Advanced Content and Calculation Sheets for Mechanical Design
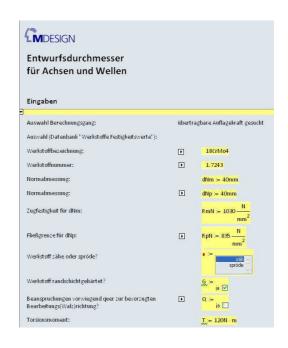
Mathcad calculation libraries today supply hundreds of standardized methods, formulas and reference tables for calculation tasks in almost all technical disciplines. Mathcad content and calculation routines give scientists, design engineers and product developers access to a huge variety of general technical and scientific fundamentals, which are indispensable for their work.

However, in addition to basic knowledge engineers require calculation and analysis tools, which are in line with the ongoing technical progress, and at the same time, represent the standards of ASME, ANSI, AGMA, ISO, EN, DIN and other specialized organizations. Beside operational conditions they today have to reflect sustainability aspects, quality standards and safety regulations.

MDESIGN with its widely used calculation libraries for mechanical design and engineering is dedicated especially to this task of disseminating state-of-the-art knowledge for mechanical engineering and design. Now also as an application to Mathcad, MDESIGN supplies its latest technical methods and procedures also to the large community of Mathcad users.

A Contribution to the Quality of Results and Procedures

Mathcad has been a preferred tool since many years for engineers for the development of individual applications. Large and complex worksheets and programs underline the outstanding performance of Mathcad technology. With **MDESIGN for Mathcad** users can now access a large and growing number of standard calculations and selection procedures for drive components and machine elements.

MDESIGN for Mathcad is a content base design tool, which combines the unique Mathcad functionality with the technical and scientific content of MDESIGN. Besides, the integrated database supplies valuable component data and physical characteristics. Property data of almost 200 different materials, which comes with the database, can be recalculated to temperature, size and shape of the individual component, which is to be dimensioned. The underlying empirical laws are well proven and have a recognized history as part of German certification procedures.

The worksheets support design engineers as well in dimensioning, optimization and verification as in the documentation phase. Representing national and international standards and technical guidelines they make an important contribution not only to the quality of the design results in respect to strength, safety and service life, but because of their systematic and transparent approach also to the quality of the governing design procedures and processes.

MDESIGN for Mathcad Encourages Team Building & Standardization

MDESIGN applications are not just programs, running on some input data. Instead, they are accompanied by a wide range of general functions and service options, which assist engineers with their daily jobs. Whether you need context sensitive help, direct database access, push-button documentation, you will get it, with Mathcad applications as well as with Original MDESIGN content. All modules and worksheets are designed in the same user friendly layout. Thus, even engineers, who do not work constantly with this tool, find their way into the calculation procedures and to a solution.

The success of MDESIGN to a large degree is due to the fact, that it promotes the implementation of consistent and company-wide knowledge bases for engineering design. And with their increasing acceptance and the number of standardized procedures and methods there is a chance for harmonizing team work and creating better interfaces across the whole company.

The Data Base caters for a large Number of Coefficients and Component Data

To a large extent technical calculations are based on empirical information like measurements, test results and damage patterns. Turned into tables, charts, and formulas with the help of mathematical procedures, the resulting algorithms and the governing coefficients form the framework of any calculation knowledge base. As the coefficients mostly are not constant, but dependant on many influencing factors, practical algorithms require a lot of assistance by tables, diagrams, further functional relationships and conversion factors. The MDESIGN service database supplies all this information.

Other very important resources for mechanical design are catalogs with property data of standard components and functional mechanical objects. Playing a central role in designing mechanical systems, their dimensions and characteristics have to be present at each design desk, and consequently, also in digital format, to serve computer aides calculation procedures. With MDESIGN for Mathcad design engineers obtain a powerful database with standard data for a large variety of design jobs.

