DELMIA

3DEXPERIENCE®

IMPROVE FORECASTING ACCURACY WITH COMPREHENSIVE TIME DISAGGREGATION

Forecasts are needed at almost every stage of a manufacturing or service enterprise. Although forecasts may have errors when compared to the actuals they predict, they are necessary for planning and scheduling operational tasks. Strategic and tactical plans are based on forecasts. If forecasts were unavailable, what would we manufacture? What would we ship? What would the customer demand? The forecasting process is a vital component in the life of an enterprise. Yet not all forecast requirements are identical.

For example, a business with thousands of SKUs faces the complex challenge of forecasting for each item. While the dazzling array of product choices is great for consumers, adding new brands, varieties, and packages can create chaos, even within the most robust supply chains. These businesses usually work with extremely detailed granular time forecasting. However, thousands of forecasts means a large amount of data has to be processed, requiring substantial power and computation time. Moreover, generating that many forecasts on a daily or weekly basis as opposed to monthly time-granularity multiplies the (already large) amount of data to process. This complex problem requires an advanced solution, one that can produce faster results with improved forecasts.

Time disaggregation is an alternative to granular forecasting, offering detailed results from high-level forecasts and providing an efficient and robust way to compute with quicker results. With time disaggregation, planners can spend their time focusing on high-value items, while using aggregated forecasting for the rest.

DASSAULT SYSTEMES

THE NEED FOR FORECASTS AT DIFFERENT TIME HORIZONS

Aside from whole organizations requiring different aggregated forecasts, forecasting time frames must also be considered, which often vary by department function.

- Sales may require forecasts that corresponds to its quarterly targets.
- Finance may require monthly forecasts that correspond with budgets.
- Logistics may require weekly forecasts that correspond to their management of inventory.
- Manufacturing may require weekly forecasts to support their scheduling functions.

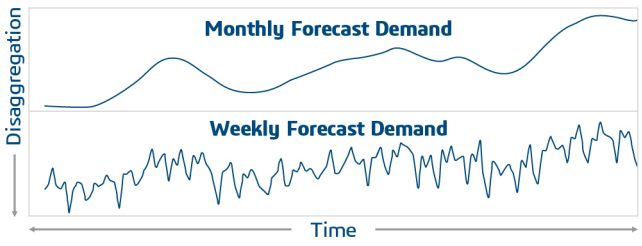
Considering these various time interval requirements, demand planners face the difficulty of how best to synchronize forecasts so that they are consistent at every time configuration, i.e., daily, weekly, monthly, etc.

THE DIFFERENCES BETWEEN HIGHER AND LOWER TIME AGGREGATED FORECASTS

Although historical demand data can be, and usually is, maintained at more granular time levels, it is also advantageous to generate statistical forecast at monthly time periods. The aggregation to a higher level of time will:

- reduce the noise of the data by cancelling random components of the historical information
- provide forecasts with accuracy higher than those based on more granular time levels
- require smaller volumes of data to be processed compared to directly generating granular forecasts, resulting in decreased computational load

The volatility of forecast demand for different time frames



Nevertheless, some forecasts require accurate estimates on a weekly and, at times, daily basis. The challenges encountered in disaggregating a monthly forecast to lower time levels include:

- Inconsistent days in a month across the year
- Weeks spanning more than one month
- Workdays vs full week filters
- Inclusion of holidays and facility closings
- Fiscal vs monthly calendar views

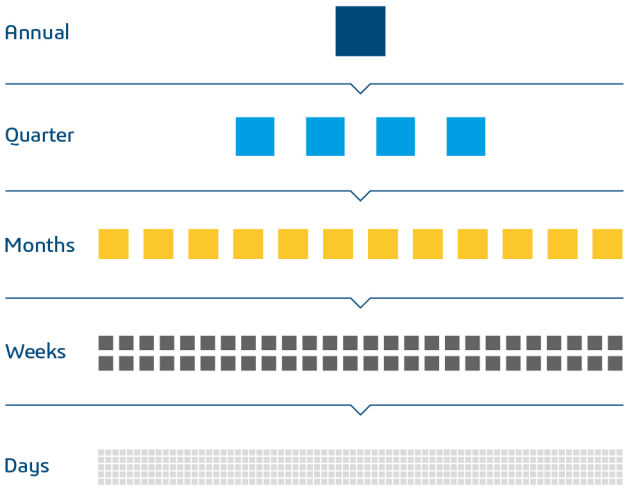
Still, there are patterns existing on a weekly basis that might not be forecasted correctly if only monthly data is used. A weekly forecast will also be able to drive weekly supply requirements more accurately for departments that rely on those time frames.

COMPREHENSIVE TIME DISAGGREGATION OF FORECAST AVAILABLE IN DEMAND PLANNER

DELMIA's Demand Planner (DP) is a comprehensive solution that is now able to generate accurate forecasts at multiple levels of granular time frames. This feature is a result of the tried-and-true robustness of its time aggregated models.

Although forecasts are usually provided and/or computed for aggregate periods, managerial and operational functions in the enterprise may require forecasts in more detailed time frames. It is therefore necessary to provide disaggregate forecasts that accurately reflect the dynamics of the calendar.

