

# MPX Programming Library

## Software Specification



*Helping you build a better machine, faster.*

# MPX Programming Library

## Software Specification



SynqNet™



### Key Benefits

- **Easy to Use**  
Develop simple to complex motion and I/O applications in Visual Basic. There is no need to learn a proprietary programming language.
- **Reduced Development Time and Cost**  
Quickly develop simple to complex motion applications with fewer lines of code. Use one development environment to create Motion and I/O applications, as well as a GUI.
- **Reduced Time to Market**  
The MPX library is fully integrated into the Visual Basic .NET environment to leverage autocomplete and tooltip features for easy and intuitive programming.
- **Easy to Maintain**  
Any programmer familiar with basic programming will be able to understand and maintain the application code without any prior knowledge of the MPX.

### Motion and I/O Programming for Visual Basic .NET

MPX is a simplified motion programming library for the Microsoft Visual Basic .NET application development tool. With the MPX, you can quickly create multi-axis motion, I/O, and Graphical User Interface (GUI) automation programs.

### Supported Features

- Multi-axis servo, stepper, and I/O control
- Motion Types
  - Coordinated point-to-point (Trapezoidal, S-Curve)
  - On-the-fly motion modification
  - Coordinated Velocity Mode
  - Streaming point (PT, PVT, PTF, PVTF, Splines, Bessel)
  - Synchronized Start/End
  - Pause-on-path
- Real-time data recorder object
- Monitor internal drive variables
- Utility library including GUI controls
- TCP/IP functionality for remote access
- Multi-tasking environments
- Event-based error handling
- PID and PIV control algorithms
- Custom control algorithms with MechaWare

### SynqNet Platform Overview

Launched in 2001, SynqNet is a digital machine control network specifically designed to meet the flexibility, performance, and safety requirements of today's demanding machine control applications. Built on the 100BT physical layer, SynqNet provides a synchronous real-time connection between motion controllers, servo drives, stepper drives, I/O modules, and custom devices.

#### FAST

- Network bandwidth for servo updates up to 48 kHz
- Supports up to 32 nodes with 32 axes\*
- Over 16,000 bits of digital I/O and 1,000 points of analog I/O
- Real-time diagnostics over SynqNet

#### SAFE

- "Self-Healing" fault tolerant operation using ring topology
- "HotReplace" allowing replacement of node without network shutdown

#### PROVEN

- Over 350,000 motion axes installed worldwide
- Multi-vendor interoperable network

SynqNet®  
www.synqnet.org



Motion  
Controllers



Drives and  
Motors



I/O



Custom  
Nodes

## Overview of “Cut to Length” Application

### OBJECTIVE

Move a strip of material across a linear axis to a specified length and cut a specified number of pieces.



### MPX Form

### Reduced Development Time

Quickly develop a GUI and motion application with fewer lines of code.

### MPX Code

```

WindowsApplication1 - Microsoft Visual Basic 2005 Express Edition
File Edit View Project Build Debug Data Tools Window Community Help
Form1.vb Form1.vb [Design] Start Page Object Browser
Timer1 Tick
Public Class Form1
    Private Cutting As Boolean

    Private Sub Form1_Load(ByVal sender As System.Object, _
        ByVal e As System.EventArgs) Handles MyBase.Load

        zmp.Axis(0).SetScale(4000) ' encoder counts per inch

        zmp.Motion(0).DefaultSpeed = 12 ' inches per second
        zmp.Motion(0).DefaultAccel = 200 ' inches per second^2
        zmp.Motion(0).DefaultDecel = 200

    End Sub

    Private Sub Timer1_Tick(ByVal sender As System.Object, _
        ByVal e As System.EventArgs) Handles Timer1.Tick

        If zmp.SynqNet(0).Node(1).DigitalInBit(0) = True And Cutting = False Then
            Cutting = True
            For n As Integer = 1 To numPieces.Value
                zmp.Motion(0).Trapezoidal(length.Value, Mpx.MoveAttribute.Relative)
                MpxUtil.Motion.WaitForDone(zmp.Motion(0))

                zmp.SynqNet(0).Node(1).DigitalOutBit(1) = True
                MpxUtil.Thread.Delay(1500) ' 1.5 seconds = 1500 milliseconds
                zmp.SynqNet(0).Node(1).DigitalOutBit(1) = False

            Next
            Cutting = False
        End If
    End Sub
End Class
Error List
Item(s) Saved Ln 26 Col 64 Ch 64 INS
    
```

