

How to Use Technical Abbreviations and Acronyms*

Abbreviations

The shortening of technical words and phrases results in the creation of abbreviations which are widely used in technical writing, especially when the abbreviations are mentioned frequently within the textual content. The placement of a full stop after each shortened word is optional. Some abbreviations may even form new technical words:

qubit - qu(antum) + bit, where: bit - bi(nary) + (digi)t;

codec - co(der) + dec(oder);

Internet - internet(work);

radar - ra(dio) d(etection) a(nd) r(anging);

syborg - cyb(ernetic) + org(anism); etc.

Abbreviations of just a few letters are frequently used, as in:

dB - d(eci)-B(el), where Bel is named in honor of (Alexander Graham) Bel(l).

The International System of measuring units (SI) defines seven SI base units which are sufficient to derive all other SI units. Both lower-case and upper-case letter are used for the representation of measuring units and prefixes of multiples and submultiples of units, as follows:

SI base measuring units: m - metre (length); kg - kilogram (mass); s - second (time); A - Ampère (electric current); K - Kelvin (temperature); mol - mole (amount of substance); cd - candela (luminous intensity).

Multiples: Y - yotta (10^{24}); Z - zetta (10^{21}); E - exa (10^{18}); P - peta (10^{15}); T - tera (10^{12}); G - giga (10^9); M - mega (10^6); k - kilo (10^3); h - hecto (10^2); da - deca (10^1).

Submultiples: d - deci (10^{-1}); c - centi (10^{-2}); m - milli (10^{-3}); μ - micro (10^{-6}); n - nano (10^{-9}); p - pico (10^{-12}); f - femto (10^{-15}); a - atto (10^{-18}); z - zepto (10^{-21}); y - yocto (10^{-24}).

The periodic table of the chemical elements uses universally accepted shortened forms:

H - Hydrogen; He - Helium; Li - Lithium; Be - Beryllium; B - Boron; C - Carbon; N - Nitrogen; O - Oxygen; F - Fluorine; Ne - Neon; etc.

The double helix of the DNA - D(eoxyribo)N(ucleic) A(cid) is formed of A-T and G-C pairs, where the letters A, T, G and C stand for:

A - Adenine; T - Thymine; G - Guanine; C - Cytosine.

Catchy abbreviations are created by intentionally selecting technical terms that would result in easy to remember shortened forms which can be associated with common words:

ATLAS - A T(oroïdal) L(arge) H(adron) C(ollider) A(pparatus);

STEREO - S(olar) TE(rrestrial) RE(lations) O(bservatory).

Programming languages and software tools are also known by their abbreviations:

ForTran - For(mula) Tran(slator);

LabVIEW - Lab(oratory) V(irtual) I(nstrument) E(engineering) W(orkbench);

Matlab - Mat(rix) Lab(oratory).

Some well-known abbreviations originate from other languages:

ca. - a contraction from the Latin word *circa*, about;

ISO - from the Greek word ἴσος, equal.

Abbreviations are introduced to save writing space and reading time by making long technical terms easier to visualize and refer to, as in chemistry:

ACAC - ac(etyl)ac(etone);

DI H₂O - d(e)i(onized) water.

In taxonomy, abbreviations are also common, for instance:

sp. - single unidentified species; spp. - multiple species;

Solanum tuberosum L. - *Solanum tuberosum* Linnaeus.

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Acronyms

Acronyms are formed from the initial letters of distinct words in a phrase and can be considered as a subgroup of the more general term abbreviation. The placement of full stops after each initial letter is optional. Common acronyms are easy to pronounce and consist of a relatively small number of letters, for example:

AC - Alternating Current;
GPS - Global Positioning System;
ICT - Information and Communication Technologies;
IQ - Intelligence Quotient;
LAN - Local Area Network.

Numerous acronyms originate from other languages, like:

Q.E.D. - what was to be demonstrated, from the Latin phrase *Quod Erat Demonstrandum*;
SI - International System of measuring units, from the French phrase *Système International*.

Acronyms containing the initials of prepositions may optionally have lower-case letters or related symbols:

MoU - Memorandum of Understanding;
S&T - Science and Technology.

Lower-case letters are used for some universally accepted acronyms, like:

laser - Light Amplification by Stimulated Emission of Radiation;
ppm - parts per million.

There are many technical organizations and companies which are referred to by their acronym, like:

ACM - Association for Computing Machinery;
IBM - International Business Machines;
IEEE - (Aye-triple-ee) Institute of Electrical and Electronics Engineers;
IEICE - Institute of Electronics, Information and Communication Engineers;
NASA - National Aeronautics and Space Administration;
NIST - National Institute of Standards and Technology;
WHO - World Health Organization.

Some acronyms may have several different meanings depending on their intended use, for instance:

AU - Assumption University, and the abbreviation *Au* from the Latin word *Aurum*, gold;
ATM - Asynchronous Transfer Mode, as well as: Automated Teller Machine;
DSP - Digital Signal Processing, but also: Deep Space Probe.

Numerical digits can also be a part of an acronym:

4G - Fourth Generation.

Abbreviations and Acronyms in Technical Writing

The long name of a technical term should be given in full at the first mention with its shortened form in brackets after it. Tables and figures with shortened forms should have explanatory footnotes or legends. A list of abbreviations and acronyms could eventually be included in an Appendix whenever their number is substantial or they are a part of a classification scheme.

The authors of technical papers may introduce for convenience their own abbreviations and acronyms. The eventual acceptance by the readers of such new shortened forms would depend on the importance of the reported information and the pronunciation of the proposed letter configuration. The simplest and sincere delivery of a technical concept is most appreciated. Shortened forms improve the readability of complex texts but also require a certain experience to fully understand the underlying ideas. Therefore, abbreviations and acronyms should be balanced with the rest of the content in creating a scholarly publication which is not only informative but also satisfies some generally accepted aesthetic criteria of academic writing.