Converting forecasts from aggregated to disaggregated time periods



The Demand Planner disaggregation function provides the planner with several strategies for time disaggregation. These include options to:

- Disaggregate uniformly based on durations of periods
- Disaggregate considering calendar events
- Disaggregate based on concurrent weights
- Disaggregate based on history
- Disaggregate proportionally to existing values
- Disaggregate by copying when using average aggregation

KEY IMPROVEMENT OPPORTUNITIES

With the comprehensive time disaggregation function, manufacturers and supply chains can meet common industry challenges and improve the optimization of their operations. Here are some of the different areas and functions that can be enhanced with the Demand Planner:

Data Integration	Workflow Management	Focus	Demand Analysis
• Reduce time spent on data gathering • Increase planning consistency • Have all data available in one system	• Clearly define workflow and responsibilities • Trace who changed what and why • Ensure that relevant parties are involved (Sales, Finance, Marketing, Manufacturing, Logistics)	• Manage by exception: Flag products/regions that need attention • Automate processes that do not require intervention • Provide visibility to relevant data	• Closely monitor forecast accuracy and bias • Decrease inventory levels • Understand forecast value add • Disaggregation analysis

THE DELMIA DEMAND PLANNER ADVANTAGE

The DELMIA Demand Planner solution enables manufacturers to capitalize on vital improvement opportunities. Our time disaggregation function provides an advantage over competitors, with an advanced forecasting system to optimize operations and ensure efficient and reliable performance. These are some fast facts on the capabilities of the Demand Planner:

Configuration:

- Models 100% of the customer's reality in terms of product portfolio, sales organization, and customer hierarchies
- Exploits historical data to determine disaggregation factors
- Supports different data and time disaggregation strategies with automatic disaggregation
- Identifies product lifecycle stage and may apply different forecasting techniques for each stage
- Automatically classifies products based on their historical demand characteristics

Data preparation:

- Centralized data in one planning solution enables easy analysis
- Supports outlier detection (identification) and resolution proposals
- Keeps track of changes and filters notes by user, date, action, etc.

Statistical forecasting:

- Automatic AI-assisted state-of-the-art model selection with best-fit approach
- Leverages leading indicators for multivariate forecasting
- Integration with statistical platform R with high flexibility in statistical methods

Demand planning:

- Multiple sources of information are visible in one screen
- Flexible operations allow easy manipulation of the forecast
- Time series allows the calculation of multiple variables that assist with interpreting the forecast (Revenue, ASP, etc.)
- Easy to understand graphic visuals for impact on aggregate planning levels
- Uses up-to-date market data to minimize excess inventory

The workflow:

- Flexible workflow setup
- Data access restrictions based on roles
- Role-specific view allows focus on the necessary data and actions

Continuous improvement:

- Automatically identifies forecasts that deviate from expected behavior
- Identifies forecasting technique that adds most value
- Recalculates disaggregation factors
- Delivers better understanding of your market

WHY CUSTOMERS PREFER DELMIA DEMAND PLANNER

- Planners are provided with a consistent and synchronous forecast at all attribute levels and time periods
- Organizational functions are enabled to participate in the demand planning process without limiting the time frame of their input
- Workdays and facility closings are considered when generating demand forecast at granular time frames
- Accuracy is higher in disaggregating forecast from planning to operational time periods
- Forecasts can be generated to reflect granular time period patterns (days of the week, weeks in a month)

REAL-WORLD RESULTS OF THE DEMAND PLANNER

A customer of DELMIA had the requirement to generate disaggregated weekly forecasts in two different formats. One format is for Finance and the other format is for Operations. Both formats are based on an identical monthly forecast value. One format, referred to as the regular calendar, has split weeks where a weekly demand forecast can span two adjacent months. The second format, referred to as the fiscal calendar, has a 4-4-5 configuration where the first of 3 months has 4 weeks, the second has 4 weeks and the third has 5 weeks. The main differences between regular and fiscal calendars are:

- Fiscal calendars have no split weeks and all months end on the completion of a full week
- Weekly representations based on a monthly calendar are the accepted norm for most organizations

Demand Planner is able to flexibly disaggregate the monthly forecast into weekly forecast for both formats thus satisfying the requirements of the two departments. The fully automatic method finds the corresponding detailed periods in time from past cycles, and uses the observed distributions to dynamically disaggregate monthly forecasts to detailed periods of any format.

The **DELMIA Quintiq Demand Planner** analyzes historical demand and market intelligence to help you accurately predict demand and determine how to profit from it. Anticipate demand through improved statistical forecasting, collaborate more effectively with internal sales teams and external customers, and explore demand scenarios to increase sales. Revise forecasts immediately whenever market conditions change or new intelligence becomes available.

If you're ready to generate higher quality forecasts for better service, higher revenue and lower inventory for your business, visit us at 3ds.com/DELMIA to find out more.

Our **3D**EXPERIENCE® Platform powers our brand applications, serving 11 industries, and provides a rich portfolio of industry solution experiences.

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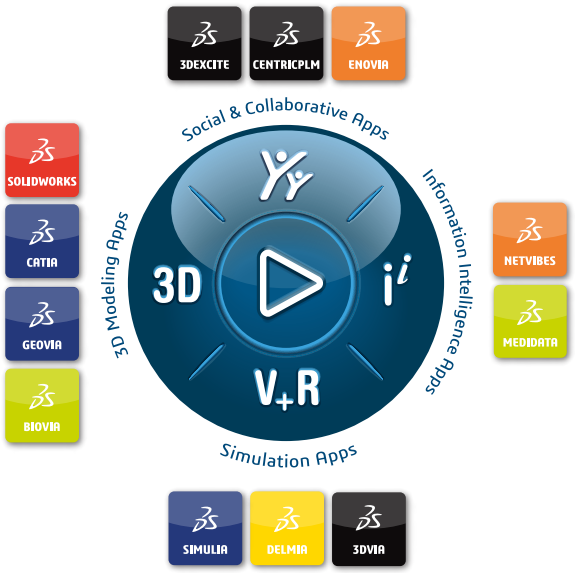

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