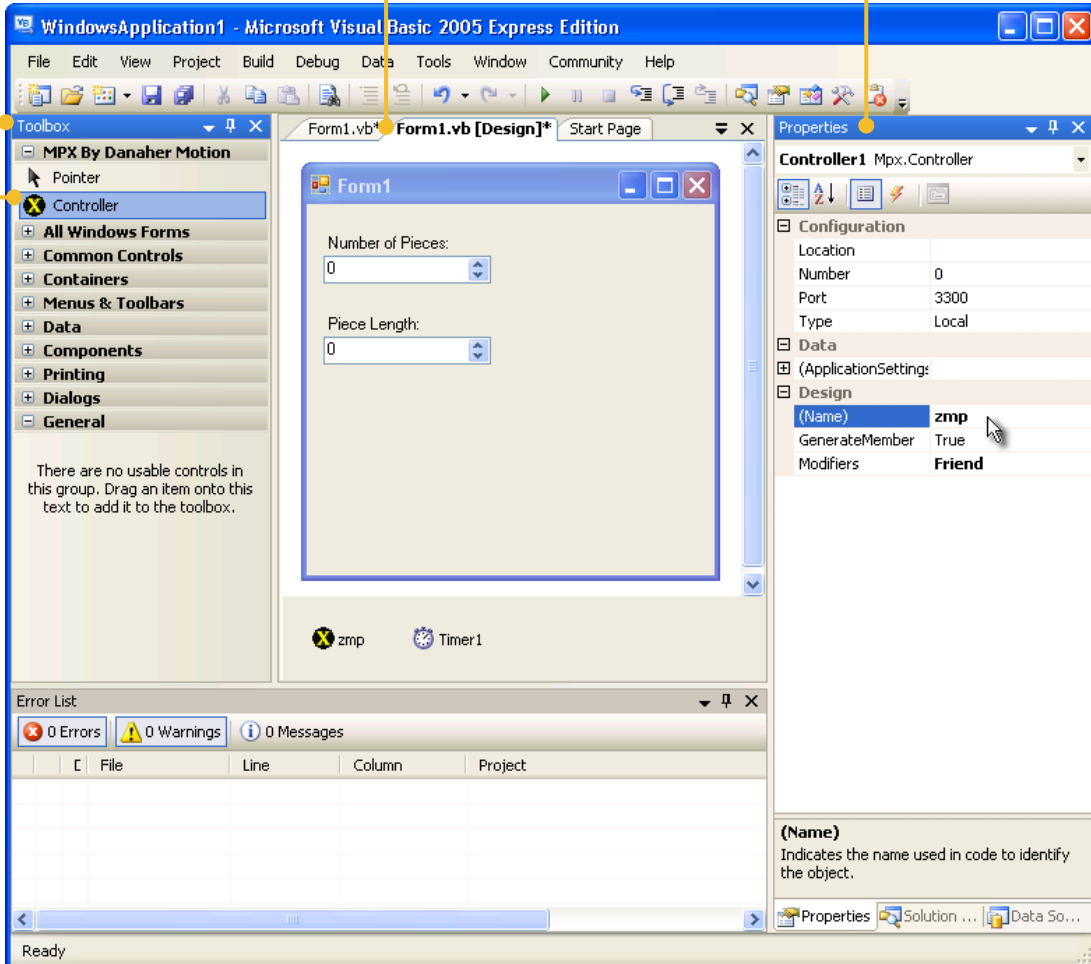
# Design the MPX Form

Double-click any object from the Toolbar or simply drag and drop it directly onto the form.

User-friendly tabbed interface to quickly switch from Design View to Code View.

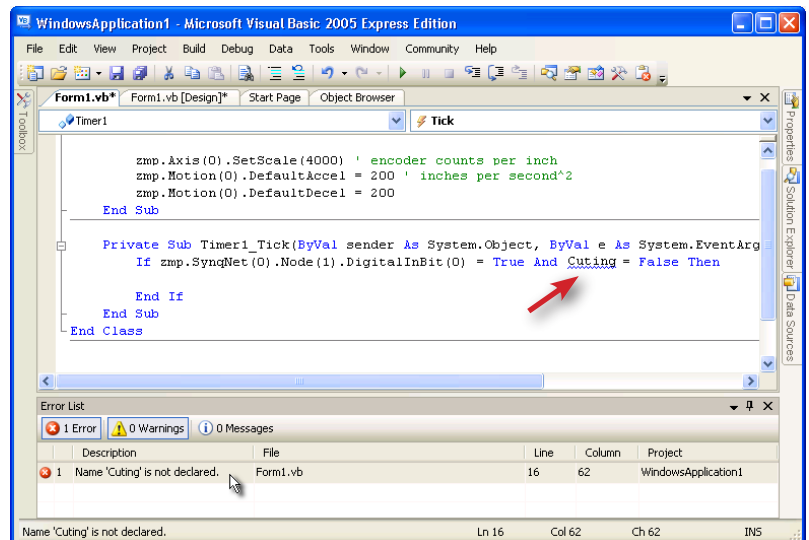
Use the Properties window to make changes to any form element, including MPX objects.