MDESIGN for Mathcad: OVERVIEW OF BENEFITS

- ensures conformity to standards when dimensioning/selecting machine elements

- provides important mathematical and mechanical formulas and procedures for product design

- contributes to the standardization of calculation applications throughout the whole company

- creates high transparency in calculation procedures and documentation

- provides an unsurpassed interaction between users and calculation procedure

- allows quick and easy modifications and enhancements of the content

- is frequently updated due to user requirements and ongoing technical and scientific progress

- utilizes all the features and productivity gains of Mathcad and its ever growing functionality

MDESIGN for Mathcad

MDESIGN for Mathcad
Version 2012 – April 2012
Content of Worksheets

Material Data
Properties of 160 materials
Material properties according to FKM

Shafts and Axles
Notch factor grooved shafts
Notch factor reduced shafts
Notch factor splined shafts
Notch factor parallel key notches
Notch factor cross bored shafts
Torsion stress in a shaft
Design diameter for axles and shafts
Damaging equivalent strain with CL (F, T)
Damaging equivalent strain with CL (Stress)

Bevel connections and clutches
Tapered connections
Parallel key connections (Method B)
Parallel key connections (Method C1)
Parallel key connections (Method C2)
Non engaging clutch (Dimensioning)
Switchable clutch (Dimensioning)

Journals, Ball and Roller Bearings
Ball and roller bearings (with load spectrum)
Ball and roller bearings (without load spectrum)
Radial journals (Detailed calculation)
Radial journals (Simple calculation)
Axial journals

Springs
Belleville springs (static)
Belleville springs (dynamic)
Tension springs (static)
Tension springs (dynamic)
Compression springs DE (static)
Compression springs DE (dynamic)
Compression springs US (static, dynamic)
Torsion springs
Torsion bar springs
Elastic spring materials

Connecting Elements
Cross bolts (Examination)
Cross bolts (Fork Width sought)
Cross bolts (Pole Strength sought)
Cross bolts (Operational Factor sought)
Cross bolts (Pole Force sought)

Cross bolts (Bolt Diameter sought)
Guiding Pins (Examination)
Guiding Pins (Pin Diameter sought)
Guiding Pins (Insertion Depth)
Guiding Pins (Operational Factor sought)
Guiding Pins (Lever Arm sought)
Guiding Pins (Bending Force sought)
Tensile loaded bonded joints (Examination)
Tangential loaded bonded joints (Examination)
Torsion loaded bonded joints (Examination)

Bolts and Bolted Joints
Bolt calculation (Design)
Initially stressed bolt calculation
Bracket connection (Examination)
Bracket connection (Transmissable force sought)
Bracket connection (Diameter sought)

Tooth Systems, Gears
Spur gear- Examination of the geometry
Profile displacement of outer teeth
Belt contact drive
Synchronous belts
Roller chains
Cylindrical worm gear

Linear technology
Power screws
Linear guide (dynamic non-stationary)
Linear guide (dynamic stationary)
Linear guide (static)

Drive Design
Lift
Rack and pinion
Spindle drive
Conveyor belt
Revolving table

General Mechanics
Statically determinate beams
Buckling of rods
Hertzian pressure (Sphere/Sphere)
Hertzian pressure (Sphere/Plane)
Hertzian pressure (Curved solid/Curved solid)
Hertzian pressure (Curved solid/Plane)
Hertzian pressure (Cylinder/Cylinder)
Hertzian pressure (Cylinder/Plane)
Polar moment of inertia
Beam profiles
Design O-Ring

Licensing Conditions

With a single-user license of MDESIGN Mathcad the customer acquires the right to unlimited use of the worksheets and the database on a desktop PC.

A multi-user license permits the use of MDESIGN Mathcad sheets on as many computers as the license agreement allows.

The user is allowed to copy parts of the worksheets and use them in other applications. Copying and deploying complete worksheets and the database or database content is not allowed, neither for private use nor in a company or a University.

Through the purchase the customer acquires the right to call the hotline up to three times. Number of E-Mails to the hotline is not restricted. Answers are limited to technical questions, to installation problems and content development. Questions concerning standards and design applications can be made in writing, but there is no obligation for TEDATA to answer these queries.

Licensing Procedure

MDESIGN for Mathcad is available as a single user or multi-user license. Licenses can be obtained by Internet as a download.

To purchase the package, the buyer has to go to the shop and make the payment. Hereafter, he gets access to his customer account, from where he can download the software and his activation code.

License Fees

MDESIGN for Mathcad

English Version 2012

78 Worksheets

Single-User License	899 €
Hotline Service for 1 year	169 €
Consulting Services	89 €/h