to simulate the inclusion of a new order in the plan.

The program calculates the closest delivery time for the item and quantity introduced without having to move any existing PO.

The program shows the selected route and the simulated time of each operation and of all the subcomponents involved in the manufacturing of the product.
16.1.7. Print Gantt

Different selections from the temporary horizon of the Gant graphic can be printed. The whole graphic can be printed, just what is displayed on the screen, or a date range.

16.1.8. Graphs

Four different graphics can be displayed:
Saturation by resource and by different time periods (days, weeks, months, etc). For each period of time and machine the % of occupation is displayed.

In the remaining graphs we can see the PO grouped by number of days of delay, by resource, by item or by restriction.

16.2. Edit menu

16.2.1. Restore plan

This erases the current plan which is in the memory and restores the plan. In other words, it erases the manual changes made since the last session start-up.

The Open option from the menu will give one the option to restore a previously saved plan (.pl file).
16.2.2. **Save plan**

This creates an “output.file” with the plan as displayed on the screen. When returning to the execution using Microsoft Dynamics NAV the operations of the PO and some other data in NAV must be updated. This action is called *Calculate Cap. Need*, and it is placed in *periodic activities* in the FCS menu. The option “Save as...” allows one to save the current plan in a .pl file, which can be restored later to make comparisons.

16.3. **About ...**

This action will display information on the license.
17. Restrictions

- FCS programs machine centers, not work centers.
- FCS does not use concurrent capacities
- Definition of alternate machines. When FCS finds a work center code in a PO routing line, it performs the following procedure:
  - If the work center has no associated machine center, the operation is programmed supposing that the resource features an infinite capacity.
  - If the work center has only one associated machine center, the operation is programmed in this machine center. It has the same effect as defining the code of the machine center in the production order line.
  - If the work center has several associated machine centers FCS considers them all as equivalent machine centers and will try to distribute the work load among them.
- The Gantt graphic is easier to read if the PO code is no longer than 10 characters. The field operation number must be no longer than 4 characters.
- To avoid two orders with the same code it is a good practice to place a prefix in the code to distinguish the planned, firm planned and released orders.
- Simulated orders are not programmed. If you want to run a simulation involving new orders you can use the planned orders.