The MPX component is seamlessly integrated into the Visual Basic library.



## Built-in Debugging Feature

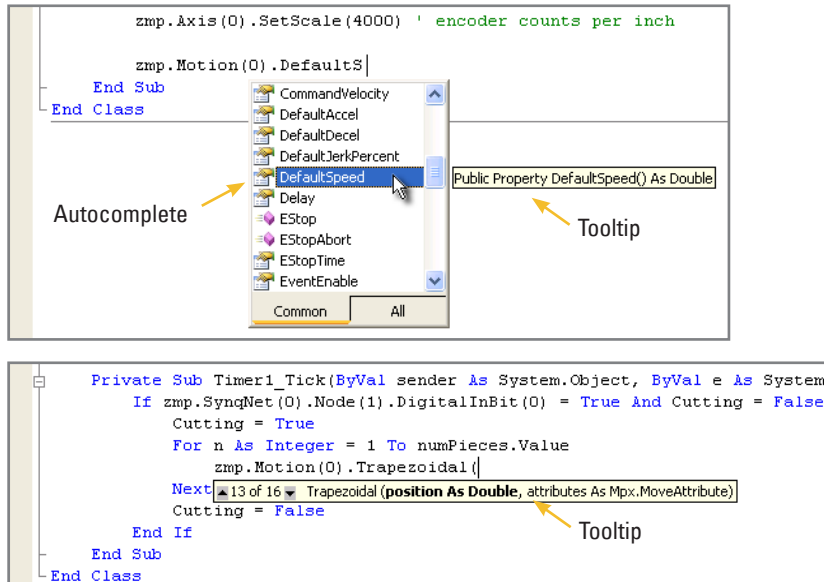
Take advantage of Visual Basic's built-in debugging capabilities to quickly troubleshoot code before compiling your application.



## Write the MPX Code

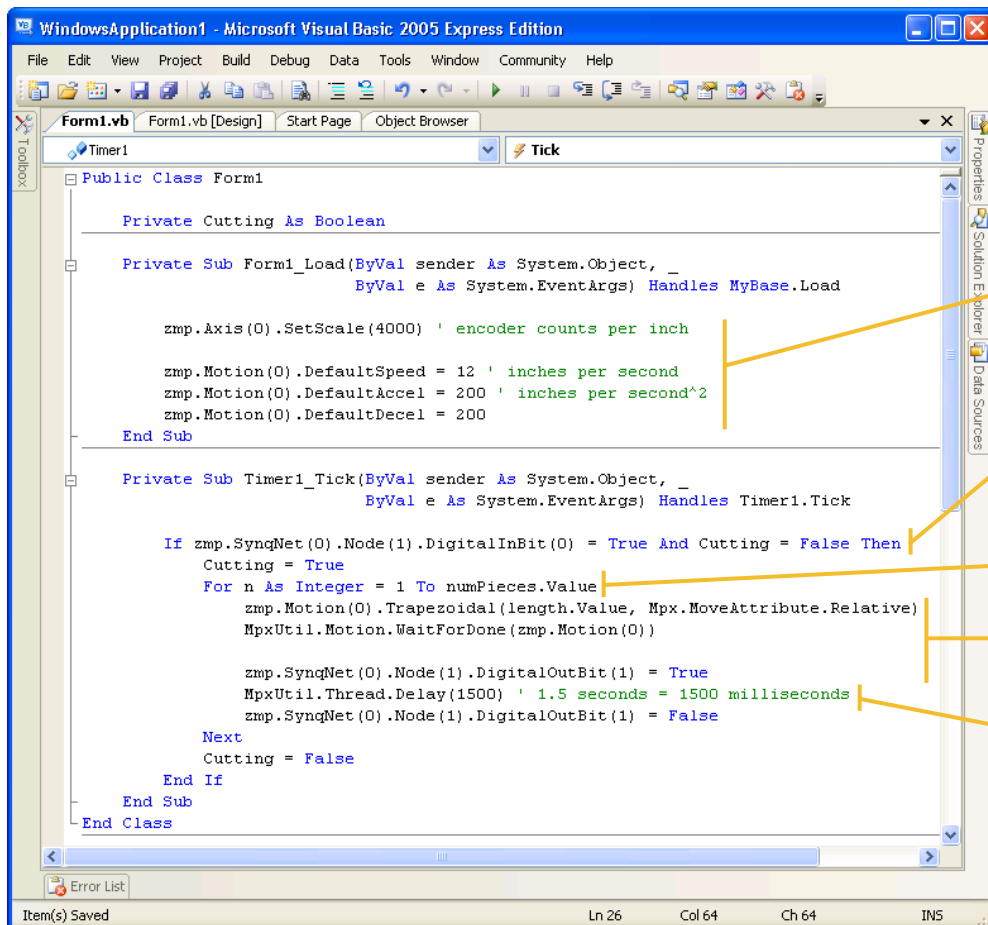
### Intuitive Coding Environment

Since the MPX library is integrated directly into the Visual Basic library, the autocomplete and coding tooltips make writing motion application code more efficient and intuitive.



### Easy to Maintain Code

Anyone familiar with basic programming languages can write and read motion applications. Users do not have to learn a proprietary programming language to write applications.



## **USA, Canada and Mexico**

Danaher Motion  
203A West Rock Road  
Radford, VA 24141 USA  
Phone: 1-540-633-3400  
Fax: 1-540-639-4162  
E-mail: DMAC@danahermotion.com

## **United Kingdom**

Danaher Motion  
Chartmoor Road, Chartwell Business Park  
Leighton Buzzard, Bedfordshire  
LU7 4WG; United Kingdom  
Phone: +44 (0)1525 243 243  
Fax: +44 (0)1525 243 244  
E-mail: sales.uk@danahermotion.com

## **Germany**

Danaher Motion GmbH  
Sales Office North  
Wacholderstr. 40-42  
40489 Düsseldorf  
Germany  
Phone: +49 (0) 203 9979 214  
Fax: +49 (0) 203 9979 3214  
E-Mail: iris.tolusch@danahermotion.com

Danaher Motion GmbH  
Sales Office South West  
Brückenfeldstraße 26/1  
75015 Bretten  
Germany  
Phone: +49 (0) 7252 97390 56  
Fax: +49 (0) 7252 97390 55  
E-Mail: kerstin.mueller@danahermotion.com

Danaher Motion GmbH  
Sales Office North  
Sales Office South East  
Kiesgräble 7  
89129 Langenau  
Germany  
Phone: +49 (0) 7471 62 23 23  
Fax: +49 (0) 7471 62 23 26  
E-Mail: ursula.koschak@danahermotion.com

## **France**

Danaher Motion  
C.P 80018  
12, Rue Antoine Becquerel – Z.I. Sud  
72026 Le Mans Cedex 2  
France  
Phone: +33 (0) 243 50 03 20  
Fax: +33 (0) 243 50 03 39  
E-mail: sales.france@danahermotion.com

## **Italy**

Danaher Motion srl  
Largo Brughetti  
20030 Bovisio Masciago  
Italy  
Phone: +39 0362 594260  
Fax: +39 0362 594263  
E-mail: info@danahermotion.it

## **Sweden**

Danaher Motion  
Box 9053  
291 09 Kristianstad  
Sweden  
Phone: +46 (0) 44-24 67 00  
Fax: +46 (0) 44-24 40 85  
E-mail: sales.scandinavia@danahermotion.com

## **Switzerland**

Danaher Motion SA  
La Pierreire 2  
1029 Villars-Ste-Croix  
Switzerland  
Phone: +41 (0) 21 631 33 33  
Fax: +41 (0) 21 636 05 09  
E-mail: info@danaher-motion.ch

## **China**

Danaher Motion  
Rm 2205, Scitech Tower  
22 Jianguomen Wai Street  
Beijing, China, 100004  
Phone: +86 10 6515 0260  
Fax: +86 10 6515 0263  
E-mail: chinainfo@danahermotion.com.cn

## **Japan**

Danaher Motion Japan  
2F, Tokyu Reit Hatchobori Bldg,  
2-7-1 Hatchobori Chuo-ku,  
Tokyo 104-0032 Japan  
Phone: +81-3-6222-1051  
Fax: +81-3-6222-1055  
E-mail: info@danahermotion.co.jp

## **Asia Pacific**

Danaher Motion (HK) Ltd  
Unit A, 16 Floor, 169 Electric Road  
Manulife Tower, North Point  
Hong Kong  
Phone: +852 2503 6581  
Fax: +852 2571 8585  
E-mail: victor.lim@danahermotion.com



[www.danahermotion.com](http://www.danahermotion.com)

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